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2022 conference roundup

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FIRST POST-COVID CONFERENCE

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president's

BY GARY SCHRIFT

MESSAGE

Our first in-person Annual Conference since the pandemic began was a great success, and now that the flurry of committee meetings, networking events, and technical discussions have ended and we're all back at work, it's time to set some new goals and carry the momentum of our recent

by your staff and our organization's leadership.

Under the leadership of our Board of Directors, and Eric Johnston, our outgoing Board Chair, our committees have seen one of their most productive years yet. In the international arena, IIAR has established close ties with regions where ammonia refrigeration and the global cold chain are growing. We'll continue

IIAR has formed several new task forces to advance IIAR's influence in the regulatory world and make our standards and other technical material more accessible and useable than ever.

My priority this year will be to make sure that these programs continue to make gains in delivering the best collective knowledge and resources our industry has to offer, both internally, to our members, and externally, to any regulators, support personnel, industries that touch industrial refrigeration, and companies and organizations new to the use of natural refrigerants.

I hope you feel free to contribute with the new ideas and level of participation that has become the hallmark of this group.

While it's hard to turn our attention away from all the excitement of our most recent conference, it's time to start thinking about how to use that renewed enthusiasm in the coming year to strengthen IIAR's member presence and plan for our next event.

The 2023 IIAR Industrial Refrigeration Conference & Heavy Equipment Expo, will be held March 12 – 15 in Long Beach, California.

If you have a Technical Paper or a workshop that you would like to present in California, please contact Eric Smith at IIAR headquarters to submit your abstract as soon as possible. Technical Paper and session topics are the fabric of IIAR meetings and will be selected quickly to allow presenters plenty of time to prepare their presentations.

As members, your ongoing work and participation make all of our activities possible. Thank you for continuing to enrich our industry with your support.

While it's hard to turn our attention away from all the excitement of our most recent conference, it's time to start thinking about how to use that renewed enthusiasm in the coming year to strengthen IIAR's member presence and plan for our next event.

meeting into the rest of the year.

For the executive committee and your staff at headquarters, that means everyone is working hard to make sure our recent initiatives – from the AIM Act to the IIAR new membership & benefits program beginning July 1 to the many new projects our committees have started – are continuing to develop and reach new milestones.

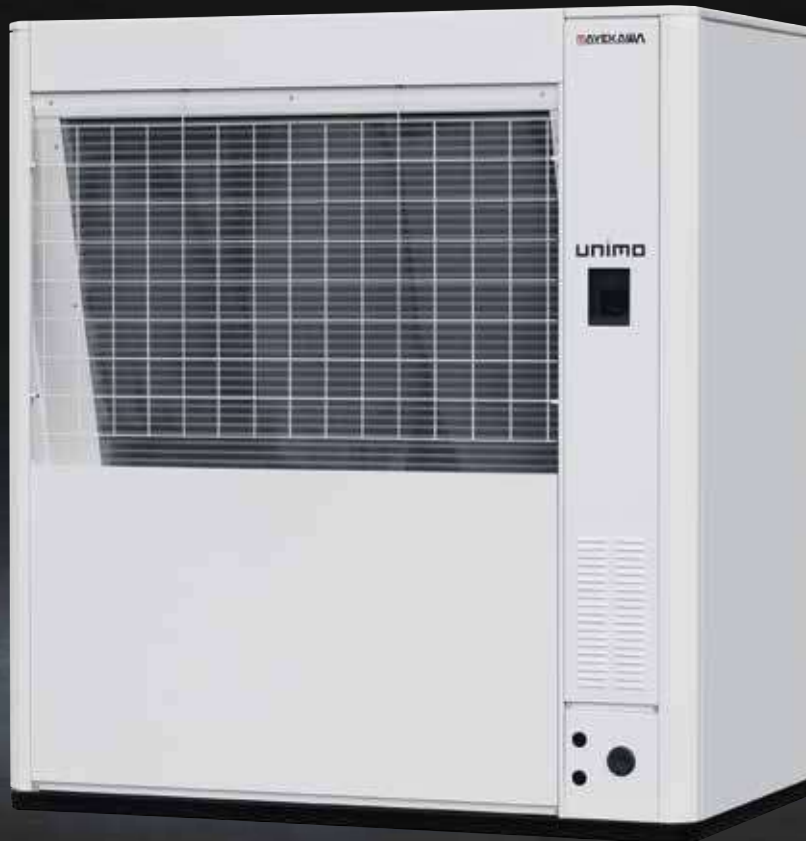
My priority this year is to carry those initiatives forward and make sure the growth of the industry and its use of natural refrigerants is well supported

to foster communication with all our international partners while at the same time looking for new opportunities to grow as a presence on the global stage.

Key to that effort is our education programs, the Academy of Natural Refrigerants and our educational video series I, II, & III, which – in addition to serving as a vital educational resource within our industry – is also laying the groundwork for powerful advocacy in the regulatory world.

As our new chairman, Trevor Hegg mentions in his column this month,

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chairman's

BY TREVOR HEGG

MESSAGE

As we conclude our first in-person conference in over three years, I'm excited to introduce myself as your new Board Chairman and tell you that, this year, the opportunities for our organization are huge. In this issue of the Condenser, you'll read about one of them, the American Innovation and Manufacturing (AIM) Act.

support the initiatives of the AIM Act and high GWP refrigerant phasedown. To support this new initiative, I want to use my space in this column this month to call on all IAR members to get vocal about natural refrigerants. Now is the time to educate anyone outside our IAR membership and our circle of influence. We can teach about our systems by talking about how good they are for

letin documentation, and other practical, usable documentation for the everyday operation of our systems.

My hope for the future is that we will be able to use the new Hydraulic Shock Task Force as a model for the conversion of information yielded by other Foundation research projects – into real, actionable information that can be incorporated into IAR materials to help us design and operate even safer systems.

Another new task force I'm excited to announce is the ANR Certification Task Force. This task force will find ways to incentivize the IAR Academy of Natural Refrigerants certification program, to make this resource a “must-have” rather than a “nice to have” resource for everyone.

After seven years of development, ANR certification has become one of the most robust educational programs our industry has to offer. Our IAR members already benefit from this incredible resource, and now is the time to position ANR as one of the best programs for high GWP refrigerant users to learn about natural refrigerants and our systems.

Finally, IAR's newly announced membership program will be implemented this year. Our new membership structure will help us grow and expand IAR membership like never before.

All of these things are geared towards the goal of raising the awareness of natural refrigerants, not just in our industry sectors, but beyond, in places and applications where natural refrigerants could help solve some of the world's biggest environmental challenges.

Coming off our recent conference, I'm energized by seeing many of you for the first time in three years – and I'm certain that momentum will propel us towards some major new accomplishments this year.

I want to use my space in this column this month to call on all IAR members to get vocal about natural refrigerants.

The AIM Act lays out regulations promulgated by the Environmental Protection Agency that will restrict refrigerants' allowable global warming potential throughout the United States, and it is expected to increase the long-term use of natural refrigerants.

As your IAR Chair this year, my major initiative has been to help lead the formation of an AIM Task Force to help learn more about the AIM Act's requirements and how the association and its members can support the act.

This initiative is one of the most important activities IAR can take on now. Through the work of this task force, every one of our members is in the position to influence the adoption of natural refrigerants and how they can

the environment; how efficient they are and how safe they can be.

I also want to use this opportunity to thank all our IAR committees for the day-to-day grunt work they have done to get us to this point. Our safety standards, educational training, and many other activities led by committee members, staff, and our past Chair, Eric Johnston, have set us up well for the effort to come.

In addition to the AIM Act Task Force, I'm excited about several other activities IAR is pushing forward this year. One of them is a newly created Hydraulic Shock Task Force which will take hydraulic shock research produced by the Natural Refrigeration Foundation, (formerly, the Ammonia Refrigeration Foundation) and incorporate it into IAR standards, bul-

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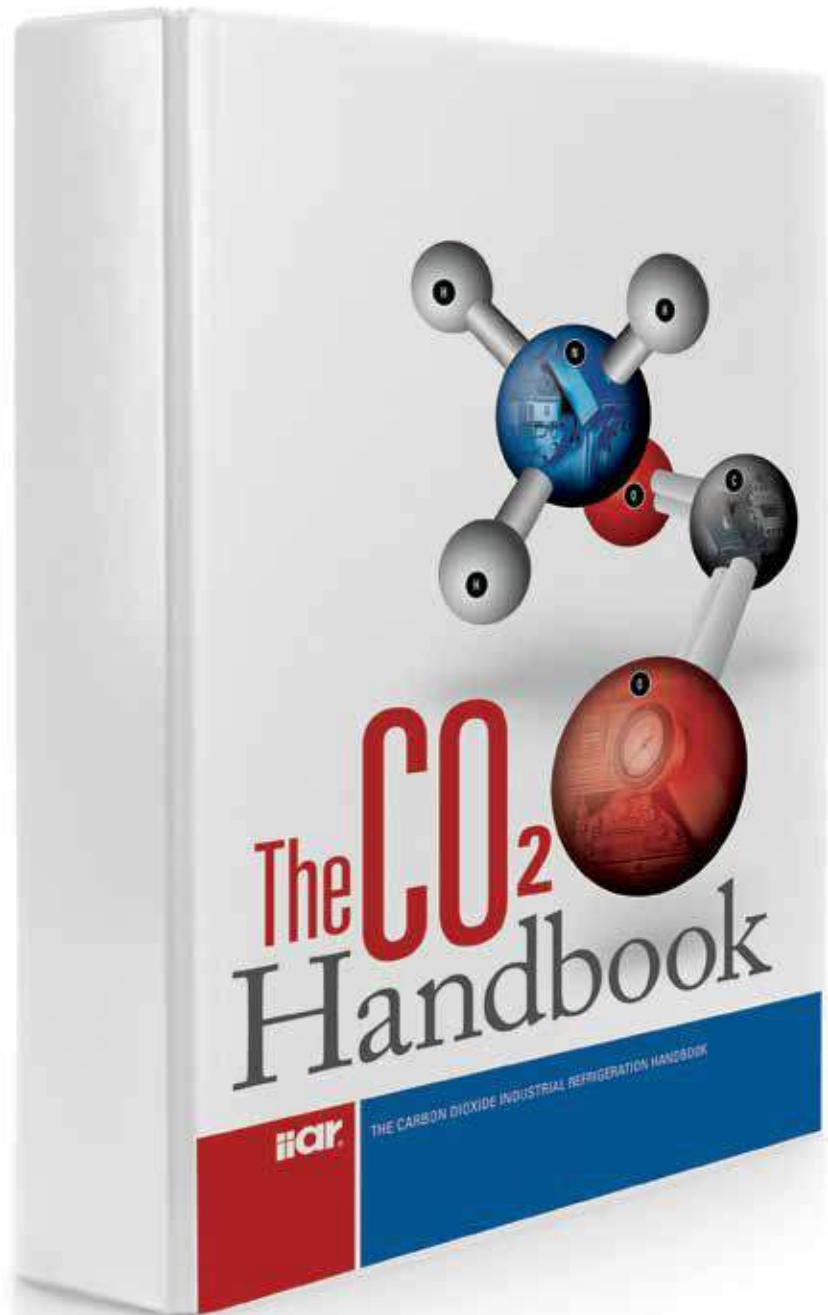
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IIAR Forms AIM Act Task Force

The American Innovation and Manufacturing (AIM) Act regulations promulgated by the Environmental Protection Agency will restrict refrigerants' allowable global warming potential throughout the United States and it is expected to increase the long-term use of natural refrigerants. IIAR has formed the AIM Task Force to help learn more about the AIM Act's requirements and how the association and its members can support the act.

"This really is the signaling of the HFC phasedown. We've been talking about it for a year, and the train is on the tracks," said Trevor Hegg, vice president, product development, industrial refrigeration, and water systems, EVAPCO Inc., and chair of IIAR, which established the task force. "Within IIAR, we're experts on systems using natural refrigerants. My message to people is we can help influence everybody and help people understand the benefits of natural refrigerants."

Miguel Garrido, executive president, GUNTER Solutions US and chair of the IIAR-AIM Act Task Force, said the main goal is to create a platform on which the different stakeholders in the industry—end-users, consultants, designers, manufacturers, contractors, servicers—could find more clarity on what the AIM Act means for them and how to make sustainable decisions on future projects and installations.

The AIM Act is broad, but the committee aims to identify who, what and how to accomplish the mandates and timeframes defined by the AIM Act and EPA. "We know there are limits on GWPs. We know that natural refrigerants like ammonia and CO₂ will satisfy those needs, but we need to research who will be impacted by this, the types of systems they are using, and how to reach them and support them," Hegg said.

PROVIDING EDUCATION

There is a need for more education and clear information communicated to the end-user community and the market in general about the forthcoming HFC phasedowns, said Kurt Liebendorfer,

Evapco's vice president of Evapcold. "In my daily work, I regularly encounter users and contractors that do not know about the AIM Act, nor what it will be enforcing over the next couple of years," he explained.

The task force also seeks to find out what customers need to know. "We don't know what they don't know. Part of the outreach is to learn if they understand what the AIM impact is on them," Hegg said, adding that IIAR members can help identify technological advancements needed to meet customers' needs. "It is about research, outreach, and education."

The HFC phase downs is a topic that has been talked about for many years. As a result, many people have become immune to it, and some are even skeptical that the government-mandated phasedowns will happen. "This is partially due to the effort being stalled for a few years when the EPA was put on hold by a supreme court ruling. Now the AIM act has changed that entirely and made it law, but the market has not yet totally understood this mandated legal change," Liebendorfer said.

What's more, end users' purchase decisions can depend on how much they know and who they contact first. "One of the biggest barriers is the technical understanding of refrigeration. Even the customers that are technically [minded] still have limitations understanding what they are buying," said David Fauser, director of sales for CIMCO Refrigeration. "The main thing is raising awareness for naturals, and that is a big role the IIAR can play."

"The manufacturers of the HFOs are painting some natural refrigerants, including ammonia, as toxic, which is true, but when you look at the industry, it has been around a lot longer than some of these other refrigerants," said Stephanie Smith, senior engineer, Risk Management Professionals Inc. and a member of IIAR's task force investigating the AIM Act. She added that the task force could partner with other groups for education.

Ammonia is very energy efficient, but those who aren't familiar with it have safety concerns. "We know it can be used safely," Hegg said.

GROWTH IN NATURAL REFRIGERANTS

Smith said the AIM Act can make a significant difference. "I have realized the biggest impact we can have are with the smaller facilities because there are so many. It adds up to a lot of refrigerant and potential for improvement. AIM is moving in that direction," she said, adding that she hopes the AIM Act brings forward an awareness that natural refrigerants have their place.

"We don't know what is in these new synthetic refrigerants. While some have components of the ones being banned or phased out, nothing extensive has been done to test the new refrigerants," Smith said. "I'm not personally against synthetic refrigerants, there is a use for them, but we can't bring something new on the market and say it is safe until we've tested it."

Large operations are more likely than smaller facilities to use natural refrigerants, and Smith said the challenge will be getting smaller facilities to recognize natural refrigerants are a good business decision that has an environmental benefit. "I think there could be a lot of demand with more education," she said.

Growth in natural refrigerants has already started to happen, and many companies are seeing this growth and investing in the ability to keep up with it, Liebendorfer explained. "We have also recently seen a lot of mergers, acquisitions, and staff changes in that space for the same reason," he said.

Additionally, due to EU F-gas regulations, since 2015, the implementation of natural refrigeration installations in Europe is very strong and serves to prove the safety and sustainability of these natural solutions, Garrido said.

Natural refrigerants have been around since the 1800s and are immune to phase-outs due to environmental issues that have faced synthetic refrigerants. "Because they have natural occurring as their base, it is a safe decision," Fauser said.

Many expect natural refrigerants to continue to grow. "This is still just a steppingstone to allow for innovation to occur. If climate change is the real goal, natural refrigerants will be the ultimate solution," Hegg said, adding that education will need to start with the top leaders of companies.



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There are no unique hurdles for applying natural refrigerants since they have been in use for a long time and have also been applied in a very diverse market, Liebendorfer said. “The new packaged low charge ammonia and CO2 technologies have also allowed these pre-engineered systems to be applied easier to non-industrial markets,” he said.

“The main obstacle in commercial markets is perceived cost because ammonia, CO2 and hydrocarbon refrigeration equipment and systems often have a higher capital cost than the commercial synthetic refrigeration equipment primarily due to the industrial versus commercial equipment difference.”

This is another area where providing education is important for the task force so it can help to simplify the difficult steps of comparing life cycle costs for the different technologies, Liebendorfer explained.

Fauser said there can be capital cost savings with a proper evaluation. “We’ve priced several systems that have CO2, ammonia, and blends, and they’re all roughly the same price,” he said.

Some technology needs to be brought forward to have natural refrigerants in homes, but it is possible. “In Canada, we’re starting to see butane freezers and some home appliances with natural refrigerants,” Fauser said.

In the last couple of years, available limits for propane and butane have increased. “This is probably easier to utilize and arguably safer than what they’re using now and probably easier to dispose of later,” Smith said.

MAKING DECISIONS

Companies will have to make decisions on the best long-term refrigerant solutions. “New technologies will come and be based on scientific and technical design concepts will be safe and sustainable,” Garrido said. “IIAR can support that process: monitoring and advising about best technologies, best practices, and well-educated stakeholders.”

Although there is not a perfect solution for all refrigeration plants, each application could have an ultra-low GWP or zero-effect natural refrigeration solutions, Garrido said.

HFOs could be an alternative for

some applications. “Some of them have 0.1% of the GWP of HFCs. HFOs below 150 GWP like 1234yf and 1234ze(E) are flammable and have -12F and -2F boiling points and very low density, requiring large compressors operating in a vacuum for low temperatures. R514a, 1234zd, 1224yd(Z) are non-flammable, but all have boiling points from 50 F to 84F at atmospheric pressure,” Garrido said. “It has consequences in the sizing of the main components of the plant, i.e., compressor’s size maintenance cost, performance losses when working in vacuum conditions due to non-condensable, leaks inspections.”

However, those are not necessarily future-proven options. “We must be very ambitious to protect our planet, and that means to invest in zero or ultralow GWP solutions. “Water (R-718), Ammonia (R-717), and CO2 (R-744) look to be very beneficial in terms of global warming potential and future proof and sustainable on a long-term basis if regulations become more and more strict,” Garrido said.

Liebendorfer noted that phaseouts have happened before. “The EPA phaseout of environmentally dangerous man-made refrigerants (synthetic refrigerants) has been successfully accomplished before. First, CFCs were phased out in the 1990s, and then HCFCs were phased out in the 2000s. Now it’s time for HFCs, which will be phased out in the 2020s. Will HFOs eventually be phased out next?”

Garrido said natural refrigerant technologies are well known and working safely worldwide already, but he realizes some users may resist change. “There is always hesitation to change something ‘working well for years,’ but the matter of fact is keeping this thought in place, we are damaging our planet very quickly, and we don’t have too much time to correct this situation and protect our communities and future generations. So, it’s time to change and now,” he said.

The application of the new HFOs is growing in the commercial HVAC market for which they were developed. However, they have not been specifically designed for lower temperature applications required for the industrial refrigeration

market. “As a result, natural refrigerants such as ammonia and CO2 are much more energy-efficient than HFOs and more economical to apply in the IR market. In addition, HFOs are being utilized in commercial-grade equipment, not the more robust and longer-lasting industrial-grade equipment required for the food & beverage market and other industries,” Liebendorfer said.

Regulatory requirements are one of the best ways to encourage end-users with high-GWP refrigerants to change to natural refrigerants, Fauser said. “In Canada, the government has dedicated funds to go to low GWP, but there is still a lack of urgency. The incentives are nice, but policy will drive the innovation and evolution to get where we need to go.”

GETTING INVOLVED

Members of the task force said they’re eager to share everything they know. “This is a global fight to raise awareness and fight climate change. There is nobody there with a personal agenda,” Fauser said. “If everyone has that collective goal of raising awareness, it will benefit all of us and, more importantly, society.”

Fauser said he asked himself, from an environmental perspective, what he could do as an individual and decided to take part in the task force. “I’m happy IIAR has put together this task force that allows us to educate and bring awareness to how important refrigerants are if we’re going to de-carbonize how we do things,” he said. “Things like the AIM Act are probably the least expensive, biggest impact step we can do as a society.”

Hegg hopes to have strategic plans for the committee laid out by the October board meeting. “The first phase down proposed is 2026, but we need to get in early before that date because companies will be making decisions a couple of years before that,” he said.

All IIAR members are welcome to take part in the task force. “We’re looking for anyone to participate because of the different aspects that need to be addressed in this task force,” Hegg said, adding that there are currently 12 members on the task force.

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2022 conference roundup

IIAR MEMBERS RETURN TO
FIRST POST-COVID CONFERENCE

IIAR Members Return to First Post-Covid Conference

The International Institute of Ammonia Refrigeration 2022 annual Natural Refrigeration Conference & Expo held its first in-person meeting since 2019 this year in Savannah, Georgia, March 6-9.

CONNECTING WITH PEERS, COLLEAGUES, AND EXHIBITORS

The event attracted 1,272 attendees and 122 exhibitors and provided four days of technical knowledge, networking, and industry-sponsored events for those involved in the natural refrigeration industry.

“Everyone was happy to be finally getting out and seeing each other face to

face after about two years of lockdowns and Zoom,” said Fran Knorr, business development manager, InterCool USA.

Gary Schrifft, IIAR’s president, said the weather was great, the location was well-liked, and the timing was just right with Covid cases greatly dropping, allowing many to feel comfortable getting out for the first time in a long while. “We received a big ‘after Covid bounce’ and therefore most everyone, including myself, thought the conference was a great success,” he said.

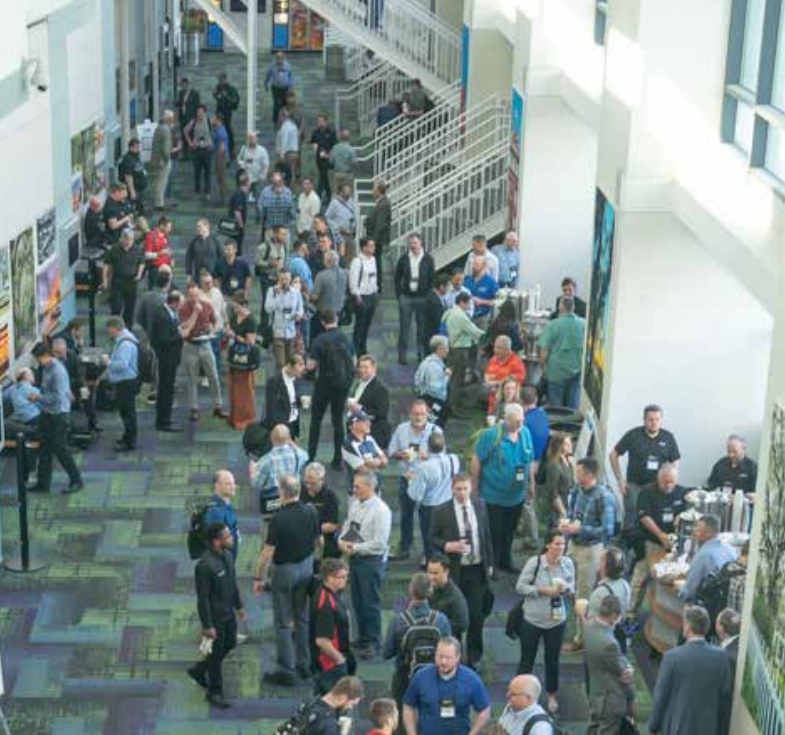
Dave Malinauskas, president of CIMCO Refrigeration, said the business meeting on Monday morning was the first event that brought all attendees together. “To see over 1,000 people, friends,

partners in the room after two years, was amazing,” he said. “The whole session was strong. We were pleased.”

SEEING IIAR IN ACTION

During the business meeting, Schrifft provided an update on all IIAR has accomplished in the past year, including its advocacy wins. “IIAR continues to support the efforts by the California Air Resources Board and the EPA to establish regulations regarding the phase-down of environmentally harmful HFC synthetic refrigerants through technical information and petitions recommending the use of low GWP natural refrigerants,” he said.

IIAR also contributed to an Amicus brief filing in support of an ammonia



which you can add significant value,” he said. “The committees are your organization’s workhorse, writing publications, creating training courses and material, providing government advocacy, developing international initiatives, and marketing

the benefits of natural refrigerants and their systems.”

A highlight for Malinauskas was walking from committee meeting to committee meeting Sunday morning. “To see hundreds of people just volunteering their time on a Sunday morning was phenomenal. Such a high percentage of our conference population participates in that,” he said.

PROVIDING TECHNICAL INFORMATION

The technical sessions and workshops during the conference were very highly attended. “All the new developments in the IIoT (Industrial Internet of Things) and the developments in the technology were very exciting,” Stachura said.

The technical programs focused on natural refrigerants and regulations and research. “There was a global natural market workshop, and the Sunday controls education program was also fantastic,” Malinauskas said.

IIAR recorded all technical sessions, and the recordings will be available to all in-person attendees and registrants and to anyone who paid for virtual conference attendance.

IIAR held its VIP, reception and other events outside, which added to the experience. Schrifft said the Monday night event was in a park in downtown Savannah and featured great music, food, and drinks. “Everyone seemed to stay till the end, and thus I see that as a great event success versus people leaving throughout,” Schrifft said.

This was the first in-person conference for Matt Stachura, PSM coordina-

tor, Perry’s Ice Cream Co. Inc. “It was a blast. The location was full of amazing pirate history, and it was good to see old friends as vendors again and hear all about some of the things people have been working on the last few years,” said

During the exhibition, many exhibitors brought and demonstrated equipment. “For many of them, they have gone two to three years with developments and no place to show them,” Schrifft said.

GOING DIGITAL

A feature of this year’s show was the app, which provided information to attendees in the palms of their hands. “It’s more convenient as everyone carries their phone versus having to remember to carry a printed guide,” Schrifft said, adding that moving forward, the plan is for this to be a staple of future conferences with more visibility and possibly more features.

The app featured technical program information, a meeting map, and a direct messaging application. It also offered attendees the ability to create their own calendar. “The app was nice so that we could keep the schedule and know where and when to be for the different lectures,” Stachura said.

The app also allows for IIAR to minimize print costs which is not only environmentally friendly but also allows IIAR to adjust times and meeting locations as needed and they are immediately conveyed.

PLANNING AHEAD

The executive officers and IIAR staff collected a large list of opportunities for improvement for the 2023 conference, such as conference and exhibition content and logistics.

“The ideas were collected from attendees, exhibitors, and from our group’s experience,” Schrifft said. “So, although the conference was a very successful event, we want to repeat the successes, but was also want to add functions and changes that make it even better.”

user, not for refrigeration, Tampa Electric in their defense of an OSHA appeal to vacate a previous favorable ruling to TECO’s emergency response and emergency preparedness.

IIAR has also formed a strong coalition with RETA, GCCA, and ASTI for the development of a safety program backed by all. “This coalition has also supported our EPA AIM act petitions and our Amicus Brief filings, creating a strong union,” Schrifft said.

HIGHLIGHTING COMMITTEE WORK

Schrifft also reminded attendees that IIAR currently has 11 active committees, each with a chair, voting members, and corresponding members, who can become voting members after serving one active year as a corresponding member.

“I believe each one of you could find a committee of interest and one for



IIAR Honors Members for Outstanding Contributions

During IIAR's annual conference and expo, IIAR honored Dave Schaefer with the Member of the Year Award and Joe Pillis and Jeff Shapiro with Honorary Lifetime Member Awards.

"All three—Dave, Jeff, and Joe—are well deserving of the awards," said Kurt Liebendorfer, vice president of Evapcold.

Schaefer served as chief engineer for Bassett Mechanical before retiring earlier this year.

"Dave has over 35 years of engineering experience managing projects for a multitude of clients and held engineering positions for several end-users before joining Bassett in 1997," said Eric Johnston, Chair of IIAR.

Schaefer has been a corresponding and voting member of the IIAR standards committee for many years and most recently chaired the IIAR-2 subcommittee during the long and sometimes arduous process of developing IIAR 2-2014 addendum A and the 2021 version. "These efforts have helped IIAR 2 become the sole source of requirements for ammonia refrigeration," Johnston said.

Schaefer served as a member of the board of directors for two terms and then rolled onto the executive committee for several years. He is currently IIAR's immediate past chair. "He was instrumental in helping IIAR pivot operations when Covid struck, providing sound leadership to the BOD and staff during this uncertain period," Johnston said.

Receiving the award was a surprise to Schaefer. "There are so many folks that work and put in a lot of hours. It is definitely a labor of love," he said. "It is so neat to be part of a group that helps the industry become safer and more aware of doing the right thing, whether it is codes and standards, research, scholarships. It is a good group."

Johnston said Pillis, an engineering fellow at Johnson Controls, has long been recognized as one of the world's leading experts on compressor design and applications.

"He's written many papers, provided very many lectures, holds several patents, and has generously given his time and expertise to IIAR," Johnston said while presenting the award. "Joe has served for many years on the IIAR standards committee, both as a corresponding member and voting member, providing a keen sense of understanding and well-balanced consideration of end-user needs, design considerations, regulatory functions, and safety concerns of our industry."

Pillis is currently an IIAR board member and is leading the committee in developing a standard for hydrocarbon refrigeration. "He continues to be a great asset to IIAR and Johnson Controls, and we are delighted to present him a lifetime membership award in recognition of his contributions," Johnston said.

Liebendorfer has known Pillis professionally and personally for over 25 years as a customer, coworker, competitor, co-committee member, teacher, leader, solver, and, most importantly, a good friend. "Joe is one of those special individuals that has earned and commanded true global respect in the refrigeration world for many years. Many times, Joe has also been a part of my personal growth in this great community, and I am honored and very thankful for knowing him," he said.

Don Faust, training manager for Johnson Controls, has known Pillis for 30 years. "You always had college professors you thought were the smartest guys you'd ever met. Joe beats all of my college professors. He is an absolute encyclopedia on compressors," he said. "It is fun to hear him talk."

In manufacturing, problems arise that can seem impossible. "Joe digs in. He's solved some problems that are just mind-boggling. He does that with a smile and an 'aw shucks' kind of thing. He is one of the most brilliant people I know," Faust said.

IIAR also presented an Honorary Lifetime Member Award to Jeff Shapiro of International Code Consultants. Shapiro has diligently worked with IIAR since the late 1990s, successfully identifying many code issues and petitioning for code changes on behalf of the industry.

"He has also represented IIAR on the ASHRAE 15 committee and helped to enable deference of ammonia refrigeration to IIAR standards," Johnston said. "He has recently succeeded in IIAR's ultimate goal to successfully petition all of the model codes to defer to IIAR standards, eliminating any confusion or conflicts for ammonia refrigeration design and operation requirements."

Additionally, Shapiro has been innovative in developing several standards and has contributed significantly to the improvement of many of IIAR's publications.

Liebendorfer has known Schaefer and Shapiro professionally for many years, working with them on projects, IIAR committee work, and related topics. "I have the utmost admiration and respect for both of them as industry leaders and experts in their field," he said. "It is leaders like Dave and Jeff that make our industry so effective, special, and dependable, and I am honored to know them."

The winners were chosen by IIAR's nominations committee, which asks members to nominate recipients. "The committee meets in October or November to review the nominations and vote on the final choices. Those choices are submitted to the chair of IIAR for his final approval," Gary Schrift, President of IIAR said.



IIAR Announces Regulatory Initiatives

IIAR dedicated time to updating members on the latest regulatory initiatives during its annual conference. Lowell Randel, director of government affairs for IIAR, discussed several areas of focus for the association and the natural refrigerant industry.

CYBER SECURITY CONSIDERATIONS

Randel told attendees that the risks of cyberattacks are increasing, and DHS is encouraging companies of all sizes to be vigilant. Resources are available at: <https://www.cisa.gov/shields-up>.

DHS VOLUNTARY CHEMICAL SECURITY PROGRAM

DHS has developed the ChemLock program to help non-regulated facilities improve chemical security. CFATS covers facilities with 10,000+ pounds. While there are no regulatory requirements below the threshold, security is still an important consideration.

The ETS was challenged in court and the case moved to Supreme Court, which reinstated a stay on the ETS stating concerns that it exceeds OSHA's authority. The court said the Administration likely didn't have the unilateral power to impose a mandate that employers ensure their workers were vaccinated or tested every week for Covid-19.

OSHA ETS UPDATE

The Biden Administration released an Emergency Temporary Standard in

2021 that would require companies with 100 or more employees to mandate vaccinations or weekly testing for all employees. The ETS was challenged in court and the case moved to Supreme Court, which reinstated a stay on the ETS stating concerns that it exceeds OSHA's authority. The court said the

Administration likely didn't have the unilateral power to impose a mandate that employers ensure their workers were vaccinated or tested every week for Covid-19.

OSHA has since withdrawn the ETS, but it has indicated it still plans to pursue a permanent standard and remains




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intent on enforcing COVID protections in the workplace. As a result, employers need to have a written COVID Prevention and Control Plan in place.

ing quality face coverings, continuing to physically distance workstations, training employees on COVID-19 policy, removing COVID-19 positive or symptomatic

or vaccination, but they must provide exemptions for disabilities and sincerely held religious beliefs and need to be aware of state and local laws. Additionally, employers must ensure that COVID-19 vaccination records are kept confidential and stored properly under ADA.

OSHA has since withdrawn the ETS, but it has indicated it still plans to pursue a permanent standard and remains intent on enforcing COVID protections in the workplace. As a result, employers need to have a written COVID Prevention and Control Plan in place.

Measures for reducing COVID-19 in the workplace include encouraging vaccinations through training/posters, provid-



ing employees away from the workplace, and providing COVID-19 testing. Employers can still require testing

PSM RULEMAKING ON OSHA REGULATORY AGENDA

The rulemaking entitled “Process Safety Management and Prevention of Major Chemical Accidents” started during the Obama Administration. It was paused during the Trump Administration but never removed from the agenda. Recently, it moved from “Long-term Agenda” to “Pre-rule Stage.” This indicates a likely stakeholder meeting in 2022 followed by a Proposed Rule.


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OSHA TRAINING

IIAR, GCCA, and IRC continue to work with OSHA to provide ammonia refrigeration training to OSHA personnel. Recently, the web-based class met over five live two-hour sessions in April and was able to reach approximately 40 agency representatives from across the country. OSHA has expressed interest in conducting additional training in the future.

IIAR, GCCA, and IRC continue to work with OSHA to provide ammonia refrigeration training to OSHA personnel. Recently, the web-based class met over five live two-hour sessions in April and was able to reach approximately 40 agency representatives from across the country. OSHA has expressed interest in conducting additional training in the future.

OSHA LITIGATION ON EMERGENCY RESPONSE

IIAR joined with GCCA, the National Association of Manufacturers, and Edison Electric Institute in filing an amicus brief in a lawsuit between OSHA and the Tampa Electric Company (TECO).

OSHA cited TECO related to its emergency response procedures, which raises significant concerns for the natural refrigerant industry.

The Amicus brief asserts that OSHA is ignoring its past letters of interpretation regarding emergency response operations. The brief also stated that OSHA has for decades taken two positions upon which industry has heavily relied: first, that the term “immediate release area” can be the entire geographic boundary of an employee’s assigned work area; and second, that emergency response requirements cannot be reduced to a simple formula, such as whether a responding employee is close enough (or not close enough) to

witness a particular occurrence.

OSHA’s position not only threatens to upend years of reasonable industry reliance on positions announced by OSHA but will detract from safety.

RMP RULEMAKING ON REGULATORY AGENDA

EPA held two listening sessions to provide interested persons the opportunity to present information, comments, or

views pertaining to the review of RMP regulation revisions completed since 2017, including the 2017 Final Amendments to the RMP Rule and 2019 Final RMP Reconsideration Rule).

IIAR participated in these listening sessions and suggested the recently finalized reconsideration rule took appropriate action and that no further rulemaking is needed. There have been indications that EPA may consider further changes to the RMP program, potentially reversing the actions taken during the Trump Administration. According to the regulatory agenda EPA is expected to issue a Notice of Proposed Rulemaking in September 2022 and complete a Final Rule by August 2023.

EPA POLICY ON UPDATED RAGAGEP

EPA expects owners and operators to regularly review new and updated RAGAGEP applicable to their industry to determine where safety gaps exist within their current process. If the updat-

ed document explicitly provides that new clauses or requirements are retroactive, those updates are relevant to determining whether the owner or operator’s practice continues to conform to RAGAGEP.

This applies to IIAR-9: Minimum System Safety Requirements for Existing Closed-Circuit Ammonia Refrigeration Systems.

AMERICAN INNOVATION AND MANUFACTURING ACT

The American Innovation and Manufacturing (AIM) Act passed in December 2020 and provides EPA new authorities to address HFCs in three main areas: phasing down production and consumption, maximizing reclamation and minimizing releases, and restricting the use of HFCs in particular sectors or subsectors.

EPA moved to implement the statute, including rulemaking in 2021 that set the HFC baseline and schedule for phasing down consumption. The next step of the process will be establishing rules for various sectors and uses of HFCs. IIAR, along with RETA and ASTI, submitted a petition to EPA in 2021 suggesting policies for phasing down HFC use in refrigeration.

Additionally, the petition calls for EPA to restrict the use of refrigerants equal to or greater than 150 GWP for all refrigeration sector end-use/subsectors.

KIGALI AMENDMENT

The Biden administration is taking steps to have the U.S. join over 120 other nations in pledging to scale down the use of hydrofluorocarbons (HFCs), widely used in refrigeration and comfort cooling. President Joe Biden sent the Senate the Kigali Amendment to the Montreal Protocol on Tuesday, November 16, 2021, clearing the way for the chamber’s review of that international pact to phase down the production and consumption of HFCs. However, with the enactment of the AIM Act, ratification of Kigali will be largely symbolic.



IIAR's Foundation Focuses on its Three Pillars, Prepares to Change Name

The foundation focuses on three pillars—research, educational training, and educational scholarships—and has had a successful year supporting each of these areas. During IIAR's annual meeting and expo, Dave Schaefer, chairman of the Ammonia Refrigeration Foundation, provided an update on the foundation's accomplishments.

FINALIZING RESEARCH PROJECTS

The foundation moved forward on three research projects: a guide to estimating ammonia releases, machinery room ventilation and CFD study, and a design basis to avoid hydraulic shock. Their accomplishments were presented during the conference.

AWARDING RECORD SCHOLARSHIPS

This year, the foundation offered its largest scholarship commitment to date. In addition to an existing \$10,000 scholarship commitment to a returning senior in the scholarship program, the foundation added eight new scholarship recipients with a financial commitment of \$5,000 each, for five juniors and three seniors.

Seven of the nine 2021-2022 Scholars attended the conference. "I think they had a great time and met a lot of contacts. Some had job interviews. It really was well received and worked out well," Schaefer said.

RE-BRANDING THE FOUNDATION

The foundation is changing its name. "While we believe the name, ARF, Ammonia Refrigeration Foundation, may be widely known in our industry, we would like to see it gain broader support outside our industry, through recognition of our foundation's mission to advocate for all natural refrigerants

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and their use in refrigeration systems,” Schaefer said.

During the January 2022 ARF and IAR board meetings, both boards voted unanimously to change the name to Natural Refrigeration Foundation, NRF. Schaefer said the name change will broaden the foundation’s outreach to many other organizations interested in environmental friendliness and sustainability, which can be brought about through the increased use of natural refrigerants.

“Increased outreach, hopefully, results in increased funding, allowing us to increase scholarships bringing more new employees to our natural refrigera-

tion industry, expand research resulting in better tools and safety practices for the application of natural refrigerants, and expand educational programs creating more experts in natural refrigeration,” Schaefer said.

Additionally, future boards may also decide to create learning centers that will offer training opportunities to further support that ammonia and the natural refrigerants are superior to the man-made synthetic refrigerants, Schaefer explained.

LOOKING AHEAD

Schaefer said the foundation will continue to focus on research and

education as well as funding. One of the big initiatives next year will be how the industry responds to the AIM Act. “Getting the word out that we can help with any of the natural refrigerants will be a big deal,” Schaefer said.

Schaefer also thanked all of those who support the foundation, including both boards, the chair of the education committee, Mark Stencel, and the research committee, Wayne Wehber, who stayed on an extra year as research chair. He also recognized the scholarship committee, Bob Port, trustees, individual contributors, and the Kahlert Foundation.



BY MONIKA WITT, MANAGING DIRECTOR OF TH. WITT GMBH, GERMANY, EURAMMON BOARD MEMBER

Eurammon will host an online event from July 4-8, 2022. Entitled “Journey to a Naturally Sustainable Future,” the event topics will include educational opportunities, regulation and policy updates, and more. The sessions will take place daily online between 9 am and 11:30 am, covering the following topics:

July 4: Keynote speeches

July 5: Policy and regulations update

July 6: Natural refrigerants for the cold chain

July 7: Education in RACHP

July 8: Heat pumps for green energy

Updated information will be available on the Eurammon website www.eurammon.com.



Foundation Scholarships Help Students Gain New Insights into the Natural Refrigeration Industry

The Natural Refrigeration Foundation, which supports research and education programs benefiting the industrial refrigeration industry, awarded its largest scholarship commitment to date. The scholarship program provides a unique opportunity for students to learn about a technical field, attend IIAR's national conference, be financially rewarded and contribute to the future of the planet.

In addition to an existing \$10,000 scholarship commitment to a returning senior in the scholarship program, the foundation added eight new scholarship recipients with a financial commitment of \$5,000 each for five juniors and three seniors.

"The need for top-caliber engineering talent in the natural refrigeration industry, the recognition of outstanding scholarship recipients, and the scholar's desire to make a meaningful difference in the health of our world, are all served by the scholarship program," said Mark Stencel, IIAR's Education Committee chair.

Seven of the nine 2021-2022 scholars attended the conference. "The IIAR scholarship was an eye-opener into the refrigeration industry for me as I never realized how many opportunities existed until attending the IIAR conference in Savannah," said Jordyn Vanevenhoven, a 2021-2022 scholarship recipient. "Because of how little this industry is advertised, I think that this scholarship program is essential for its longevity since it is a great way to reach out to engineering students."

Caden Matson, a returning senior who first received the scholarship in 2020, said both the people and the potential to change the world are the most exciting aspects of the industry, which was evident at the conference. "Walking

around the conference expo floor, every manufacturer was showcasing their newest technology and refrigeration solutions that simply didn't exist years ago, like CO₂," he said. "Everyone I met at the conference was excited to see young scholarship recipients in attendance and their passion for the industry could be seen the moment we started up a conversation."

Former scholarship recipient Adam Tilgham agreed that the opportunity to attend the conference was invaluable. "The relationships and opportunities that came about from going to the conference were priceless," he said. "Every single person we were introduced to or talked to was interested and wanted to grow our knowledge."

Tilgham received the scholarship in 2019 and has since graduated with a mechanical engineering degree from the University of Maryland Eastern Shore. He learned of the scholarship his junior year after interning at General Refrigeration Co. in 2017. "That opened up the whole industry of industrial refrigeration," he said, adding that the scholarship was a good opportunity to not only help pay for school but also to get his foot in the door and learn more about the industry.

After graduating, Tilgham took a full-time role with General Refrigeration Co. "I think the ammonia refrigeration industry and the industrial refrigeration industry is an incredible group of people," he said.

Mackenzie Peck, a recipient of a 2021-2022 scholarship award said ARF and IIAR play a valuable role in sharing the importance of refrigeration. "It is extremely important for educating college students about the natural refrigeration industry. It sparks an interest in students who may not have known about their interest without the confer-

ence/scholarship," she said, adding that natural refrigerants help make the world a better place. "Being able to work for an industry that is making a difference for our planet is very rewarding."

MEET THE 2021 ARF FOUNDERS' SCHOLARSHIP AWARDEES

Kyle Brooks

Purdue University

Kyle Brooks is a junior pursuing a degree in mechanical engineering. He has worked the past two summers as an engineering intern for Wagner-Meinert in Fort Wayne, Indiana, and he is returning to that same position this upcoming summer.

"Industrial refrigeration is an interesting and exciting field because it can affect a large number of industries," Brooks said. "I have been able to visit a wide variety of commercial buildings and factories throughout my time as an intern, and it opened my eyes up to how many different industries rely on effective refrigeration systems to function. The importance of the industry gives meaning to the work I would do, and that is what excites me."

The scholarship has helped alleviate a bit of financial stress for Brooks. "College is expensive, so being able to get some help paying for it takes a weight off my shoulders and allows me to focus even more on academics and extracurriculars here on campus," he said. "Besides being a nice financial boost, the scholarship has also opened some doors to new opportunities and connections within the industry."

Brooks also participates in the Purdue All-American Marching Band.

Zachary Laser

University of Tennessee

Laser is working towards a mechani-



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cal engineering degree and has gained practical work experience with POWER Engineers, working with engineers, architects, and plant representatives on a large frozen food plant refrigeration project and acting as construction manager on a freezer racking project.

In his application, Laser said ammonia plays a vital role in meeting current and future global challenges. “With the growing population of the Earth, sustainable means of increasing the shelf life of food is more important than ever. If we were to get to a point where the freezing of all vegetables was required so that stockpiles could be secured, ammonia would be a great refrigerant for the job,” Laser said. “Ammonia refrigeration systems are becoming engineered so that they are nearly the most cost-effective option for any facility to install and maintain for long-term, large-scale use.

Mackenzie Peck

University of Florida

Peck, who is pursuing mechanical engineering, said she is interested in the refrigeration industry because of its importance to the well-being and function of society. “Cooling systems store food, keep homes at a comfortable temperature, and aid in cooling systems down that tend to produce heat—data servers, vehicles, etc.,” she said. “For example, refrigeration was in the spotlight earlier this year with the rollout of the COVID-19 vaccine that required cooler temperatures.”

Peck is paying her way through school and said the scholarship has been tremendously helpful. “I can focus more on learning and my courses than my part-time job. Additionally, being able to attend the IIAR Conference expanded my technical knowledge and knowledge of the industry,” she said.

Currently, Peck works in a machine shop at the university and teaches students how to machine. “I have discovered a passion for manufacturing from this position and hope to go into a technical manufacturing role,” she said.

Ghazal Pourvash

Texas A&M University

Pourvash is studying industrial engineering. In the scholarship application, Pourvash explained he immigrated from Iran after graduating high school. “I did not have the privilege of building my career from the early start, however, I did not let that stop me. From the moment I got into college, I participated in college activities,” he said.

Pourvash has worked as a campus ambassador planning campus events. “Helping fellow students with their studies meant so much to me. It helped me to shape my social skills and build connections,” he said. “Then participating in invent challenges helped me to shape my technical skills.”

Pourvash has also received several academic awards, including the T-STEM Scholarship, Aggies Invent Third Place Winner, was a speaker at the national honor society graduation class ceremony, took part in the National Instruments Externship, and received the Scholastic Leader Award.

Trey Saltzman

Texas Tech University

Saltzman plans to enter the industrial refrigeration design field after graduating and hopes to have an impact on the natural refrigeration industry. The IIAR Scholarship program sparked an interest in Saltzman and inspired him to try and make a difference in the natural refrigeration industry.

“What excites me the most about the refrigeration industry is the capabilities to advance industrial refrigeration efficiencies all while doing it in a way that is safe for our environment,” he said.

For Saltzman, the IIAR Scholarship program is extremely important not only from a financial perspective but from a networking perspective as well. “Young upcoming engineers have a difficult time getting recognized,” he said. “Through the IIAR Conference, I was able to build more connections to a field of work than I have been able to do in

my entire educational career at a university. To me, that is extremely valuable and more beneficial than anything else I have been a part of.”

Jordyn Vanevenhoven

University of Wisconsin-Platteville

The scholarship has given Vanevenhoven the financial security to not take out federal loans his senior year and even start paying off current loans. “Because of the scholarship, I am also now considering additional schooling at UW-Platteville to earn my M.S. in Engineering with an emphasis in Engineering Management,” he said. “This program would allow me to expand upon my knowledge in the supply chain, project management, method of experimentation, and cost/value analysis.”

This summer, Vanevenhoven is interning at Bassett Mechanical in Kaukauna, Wisconsin, with the refrigeration team. “I am so excited to experience this field first-hand and depending on how the summer goes, I could see myself in the refrigeration field upon graduation. However, I also have a background in HVAC and may pursue a career in HVAC consulting,” he said. “My future is thus somewhat undecided, but the conference in Savannah certainly helped narrow down what jobs I wish to pursue at the upcoming UW-Platteville career fair.”

Vanevenhoven’s impression after the conference was that the natural refrigeration industry relies heavily on professional connections between manufacturers, contractors, and customers. “I am excited to make these connections as a professional engineer and meet individuals from across the country,” he said.

NEW SENIORS

William Moore

Arizona State University

Moore is majoring in mechanical engineering. He takes part in varsity baseball and basketball and has made the Dean’s List every semester in college. He has also worked at American Foods Group.



“While working at American Foods Group, I was fortunate enough to gain experience in industrial refrigeration as well as manufacturing processes,” Moore said. “I was able to travel around to each of the company’s meat processing plants, which allowed me to see a variety of different industrial refrigeration systems. Because of the immense amount of hands-on learning I was able to receive, I believe this experience has provided a head start for me, so I am able to hit the ground running when I get into the engineering workforce.”

Leonard Walker

Baylor University

Walker is majoring in mechanical engineering and has been able to gain valuable work experience while studying. He has been an undergraduate student researcher at Baylor University for combustion analysis used in NASA and SpaceX and an automation specialist for a chemical powerplant at Bechtel Corporation. While there, he led a

team of 18 to fix efficiency issues at the power plant.

In his application, Walker said the internship helped him soar in a professional environment that spanned all aspects of his academic and engineering career. “From an engineering perspective, I was able to learn and understand better ways to solve problems while also implementing economical and efficient technology into my solutions,” he said.

RETURNING SENIOR (2020 AWARDEE)

Caden Matson

University of Florida

Matson is pursuing a degree in mechanical engineering as well as an Engineering Leadership Certificate as part of a minor program. He will graduate in December.

“The ARF scholarship has been immensely helpful in easing the financial burden of college and allowing me to focus on my studies. As someone who goes to a public university as an in-state stu-

dent, a few thousand dollars per semester is able to cover almost my entire tuition fees and free up my time for projects that will better prepare me for the industry after graduation,” Matson said.

This summer Matson will be interning with Clauger in Jacksonville, Florida, and is looking forward to getting more hands-on experience in the refrigeration industry. “With only one semester left, I hope to be back working with the world of natural refrigerants after I graduate this coming December,” he said.

Matson said attending the IAR Conference is an amazing experience. “Everyone at ARF and IAR goes above and beyond to make our time there be filled with meaningful activities from dinners with various companies to meeting young engineers in the industry,” he said. “The entire weekend blew my expectations out of the water and got me so excited for the work I’ll be doing this summer.”

IIAR, RETA Celebrate and Encourage Women in the Industry

IIAR hosted its first women’s networking reception during the annual meeting and expo, celebrating women in the industry and providing a venue for them to connect.

“I’m always impressed with the women’s drive and what they’ve accomplished. We tend to be humbled by ourselves, but there are so many wonderful and smart women in our industry that it is nice to witness that appreciation,” said Beth Fox, evaporator product manager at Evapco.

The idea of a women’s networking event started as an information dinner at the last in-person IIAR meeting in Phoenix. “It was a pop-up event. A bunch of ladies decided to get together. From there, it was determined we’re all

cut from the same cloth and wanted to make it more formal,” Fox said. “It is a way to celebrate women.”

This time, it was more formal, with



the event scheduled in advance. “It was nice to see the support of the IIAR board of directors. If you were to have taken a snapshot of everyone in the area in Phoenix, it was all female. Then if you take a

snapshot of what took place in Savannah, you couldn’t tell if it was a women’s event or for everybody,” Fox said.

Melissa Cassell, finance director for General Refrigeration Co., said the events are open to everyone who believes in furthering and advancing women’s careers. “There are many men in our industry who have sought out and provided opportunities for women and I think it’s important that women without that support know that it does exist,” she said.

IIAR is focused on networking and support. “In an industry filled with men, it is sometimes hard to break the surface. We’re there to encourage women to get involved and write technical papers and make sure they know their voice and influence are as important as



the men in the industry,” said Eileen McKeown, vice president of marketing and sales for IIAR.

Cassell said support is critical. “In any industry that is primarily male-dominated such as ours, I believe it is natural for women to sometimes feel as though there are hurdles to their promotion and growth within their careers,” she said. “Our desire in bringing women in the industry together is to provide a support network to not only demonstrate the ability for women to succeed, but to also provide resources

Technicians Association (RETA) group Women in Natural Refrigeration, which was founded in 2018 as part of the RETA Training Institute to address the workforce development needs of the overall industry. WiNR is one of three RETA programs designed to encourage new entrants in the industry through networking, mentoring, and education.

“Over the last year, we pushed to take that on and run with it,” Smith said, explaining that WiNR’s mission is to dedicate time and space for career development for women.

WiNR hopes to focus on training in the future and possibly add a scholarship to bring young women to a conference or encourage their education.

The WiNR group has evolved significantly in the past six years, and the involvement and excitement behind it have grown exponentially, Cassell said. “I believe this group can really impact not only women currently in our industry but also the number of women entering our industry in the future,” she said.

While IIAR’s group isn’t run like WiNR, Smith said both groups connect many of the same people with the same objectives. “The biggest thing is that these groups can bring together familiar faces, so you don’t walk into a room without recognizing anybody,” she said. “I like how IIAR has kept it as an event for now because we all have so many things to go to at conferences.”

Some attendees even brought young daughters or students to the IIAR event. “That provides them opportunities to see what is going on,” she said. “People ask how I got into the industry, and I say by accident, but it doesn’t have to be. This group brings an opportunity to advocate and educate about the industry. The more generally our kids know about what we do and our colleagues do, the better equipped they’ll be to find their paths.”

Cassell said the number of women she has connected with in the past several years has been incredible. “When I first began attending conferences, women were typically seen primarily in the guest programs as wives of attendees,” she said. “Now when I attend conferences, it’s incredibly humbling to see the number of women attending conferences as representatives of companies within our industry.”

McKeown said IIAR hopes to continue to grow women’s initiatives. “It is a newly formed initiative within IIAR, and anyone who wants to be part of the conversation is welcome to take part,” McKeown said.

“I believe this group can really impact not only women currently in our industry but also the number of women entering our industry in the future.”

Melissa Cassell, finance director for General Refrigeration Co.,

and a network of support when women are facing situations that they are unsure of how to navigate.”

Stephanie Smith, senior engineer II for Risk Management Professionals Inc., said having a broad range of support is essential. “We need to allow men to come and support us as much as women supporting each other,” she said.

Fox said it is especially nice to see the young women coming into the industry. “Being one of the legacy women—I’ve been in 18 years—it is nice to see that support of the younger ones just starting in the industry and letting them know they’re not alone,” she said.

Smith, an environmental engineer, said her schooling was vastly male-dominated. “Everyone was very nice and accepting, but it has come a long way since then. We want to help those coming into the industry, so they don’t have to feel like they are the only woman in the room,” she said.

Both Smith and Fox are also involved with the Refrigerating Engineers &

Lois Stirewalt, a spokesperson for RETA, said WiNR has its roots in an informal get-together in 2016. During the RETA conference in Las Vegas, a small group of women in attendance decided to connect over dinner. “It turned into a fun, long evening, so we made a point to stay connected with email after that. Every time we had either an IIAR, RETA, or Global Cold Chain Alliance event, the same people started sitting together,” she said.

In 2018, RETA held a formal breakfast. “We had the speaker come and speak to the group of women. It was organized but was loosely organized,” Stirewalt said, adding that the event was held at the front end of the conference. “That way, you will have facial recognition and not feel so singled out in a traditionally male-dominated industry.”

WiNR also holds Zoom meetings with young women in Mexico. “Some of the women in our group have shared information papers about products and training,” Stirewalt said, adding that

Automatic Oil Return Systems: Why, When, and How?

MONIKA WITT, TH. WITT

Safe oil draining is a subject that is well documented in IIR publications, and workshops dealing with proper oil draining are always well-attended. Removing oil from an ammonia refrigeration system is routine maintenance that nearly every ammonia refrigeration system operator will encounter sooner or later.

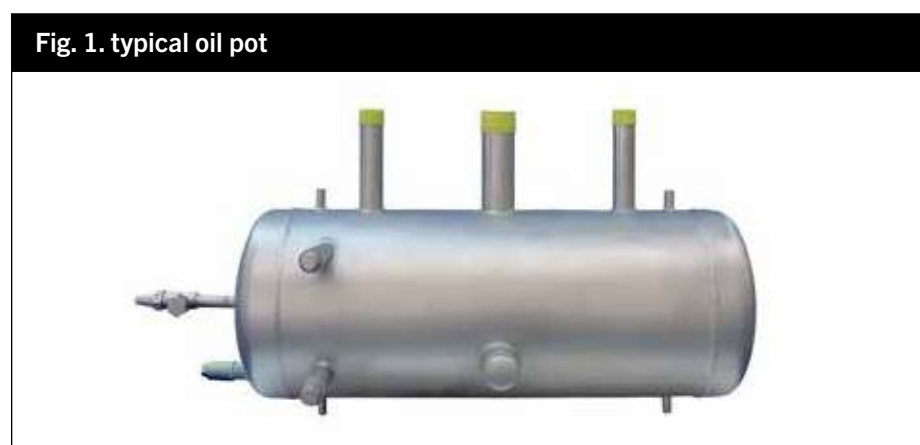
One major advantage of ammonia systems is that oils are not normally soluble with ammonia and will there-

part of the separator and route the ammonia/oil mixture to an oil drain vessel (oil pot) through a large connection on top of the oil drain vessel (refer to Fig. 1).

During normal operation, the refrigerant oil mixture enters through a sufficiently large valve (1), refer to Fig. 2. Generally, to remove the oil from the oil drain vessel, the supply line valve (1) and the equalizing line valve (3) are closed. Ambient heat will evaporate liquid ammonia and raise the pressure inside the oil collector vessel so oil can be drained

draining is a potentially hazardous activity.

One method of automatic oil return, for systems up to 2800 TR (10 MW) is described as follows (larger systems



fore collect at the lowest spot in the system. However, accumulation of oil is gradual, and the location for accumulation must be suitable, i.e., calm enough, such that oil gets a chance to settle. In some instances, the operator may only use visual indication such as of heavy ice build-up on the oil drain vessel to indicate oil draining is required.

These conditions are often underestimated. In some locations, oil cannot be drained because there is too much turbulence/boiling of the refrigerant-oil mixture, even though the conditions would seem to be ideal.

It is particularly hard to drain oil at heat exchangers (HX) because there is nearly always too much turbulence during operation. Sometimes it can take several days of idling and warming up until oil settles from the HX surfaces and collects at the lowest spot. It is therefore recommended that oil is removed before it can even enter the evaporator and start decreasing the heat transfer capability and overall system performance.

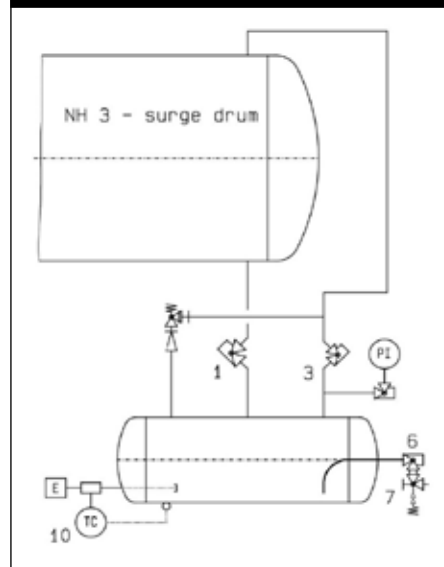
Traditional common practice has been to collect the oil in a sump or the lowest

through a stop valve (6) and a self-closing valve (7) into a suitable container. To speed up the process an electric heater element (10) can be used to evaporate the liquid refrigerant and increase viscosity. This is particularly helpful at low evaporating temperatures. The smell of ammonia usually cannot be completely avoided during the process of draining of oil. Drained oil is normally either discarded according to local environmental regulations or is recycled, but it is not normally re-used.

It is a good practice to dispose of the initial oil that is drained from a new system because it can contain dirt from piping and components that will be flushed out with the oil. Subsequently, the oil is mostly in good condition and could be re-used at least 2 to 3 times, depending on the outcome of the regular oil analysis that should be periodically conducted to check for contamination.

Using an automatic oil return system will not only save refrigerant oil (which has become quite costly) but also eliminates the need for manual oil draining. Overall safety is improved because oil

Fig. 2: schematic of oil drain vessel piping



can be equipped with two or more oil return pots in parallel). A vessel with an integrated mechanical valve that is activated with hot gas will collect the oil, refer to fig. 3. Like a manual oil collection vessel, the refrigerant/oil mixture enters through the top connection. Over time, liquid refrigerant boils off and escapes through the equalizing line into the separator and the vessel gradually fills with oil. The hot gas solenoid valve is opened when the oil sensor at the upper level of the oil collector vessel is reached. The hot gas entering pushes the mechanical valve upwards and the content of the vessel is pushed out through the discharge connection back to the compressor, refer to fig. 4. It is important the discharge tube inside the oil collector vessel does not extend all the way to the bottom. This ensures there is enough space for debris that collect within the lower part of the vessel which should not be conveyed back to the compressor.

The mechanical valve inside the oil collection vessel is designed with damping that avoids being moved up too

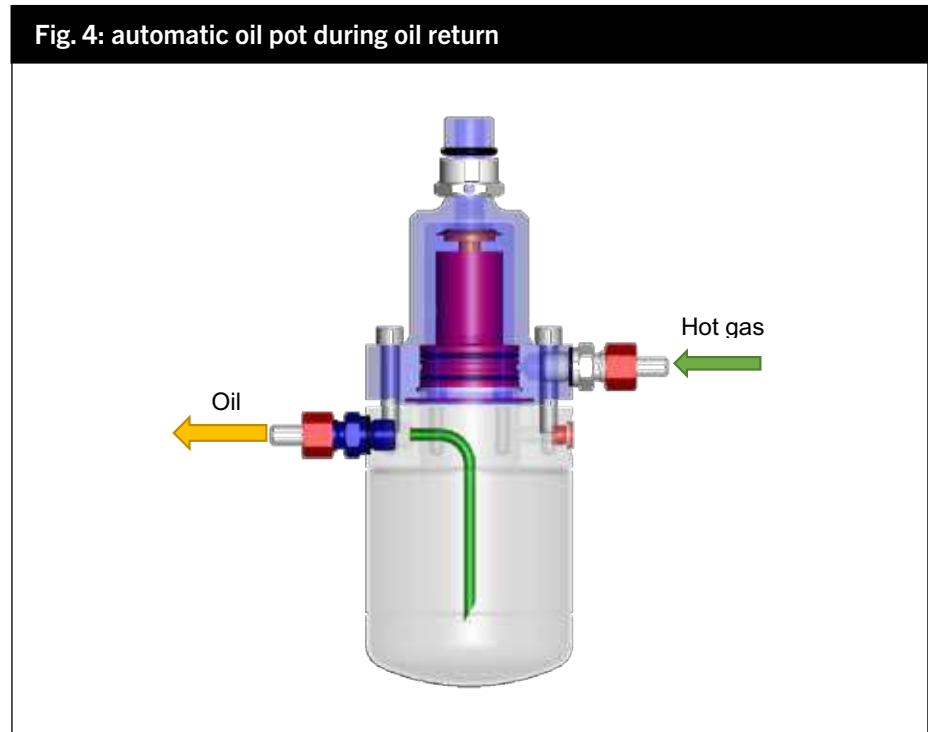
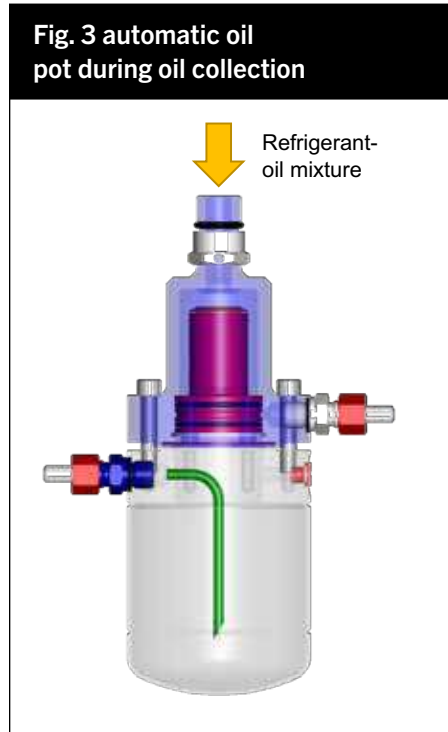
Automatic Oil Return Systems: Why, When, and How?

quickly and protects against damage to internal components and seals. Once the oil has returned, the hot gas supply is stopped and an integrated hole in the mechanical valve will equalize the pressures between the separator and

tivity of hot gas at about 58-116 psig (4 – 8 barg) is taken to the BDP.

Although it is mostly oil that is pushed back to the compressor, there may still be some liquid refrigerant residue left in the returned oil. It is therefore recom-

a screw compressor (schematic B and C). An oil filter (OF) in the outlet of the heat exchanger will ensure only clean oil is returned. Optional sight glasses (SG) are available and allow the returned oil to be visually checked.

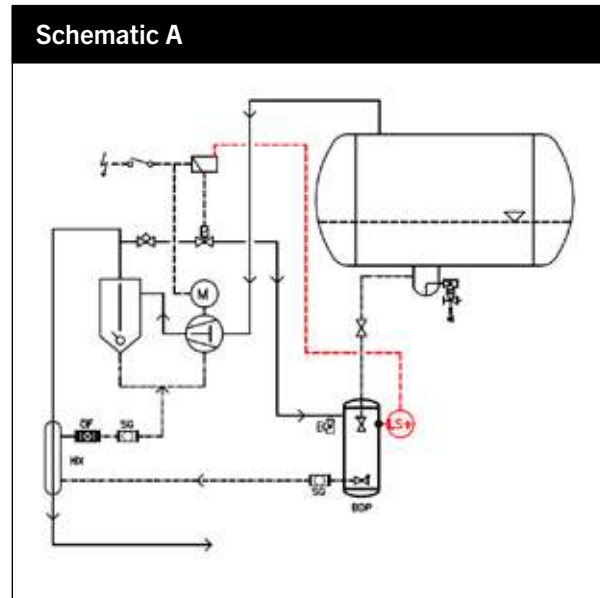


the oil collector vessel. This permits the mechanical valve to fall open by gravity and the cycle to commence again.

The selection of the correctly sized oil collector pot depends on the size of the system and the oil carry-over from the compressor. Unless otherwise declared, 15ppm oil carry-over can be assumed for new compressors and existing systems may go up to 30 ppm. While automatic systems could handle even more carry-over design improvements should be considered for a system that exhibits carry-over exceeding 30 ppm.

Activation of the hot gas supply can be accomplished with different methods, as shown in the following schematics A, B, and C. In all schematics, the oil collecting pot with an internal plug is shown as BDP.

Schematic A represents the most common method to activate the oil return cycle. This method uses an oil sensor (LS) installed at the upper level of the oil collector pot that activates the solenoid valve as mentioned above. The regulating valve behind the small line coming off the compressor discharge pipe will ensure that only a small quan-



mended that the drained oil be passed through a heat-exchanger, shown in the schematics as a tube-in-tube heat-exchanger with hot gas in the inner pipe (HX). Any remaining liquid refrigerant is evaporated before oil is returned to the crank case of a reciprocating compressor (schematic A) or into the suction line of

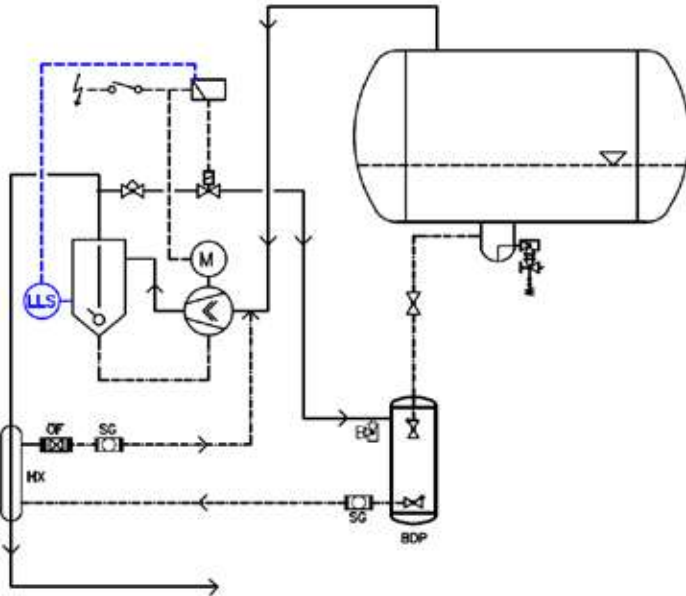
Another option to actuate the solenoid hot gas valve that supplies the BDP is by a sensor installed at the low point of the oil separator (LLS) as shown in schematic B.

It is also possible to simply activate the oil return once or twice a day without a need for an oil sensor by means of a simple time control (as in schematic C). Note that using time control or level control on the compressor's oil separator will always require a heat-exchanger (HX) to be included downstream of the return line because

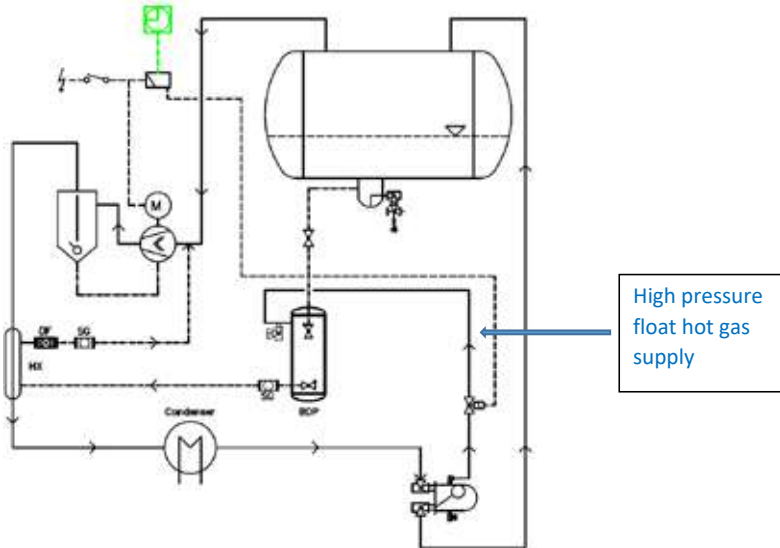
the amount of liquid refrigerant in the oil is undetermined.

The hot gas needed to activate the automatic oil return system can also be taken from the top service valve of a high side float regulator (as shown in schematic C) when it is more convenient for installation.

Schematic B – Liquid Level Sensor



Schematic C – Automatic Timer



An advantage of taking hot gas from the high side float regulator is the lower temperature, as the gas is no longer superheated. This extends the lifetime of sealing materials. However, superheated hot gas from the compressor works as well.

Although such a design should provide maintenance-free operation, experience has shown that it is good to allow access to the oil collector vessel when needed (e.g., for cleaning when there is

a high degree of oil contamination).

At evaporating temperatures below -22°F (-30°C) oil may not be viscous enough (like honey) and it has proven good practice to wrap self-regulating heat trace around the oil collecting pot to achieve higher oil viscosity.

In Europe, the use of automatic oil return systems typically pays back (or makes its ROI) after about two years of operation, just from the oil that is saved.



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IIAR Continues Work Updating and Developing Standards

IIAR is known for its development of standards, and to date, IIAR has published nine ammonia standards and one CO2 standard. Per ANSI requirements, each standard must be updated at least every five years.

“In this past year, IIAR has updated its flagship IIAR-2 standard, and released a new CO2 standard,” said Gary Schrift, president of IIAR. “We also publish our standards in Spanish and this past year, four of IIAR’s 10 standards that were updated or created in English in recent years are now updated and published in Spanish, resulting in 9 of IIAR’s 10 standards updated in Spanish, with our most recent IIAR-2 2021

English update translation underway.”

Don Faust, training manager for Johnson Controls, said two standards currently under public review are IIAR-1 and IIAR-3.

IIAR-1 focuses on definitions. “It is interesting. We’re looking at how the industry defines terms,” Faust said.

One definition that arose is that of liquids, which can be inert, combustible, or flammable. “We always had an OSHA definition of what a combustible liquid is and what a flammable liquid is. You have to handle them differently,” Faust said.

The definitions all changed in 2019, so what constitutes a flammable or

combustible liquid is different now, and there is a worldwide organization, Global Harmonization System (GHS), trying to get everyone’s definitions together. “We’re keeping our standards up with global harmonization,” Faust said.

The IIAR-1 revision is out for public review and should be published by the end of the year.

The other standard under revision is IIAR-3, which focuses on valves. “It is different from all of the other IIAR standards. It is a performance standard. We’re trying to have somebody who manufactures ammonia valves meet certain minimum criteria for how tight it is, how well it seals, flow rates and

Standards at a Glance

2021-2022 Accomplishments

Standards Completed:

IIAR 2-2021: Design of Safe Closed-Circuit Ammonia Refrigeration Systems

IIAR CO2-2021: Safety Standard for Closed-Circuit CO2 Refrigeration Systems (Industrial & Commercial)

Spanish IIAR 4-2020: Installation of Closed-Circuit Ammonia Refrigeration Systems

Spanish IIAR 5-2020: Startup of Closed-Circuit Ammonia Refrigeration Systems

Spanish IIAR 8-2020: Decommissioning of Closed-Circuit Ammonia Refrigeration Systems

Spanish IIAR CO2-2021: Safety Standard for Closed-Circuit CO2 Refrigeration Systems (Industrial & Commercial)

Guidelines Completed:

Insulation Installation Guideline

Critical Task Guidance for Ammonia Refrigeration System Emergency Planning



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seals, ratings, traceability,” Faust said, adding that it is a significant revision. “That will help establish IIAR-3 as the standard for industrial ammonia refrigeration valves.”

IIAR is developing its hydrocarbon standard, which has not yet been put out for review. “We start addressing some of the safety issues around hydrocarbons,” Faust said. “It is a first for our industry. It is groundbreaking.”

IIAR-2 underwent an extensive revision last year, and several Spanish standards were updated.

IIAR 6, which is inspection testing and maintenance of refrigeration systems, has been out for several years, but OSHA and EPA have not been issuing citations based on non-conformance with IIAR-6.

“At some point, they will end the grace period and start to enforce IIAR-6. I want our members to be aware that just because you haven’t seen any fines for it doesn’t mean there won’t be any fines,” Faust said. “The expectation from regulators is end users are incorporating this into their standards and inspections.”

Faust said IIAR-6, the inspection testing, and maintenance standard is the most groundbreaking for the industry. It took 10 years to write, and it wasn’t always popular with our membership. “OSHA said,

‘If you don’t write an ITM Standard for your industry, we’ll apply some other industry standards to yours. This gave us the drive to complete this Standard.

During the IIAR annual meeting and expo, Schrift reminded members that IIAR standards have been adopted in the U.S. by all major code bodies deferring to the IIAR standards for ammonia refrigeration systems, with adoption by the IFC, International Fire Code, being the most recent. In addition, four Latin American countries, India, China, and Singapore have adopted or are in the process of adopting the IIAR standards for their ammonia refrigeration systems.

IIAR is always looking for volunteers who want to contribute and welcomes new members to the Standards Committee, which is the largest committee. “We have more than 120 contributing members,” Faust said. “We always want to hear what they think.”

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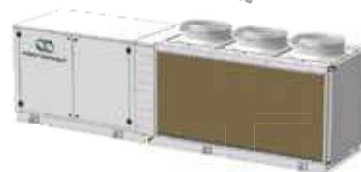
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Tax Planning for Each Generation

The utility of different tax strategies can fluctuate with your age and where you are in your career. Below we'll take a look at how various tax strategies may apply to each generation.

GENERATION Z

Whether they're working part-time during high school or starting a career, members of Generation Z typically fall into one of the lower income tax brackets. As a result, they may benefit from funding a Roth IRA (or Roth 401(k) if offered by an individual's employer).* Although Roth IRAs are funded with after-tax money, the account grows tax-

ibility of contributions to a traditional IRA depends on the taxpayer's modified adjusted gross income and whether the taxpayer is covered by an employer-sponsored retirement plan.* Although growth that occurs within a traditional account is tax-deferred, withdrawals are considered ordinary income. As a result, traditional accounts work best when a taxpayer anticipates that retirement income will be subject to lower tax rates than his or her current income.

RETIRED MEMBERS OF GENERATION X AND BABY BOOMERS

Retirees with assets in retirement accounts may consider using the following strategies to minimize future income tax liability.

For individuals currently in a lower tax bracket, a contribution to a Roth account may be preferable to a contribution to a traditional (tax-deferred) account because the tax-deferral benefit inherent to a contribution to a traditional account is less beneficial to a taxpayer in a lower tax bracket.

free. After the account owner reaches age 59 ½, withdrawals will also be tax-free. For individuals currently in a lower tax bracket, a contribution to a Roth account may be preferable to a contribution to a traditional (tax-deferred) account because the tax-deferral benefit inherent to a contribution to a traditional account is less beneficial to a taxpayer in a lower tax bracket.

MILLENNIALS AND WORKING MEMBERS OF GENERATION X

Generally, the benefits associated with tax-deductible contributions to a traditional retirement account increase as a taxpayer moves into a higher marginal tax bracket. Consequently, millennials and members of Generation X may want to prioritize contributions to traditional retirement accounts as they enter their higher-income years. All contributions to a traditional employer-sponsored retirement account are deductible up to the contribution limit. The deduct-

Converting assets from a traditional account to a Roth account

A Roth conversion allows a taxpayer to strategically move assets from a traditional account to a Roth account. The converted amount is taxed as ordinary income in the year of conversion. Account growth that occurs after the conversion is tax-free at the time of distribution. Roth conversions are often executed during the low-income years following retirement but prior to the start of Social Security benefits and/or required minimum distributions from tax-deferred accounts. A Roth conversion can have significant consequences, including increased Medicare premiums, increased taxation of Social Security benefits, and increased Net Investment Income Tax liability. Be sure to consult with your tax professional if you are considering implementing a Roth conversion strategy.



Executing a Qualified Charitable Distribution (QCD)

A taxpayer age 70 ½ or older may choose to transfer up to \$100,000 per year from his or her traditional IRA to a public charity. QCDs are often used to satisfy a taxpayer's required minimum distribution. Any amount transferred in this manner is excluded from the taxpayer's adjusted gross income. This provides a great opportunity for taxpayers taking the standard deduction who generally don't receive a benefit for charitable contributions. Additionally, a QCD can potentially have a positive impact on a taxpayer's Medicare premiums. For more information on QCDs, contact your Stifel Financial Advisor and consult with your qualified tax professional.

IMPORTANT DISCLOSURES

The IIAR and ARF reserve investment funds are currently managed by Stifel Financial Services under the investment policy established by their respective board of directors. Members of IIAR may use the services of Stifel for personal and business investments and take advantage of the reduced rate structure offered with IIAR membership. For additional wealth planning assistance, contact your Stifel representative: Jeff Howard or Jim Lenaghan at (251) 340-5044.

Stifel does not provide legal or tax advice. You should consult with your legal and tax advisors regarding your particular situation.

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EPA Continues Work to Implement AIM Act

iiar government

RELATIONS

BY LOWELL RANDEL, IIAR GOVERNMENT RELATIONS DIRECTOR

The Environmental Protection Agency is continuing its work to implement the American Innovation and Manufacturing (AIM) Act of 2020. The AIM Act authorizes EPA to address HFCs in three main ways: (1) phase-down HFC production and consumption through an allowance allocation and trading program (2) Facilitate sector-based transitions to next-generation technologies through restrictions on HFCs, and (3) Promulgate certain regulations for purposes of maximizing reclamation and minimizing releases of HFCs and their substitutes from equipment. EPA recently held a series of public meetings in March 2022 to discuss the agency's plans for future rulemaking and to seek stakeholder input. Representatives from IIAR participated in these meetings and are continuing to work closely with EPA and industry partners.

These meetings build on a series of actions that the EPA has taken in recent months. In October 2021, EPA published a Final Rule establishing an HFC allowance allocation and trading system to phase down HFCs. From 2022 to 2050, cumulative net benefits are estimated to be over \$272 billion, and total emission reductions are projected to be the equivalent of 4.6 billion metric tons of CO₂ or nearly equal to three years of U.S. power sector emissions at 2019 levels. HFC allowances for calendar year 2022 were issued Oct. 1, 2021.

Under the AIM Act authority, EPA may by rule restrict the use of HFCs in a sector or subsector in which the HFC is used. EPA has acknowledged that restricting HFC use in certain sectors or subsectors where there are alternatives could support smooth transition and the economy-wide HFC phasedown goals of the AIM Act. This would result in reducing HFC use and emissions while promoting U.S. innovation in the development of substitutes

and alternative technologies. The AIM Act provides that a person or organization may petition EPA to promulgate a rule for the restriction on use of a HFC in a sector or subsector, such as refrigeration. Petitions submitted to EPA must be acted upon within 180 days, and if granted, EPA must complete a rulemaking within 2 years.

In 2021, EPA received a number of petitions to restrict HFCs in the refrigeration sector, including one from IIAR. IIAR's petition, along with several others from industry and environmental groups, was granted. Granting petitions does not mean EPA will propose or finalize requirements identical to the petitioners' request. However, by having a granted petition, IIAR is well-positioned to influence the process moving forward. EPA has indicated that it plans to address the granted petitions in a single rulemaking. Under the procedures established in the AIM Act, EPA is required to issue a Final Rule two years from granting a petition, which would be October 7, 2023.

In addition to restricting HFC use in various sectors, EPA is also establishing a system to track and allocate HFCs. As of January 1, 2022, allowances are needed to produce or import bulk HFCs (with limited exceptions). Producing HFCs requires expending both production and consumption allowances while importing HFCs requires expending consumption allowances. EPA has set the target of 40 percent reduction from baseline starting January 1, 2024.

The HFC Allowance Allocation and Tracking Program also has a robust enforcement and compliance system. The program requires advance reporting so EPA can monitor imports in real-time and flag suspect shipments. EPA also requires electronic tracking for movement of HFCs through commerce (QR codes) starting January 2025. Over the next 5 years, the program will phase in use of only refillable cylinders and will

prohibit single-use disposable cylinders. The transition will be a two-step process. First, starting in July 2025, new disposable cylinders will be eliminated. Then, starting in Jan 2027, industry will be expected to retire those that remain in the market. The system will require recordkeeping and reporting, labeling, auditing, and data transparency. EPA will have the authority to use administrative enforcement actions such as revoking or retiring allowances, as well as potential civil and criminal enforcement actions.

EPA also provided notice that on March 31, 2022, the Agency issued hydrofluorocarbon allowances to applicants that met the applicable criteria from the set-aside pool established in EPA's 2021 final rule titled Phasedown of Hydrofluorocarbons: Establishing the Allowance Allocation and Trading Program under the American Innovation and Manufacturing Act. In accordance with this final rule, the agency redistributed allowances remaining in the set-aside pool to entities that received general pool production and consumption allowances on October 1, 2021. Both the set-aside allocation and the general pool reallocation were announced on the Agency's website on March 31, 2022, and entities were notified either by letter or electronic mail of the allocation decisions. The agency also provided notice to certain companies on March 31, 2022, that the agency intends to retire an identified set of those companies' allowances in accordance with the administrative consequences provisions established in the final rule.

The AIM Act and resulting phasedown of HFCs provides an important opportunity to promote the benefits of natural refrigerants. IIAR will continue to work closely with EPA and other partners as implementation moves forward to ensure that the forthcoming policies and rulemakings are well informed by the natural refrigeration industry.



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Learning About Learning

KEM RUSSELL, P.E

Many times we don't think about how we learn, which is something we are or should be doing most of our lives. This fact was brought home to me this past winter as I became involved as an instructor in a winter sport I like. As I was learning to be an instructor and understanding how people might learn I could see a correlation between what and how someone is teaching and how people learn.

Our learning preferences could be considered to be made up of two basic components: how we perceive and communicate information, and how we process that information. It is likely apparent that these two basic components will be different for different people. These will be affected by a person's age, mental and emotional state, culture, past experience, upbringing, etc.

The learning styles that we each use can be broken into the following: Visual, Auditory, Kinesthetic, and Reading and Writing. Briefly, here is an overview of these four learning styles:

Visual: A person is better able to retain information when it's presented in a graphic depiction (think computer control system displays and what is happening in a system both currently and

analyzing historical information), charts, diagrams (think P&ID's, process flow diagrams, etc.) to emphasize specific design elements and operations in a system or piece of equipment.

Auditory: Someone who prefers listening to information presented audibly (think technical presentations, webinars, etc.).

Kinesthetic: These are "hands-on" learners who thrive when engaging all of their senses.

Reading and Writing: Learners who succeed with written information from written procedures (operation and maintenance), equipment manuals, presentations like from past IIAR or RETA conferences (again reading technical presentations and information from vendors), etc. Usually, note-takers (could be handwritten or on an electronic device) perform well when they can reference written material.

Each of us can likely associate with one of the above four learning styles, but we also may realize that our learning styles can vary during different occasions or be some combination of styles. Similar to the learning preferences stated above, several factors can affect how we learn such as education level, experience, mental and emotional state, physical condition, age, etc. Just imagine attending an IIAR confer-

LESSON LEARNED?



ence technical session after spending a late night out socializing. When you sit down to listen and learn at an interesting presentation your mental state may be pretty foggy, and your physical condition is stressed from too much good food, drink, and lack of sleep. Even if you don't doze off during the presentation, the amount you learn will be diminished. Fortunately, IIAR has all technical presentations saved for later reading (and in some cases viewing) when you are at or near your peak performance level.

You might have a good idea of what your primary learning method is, or you may need to spend some time thinking about how you learn best. Remembering that how we learn best will vary many times with what and where we are trying

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LESSON learned

to learn. I would guess that many of us can see in someone else what seems to be their primary learning method. I have worked with people that are strong kinesthetic learners. Many technicians seem to learn this way. Some may not read or write well or don't really understand just listening to someone talk (auditory). However, they may start the learning process by watching (visual), but if they can put their hands on it they can master something fairly quickly.

The location where the learning is to take place will also impact how much and how fast we might learn. It should be obvious that distractions should be eliminated or at least greatly reduced. Imagine trying to learn something while someone near you is using a jackhammer. Or your phone keeps getting calls or your computer gets a multitude of emails. Or others are talking. Or it's hotter than ... well you get the idea. If you want to learn something try to control or eliminate as many distractions as you can. In addition, you need to put in enough time and effort.

This winter I had a 6th grade Language Arts teacher as a student, and I asked her about how teaching was going. She said "It has become more and more difficult to teach the students. Most of them have the attention span of a goldfish." I asked what

she thought seemed to be causing the short attention span. She answered that most of the students have become used to getting a lot of their learning through almost instant feedback. For example, social media, texting, video games, and other entertainment sources. The students are not used to having to put in much effort or focusing on something for a long enough time to learn.

Do you put in the time and effort to learn? How much time and effort might that be?

Most people have heard of the 10,000-hour guideline popularized by Malcolm Gladwell's book "Outliers: The Story of Success" to get good at something, to master it.


This is not a hard and fast rule. If you are going to be a really good designer, builder, operator, or maintainer of refrigeration systems the time and effort you put in must be from knowledgeable and reliable sources. Also, you must have learning experiences (challenges) for a long enough time period that can help you achieve higher skill levels and understanding. The quality of your learning matters. Without a doubt, you still must put in the time and effort to get good at doing whatever you're trying to get good at.

So, you have figured out what your

learning style is, which likely varies with the subject, and you are putting in the time and effort to learn from quality sources. What's next? Don't stop learning!

Learning should be a lifetime process and as uncomfortable as it might seem to be we need to expand our learning comfort zone. Try learning something new. You might also consider re-learning something you haven't used or done in a long, long time. What you start learning might be directly related to industrial refrigeration or some field you think might be interesting. You might look into how to use/apply other natural refrigerants, a better understanding of some new piece of equipment, a better understanding of some different process, etc. IAR has developed many ways we can continue our learning from annual conferences, involvement in committees, the library of technical articles, monthly webinars, videos, Academy of Natural Refrigerants, Guidelines, and Standards. We also have access to many very knowledgeable and experienced people that can further our learning.

How do we learn? Know your learning style, put in the time and effort, and keep learning!



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Low pressure-drop ball valves can greatly reduce energy costs

800 psig SWP @ -70°F for ammonia, CO₂ and other approved refrigerants

Ideal for: Low-Temperature Suction, Blast Freezers, Transfer Vessels

No painting or costly plating required

3" MCBV (shown)

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ATI has Replacement Ammonia Gas sensors for many Honeywell, Manning & Calibration Technologies models.

SENSOR OPTIONS



MANNING/HONEYWELL REPLACEMENT



PORTABLE SENSOR

For over 15 years, ATI has manufactured the ammonia sensors used in your Manning Systems leak detectors. Now, you can buy direct from the source and save time & money.

- Economical, Dependable, and Direct from the Manufacturer.
- 18 Month "no hassle" warranty. New sensors supplied at half off if required less than 18 months from shipment.
- And, we offer our own gas transmitters and alarm systems for your expansion needs.

LOCATE NH₃ LEAKS



C16 PortaSens II Portable Ammonia Detector

ATI's C16 PortaSens II portable leak detector is used to check for gas leaks in storage areas, around process equipment and piping, and in confined spaces prior to entry.

FEATURES

- Interchangeable "Smart Sensors" for Over 30 Gases
- NH₃ Sensors from 0-50 to 0-2000PPM



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Announcing NEW IIAR Member Structure!

**The IIAR has significantly INCREASED
MEMBER BENEFITS and
updated member rates.**



**Beginning July 1, 2022 for IIAR membership year
July 1, 2022 to June 30, 2023 the IIAR rate structure will be:**

NEW IIAR Member Benefits

**FREE eReader access to
IIAR Standards**

**FREE access to 1 online
education program per
member – members choice
– PDH Credits apply**

**FREE access to 1 IIAR
Training Video Series per
member – members choice
– PDH Credits apply**

**FREE access to the IIAR
Conference Technical
Content online – PDH
Credits apply**

Individual Membership

The price of an individual membership is the same for all IIAR Regular Member Categories*

\$1,000 – per individual

Group Membership

The price for group membership is the same for all IIAR Regular Member Categories*. A Group membership must be comprised of individuals from the same company or company subsidiary.

\$2,000 – 2 to 5 individuals

\$4,000 – 6 to 10 individuals

\$6,000 – 11 to 15 individuals

\$8,000 – 16 to 20 individuals

\$10,000 – 21 to 25 individuals

\$100 for each individual above 25

Special Membership

Special Membership Categories include Academic, Retired, Affiliate and Student. Structured group discounts do not apply to special membership categories.

\$100 – per individual

VOICE ADDS IMPACT TO OUR INDUSTRY.



IAR Member App

Continuing IAR Member Benefits

Access to the IAR eLibrary which includes hundreds of peer reviewed technical papers, IAR Standards, access to superseded IAR Standards and Bulletins and the Ammonia Data Book

Significantly discounted rates on attendance at the IAR Natural Refrigeration Conference & Expo, IAR Publications and Guidelines, and special programs.

Access to the online IAR Education Webinars
– PDH Credits apply

IAR Communications including Technical, Regulatory and Industry updates

If you have questions regarding the membership structure please contact us at membership@iiar.org

To access our online Membership FAQ sheet go to www.iiar.org/membershipfaq



IAR Member Categories

*Regular Member Categories

Contractor – Principle business is installation/service/maintenance of refrigeration systems

Engineer – Principle business is design of refrigeration systems

End User I – User of ammonia refrigeration, e.g., refrigerated warehouse, food processor, etc., multiple facilities over 10,000 pounds

End User II – User of ammonia refrigeration, single facility with less than 10,000 pounds of ammonia

Manufacturer – Manufacturers of ammonia/industrial refrigeration equipment/components

Manufacturer's Representative – Principal business is the marketing/sales of industrial refrigeration equipment

Other – Utility companies, Consultants, Trainers

Wholesaler – Wholesaler or supplier of ammonia or other type of refrigerant

Special Member Categories

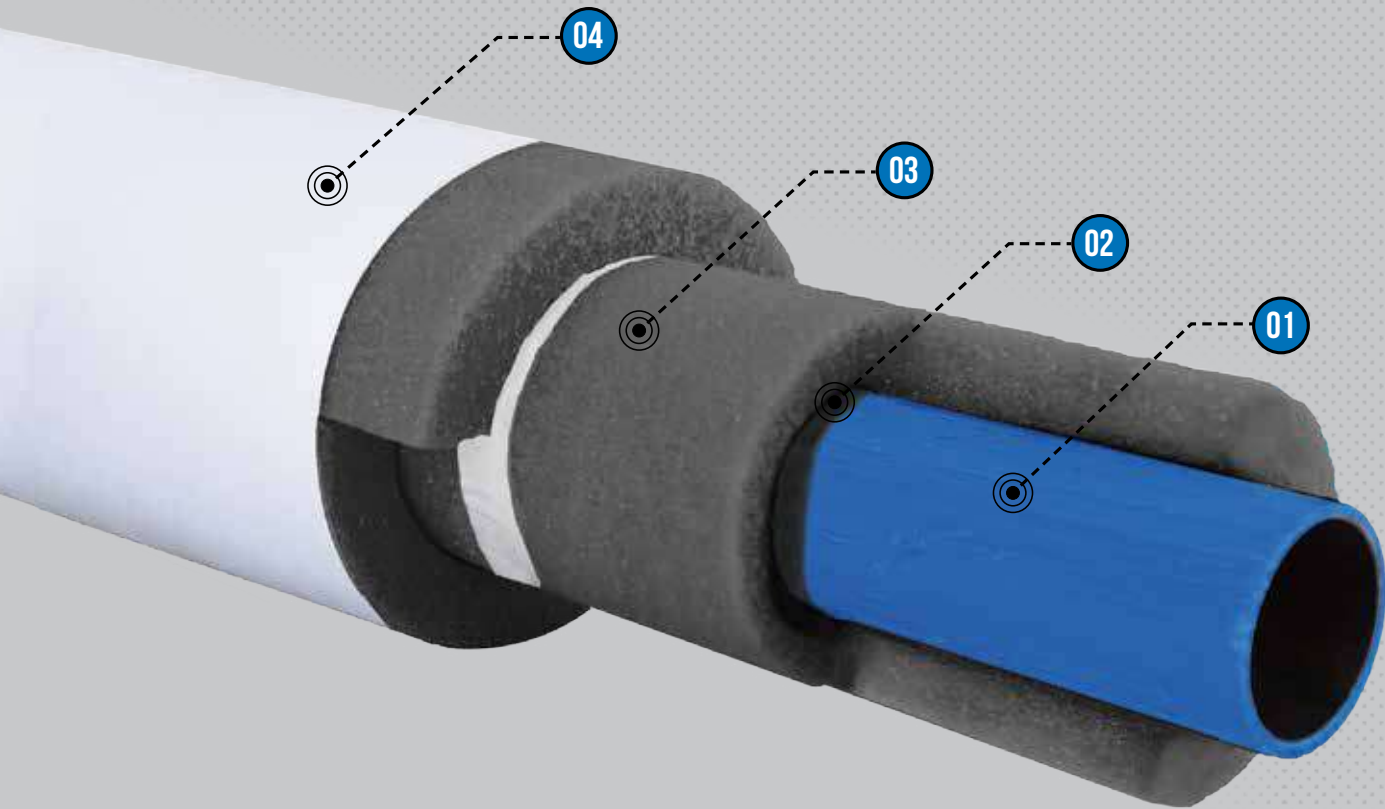
Academic – Instructors, Professors, Researchers, etc.

Affiliate – Code Groups, Insurance Companies, Regulatory Agencies

Retired – person no longer gainfully employed in the industry on a full-time basis

Student – Must provide name of academic institution where enrolled & student photo identification

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- 02** VaporGuard[™] for use as a vapor stop on sub-freezing insulation systems.
- 03** DuPont[™] Styrofoam[™] insulation provides long-term stable R values.
- 04** The insulation is covered with Polyguard ZeroPerm[®] or Insulrap[™] vapor retarders to keep the insulation dry. Or complete the system with our Alumaguard[®] family of flexible weatherproof cladding products.

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Today, our 90,000-square-foot factory on our 13-acre campus produces process-critical, custom-engineered systems; screw compressor packages; chillers; heat pumps and controls — all backed by a comprehensive service platform in conjunction with experienced and qualified refrigeration contractors throughout North America.

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