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May 2017 Vol 17 | No 5

PLUMBING

Applying Profit Margins

p 20

HYDRONICS

Boiler Report Full Steam

p 70

GREEN

The Big Storage Room

p 160

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A Search for the Perfect Plumber

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COVER STORY

A Search for the Perfect Plumber

Lexington Institute reaches out to young technicians in the making. p 146



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PLUMBING

- 34** **Flint Water Infrastructure Conference**
Leaders and residents gather for three-day event.
- 50** **One Design Does Not Fit All**
Defining sustainability and usability in bathrooms.
- 54** **Reverse Osmosis**
Water treatment in Mexico hotels addresses consumption.

HYDRONICS

- 62** **Harvey Ramer**
Hot water for dairy farms, a complicated process.
- 70** **Boiler Report Full Steam**
Industry advances comfort and more.

BUSINESS RESOURCES + TOOLS

- 138** **Heather Ripley**
Reviews and stars affect your online reputation.
- 142** **Ellen Rohr**
Leave room for the wormhole when chasing dreams.
- 150** **Inside Milwaukee Tool's Sawzall Factory**
Behind-the-scenes look at first-ever media tour.

GREEN SYSTEMS

- 156** **Jay Egg**
Nashville airport's geothermal legacy is HVAC success.
- 160** **Max Rohr**
Shop class should be a priority for future students.

MECHANICAL CONTRACTING

- 174** **MCAA Convention Recap**
Biggest show in years addresses technology, economy, incoming workers.
- 182** **Venting Systems**
What you need to know about standards and testing.

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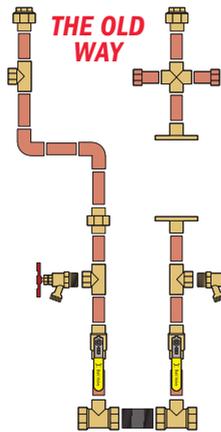
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CONTENTS | MAY 2017

INDUSTRY NEWS

- 8** Sato Toilet selected as finalist in World Changing Ideas Awards
- 10** Taco Comfort Solutions wins local safety award
- 12** PHCC'S events reinforce value of targeted programming
- 13** Mestek promotes seven employees throughout core business units
- 14** Bill Lee, Lee Co., considers running for Tennessee governor
- 15** Kohler Signature Store first retail space to receive LEED Gold certification
- 16** New Fernco app finds products instantly

VIEWPOINT

- 194** Spring, Geese, Boilers And Other Things



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Direct subscription inquiries to:

Cynthia Lewis, Creative Data Services
440 Quadrangle Dr Suite E
Bolingbrook, IL 60440
clewis@cads1976.com
630-739-0900 x203 Fax: 630-739-7648

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EDITORIAL OFFICES

6201 Howard St., STE 201
Niles, IL 60714
Phone: 847/564-1127
Fax: 847/564-1264
publisher@tmbpublishing.com

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Steven Nudelman	Chip Greene

SALES OFFICES

MIDWEST, SOUTHEAST, EASTERN CANADA

David Schulte, Sales

Phone: 847/564-1127
dave@tmbpublishing.com
6201 Howard St., STE 201
Niles, IL 60714
Phone: 847/564-1127
Fax: 847/564-1264

EAST

Brad Burnside, Publisher

Phone: 847/564-1127
brad@tmbpublishing.com
6201 Howard St., STE 201
Niles, IL 60714
Phone: 847/564-1127
Fax: 847/564-1264

WEST, TEXAS

Scott Reimer, Sales

scott@tmbpublishing.com
6201 Howard St., STE 201
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Sato Toilet selected as finalist in World Changing Ideas Awards



The SATO toilet is designed for use in Sub-Saharan Africa as a seated sanitation solution.

LIXIL Corp. announced its SATO toilets have been selected as a finalist for Fast Co.'s World Changing Ideas Awards in the Health and World Changing Idea categories. The World Changing Ideas Awards recognize companies for creating new concepts, products and projects that can potentially transform people's lives and improve the world.

"Receiving this prestigious recognition for our SATO products, and its role in improving health

around the globe, is a sincere honor. We are deeply committed to improving sanitation and hygiene conditions globally by increasing access to these innovative products in developing countries," said Jim McHale, Ph.D., vice president and general manager of LIXIL's SATO business unit, and co-inventor of the SATO toilets.

McHale added, "The original SATO toilet was the first step in developing a full-line brand of bathroom products created for

people living without access to clean sanitation facilities."

SATO toilets are designed to provide a sanitation solution that does not require water and sewer infrastructure. Created to improve the user experience and safety of open-pit latrines in developing countries, SATO toilets utilize a counter-weighted trap-door to minimize odors and the transmission of disease. The first hygienic SATO toilet was developed by American Standard, part of LIXIL, with support from the Bill and Melinda Gates Foundation in 2012. More than 1 million units are currently in use in over 14 countries, starting with Bangladesh and now including the Philippines, India, Uganda, Kenya and Haiti. They are available in a number of variations that take into account local needs.

LIXIL has set a target of improving access to sanitation and hygiene for 100 million people by the year 2020.

Launched this year, the World Changing Ideas Awards showcase 12 winners and nearly 200 finalists from a pool of more than 1,200 entries in categories ranging from Food to Energy to Developing World Technology. A panel of judges selected winners and finalists from entries hailing from across the globe.

Visit www.lixil.com

Aquatherm North America Opens 82,000 square foot headquarters and fabrication facility

Instead of a traditional ribbon-cutting, the grand opening of Aquatherm North America's brand new headquarters featured a heat-fusion ceremony to illustrate the connection and bond between Aquatherm Worldwide and Aquatherm North America.

Aquatherm North America, the U.S. and Canadian subsidiary of polypropylene-random (PP-R) pipe system manufacturer Aquatherm Worldwide, held a grand opening ceremony and open house to celebrate its new 82,000-square-foot

headquarters and fabrication facility in Lindon, Utah.

Utah Lieutenant Governor Spencer J. Cox, Lindon Mayor Jeff Acerson, and Aquatherm Worldwide executive leadership addressed the crowd of more than 75 guests assembled to see the new facility. Aquatherm leadership traveled from the Worldwide headquarters in Attendorn, Germany, to participate in the occasion.

According to Cox: "As Aquatherm was looking around for a location in the United States, [the leadership] looked at several other states and chose Utah. Although there were many reasons for choosing Utah ... most importantly, it was about the people. Aquatherm has a culture of caring about people. It's a family-run company whose values and culture will fit perfectly here in Utah."

The symbolism of the partnership was represented by a ceremonial



heat-fusion connection, which joined two pieces of 6-in. Aquatherm Blue Pipe together, one labeled with a German flag and the other with U.S. and Canadian flags.

"This building, its inventory, and the services Aquatherm North America can now provide in a more comprehensive way, is proof of this commitment to our partners and customers. This building also stands as evidence of Aquatherm Worldwide's commitment to remain

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the market leader in polypropylene-random (PP-R) pipe systems in North America,” explained Aquatherm Worldwide Co-Managing Director Dirk Rosenberg.

Attendees toured the new facility, which features ample space for operations, including office space for corporate staff, engineering, and quality-assurance laboratories; extensive warehouse space; and a state-of-the-art design and fabrication facility. The warehouse now represents one of the largest concentrations of PP-R piping in North America and will provide customers access to a full inventory line of Aquatherm piping systems ranging from ½- to 24-in.

During the open house, the company’s Design and Fabrication Services Team also performed multiple demonstrations showcasing large-diameter fusion, custom spool and manifold design and creation, and the new Hot Tap Tool, which was designed in partnership with McElroy.

Visit www.aquatherm.com

LG Air Conditioning Technologies appoints new industry veterans

LG Electronics USA Air Conditioning Technologies has added two more industry veterans to the sales organization: William Danford, named as Northeast regional manager; and Sean Boyer has been named director of innovation and customer experience.

Danford joins LG with more than 25 years of HVAC experience. He previously held key management and sales roles for Johnson Controls and York International.

Boyer will be responsible for customer support, sales systems, training and inventory management. Boyer joins LG with a decade of industry experience and proven track record of success at Fujitsu General America, Haier America

and Mitsubishi Electric Cooling & Heating.

“At LG, we have an unparalleled commitment to our customers to deliver innovative technology that secures our position as a leader in our industry. For that reason, it is critical that we recruit and retain the best and brightest in the industry,” said Kevin McNamara, senior vice president, LG Air Conditioning Technologies. “The addition of these industry experts positions the LG team to better support our customers in the U.S. market.”

Visit www.lg.com/us

Taco Comfort Solutions wins local safety award

Taco Comfort Solutions has earned the 2017 Excellence in Safety Performance & Records Award from the Providence Business News, Rhode Island’s statewide business weekly.

The safety award is part of the newspaper’s annual manufacturing awards, which recognizes local manufacturers for excellence in a dozen categories ranging from Supply Chain to Lean Manufacturing Excellence.

Taco Comfort Solutions maintains an active safety program at its facilities in Cranston, Rhode Island and Fall River, Massachusetts.

The Fall River facility, which has been recognized by OSHA for its safety record, is a heavy metal fabrication shop where Taco manufactures heat exchangers and expansion tanks in a range of sizes, with much of the work being custom in nature.

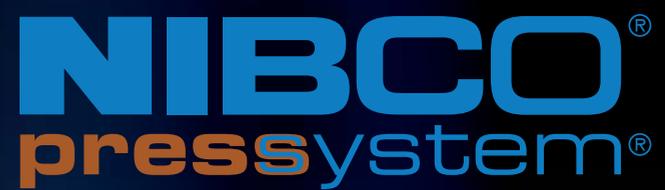
The facility processes more than 4 million pounds of steel annually, yet has achieved more than 9 years without a single day lost as a result of a work-related injury — equating to 1,467,751 hours of injury-free work. Its safety record is more than five times better than the national average for its type of facility.

Taco Comfort Solutions’ Cranston and Fall River facilities have earned OSHA Consultation SHARP (Safety

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& Health Achievement Recognition Program) certifications.

David Grof, safety and environmental director, accepted the award for Taco. Anthony DeMoura, vice president for operations, is in charge of the Fall River facility.

Visit www.taco-hvac.com

AB&I Foundry joins REV Net Business Sustainability Group

AB&I Foundry, an Oakland-based company that manufactures cast iron pipe and fittings, has joined the REV Net Business Sustainability Group, part of the flagship Sustainability Circle program.

The REV Net Sustainability Circle program will help AB&I adopt sustainability practices,

including behavioral changes in a proven peer-learning model, which are intended to accelerate business impact. The REV Net program will enhance existing initiatives while identifying new ways AB&I can reduce and recycle by-products in the manufacturing processes.

“As part of this group AB&I will create a five-year sustainability action plan where key initiatives are identified, driving efficiencies all while fostering a green culture within the company,” said Mike Olvera, environmental and sustainability manager of AB&I Foundry. “AB&I is environmentally conscience. Our products are made from 100 percent post-consumer scrap metal, and they’re 100 percent recyclable at the end of their service life.”

Benefits to being part of this program include: immediate and long-term efficiencies, new insights and ideas on how to be innovative, improved team member engagement and the adoption of a comprehensive sustainability plan.

Visit www.abifoundry.com

PHCC’S events reinforce value of targeted programming

The Plumbing-Heating-Cooling Contractors (PHCC) National Association tackled its business challenges equipped with new tools and strategies to help them run its companies more effectively in three separate conferences.

At its respective winter conferences, the PHCC Enhanced Service Groups, Quality Service Contractors (QSC), Union-Affiliated Contractors (UAC) and Construction Contractors’ Alliance (CCA), offered segments opportunities to share best practices with fellow contractors and learn the latest approaches and technologies from expert speakers.

QSC Power Meeting

In February, QSC took its Power Meeting to Anaheim, California, where contractors in the service and repair industry got a mix of education and networking opportunities — as well as exclusive coaching sessions — to help them confront their toughest business challenges, improve operations and grow profits.

UAC Unity Meeting

Addressing the hottest topics among signatory contractors, UAC’s Unity Meeting that occurred in late February and early March in Las Vegas, proved the benefit of cultivating strong working relationships among the industry’s labor and business leaders. Attendees tuned into sessions on innovative and integrative technology for planning, design and construction of buildings; the “hows and whys” of market share studies; legal tips for UAC contractors; service contracting management and growth; and UA National Agreements.

CCA Meeting

Members in new construction convened in Park City, Utah, in early March for a packed program on business solutions, a contractor spotlight, commercial and residential

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breakout sessions, and valuable roundtable discussions where attendees shared challenges and best practices in the new construction arena.

"The real-life best practices and lessons learned provided at these events certainly reinforces the benefit of getting involved in these Enhanced Service Groups," said PHCC National Association President Patrick Wallner. "Face-to-face contact with peers and experts in these specialized segments, as well as market insights — and solutions — to the specific challenges these groups face, goes a long way in extending the value of PHCC for our members."

Visit www.phccweb.org

Yelp and Housecall Pro partner to make on-demand scheduling possible

Yelp and HouseCall Pro announced a partnership for online booking of home service businesses directly through the Yelp platform.

HouseCall Pro, award-winning mobile software for field service management, and Yelp, a guide for reviews of local businesses, are joining together to connect consumers to home service businesses.



HouseCall Pro is the first live Yelp Platform Partner in the home services space.

By connecting HouseCall Pro's back office operations and Yelp's user experience, consumers will now be able to select their desired services and book their appointment time directly into the professional's job calendar quicker.

Once the appointment is booked, service professionals will be able to continue the job process with other HouseCall Pro features such as automated invoicing, payment processing, and customer remarketing, coming full-circle back to new reviews on the professional's Yelp page as a means to drive new customer acquisition.

Visit www.housecallpro.com

American Standard commits to wholesale success with new web page

Known for manufacturing water heaters with thicker tanks, ensuring quality and longevity from its entire product line, American Standard has reiterated its commitment to wholesale representatives from a newly added page on its website.

The webpage outlines incentives that representative companies witness and the manufacturer's comprehensive commitment to wholesale representatives for the long term.

Visit www.americanstandardwaterheaters.com/representative

Mestek promotes seven employees throughout core business units

Mestek's Distributor Products Group announced organizational changes throughout its business units, which include:

Manny DaSilva: Appointed to president of operations for RBI, a manufacturer of high efficiency boilers and water heaters. DaSilva started as plant manager in 2001 and was promoted to operations manager in 2006. In 2010, he was elevated to vice president, operations.

Mike Nihill: Promoted to vice president of operations with a concentration on all facets of customer relations including customer service and technical resources. Nihill has a history with Mestek spanning more than 20 years in various capacities.

Matt Kleszczynski: Promoted to director of marketing for all DPG product offerings. Kleszczynski will continue to manage the day-to-day marketing initiatives for all commercial and residential product offerings. He began his career with Mestek in 2001 as a trade show coordinator and has worked in several different capacities.

Dan Torres: Promoted to product manager for SpacePak, manufacturer of small duct DX-based heating/

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cooling and hydronic heating/cooling through reverse-cycle heat pumps. Torres brings with him more than six years of experience in the Research and Development Group, with a concentration on new product development and certification standards.

Tim McNeill has been appointed director, Application Engineering and Presales Support. McNeill will oversee the newly create Presales Group, which provides assistance in the sizing, design and layout of equipment applications across various Mestek divisions, including: commercial boilers/water heaters, rooftop equipment and unit heaters. Presales also provides

front-end support for residential small-duct offerings under the SpacePak division. McNeill has been with Mestek for four years, and brings with him over 20 years of experience as a consulting engineer with an emphasis on boiler and chiller plants.

Tom Neill: Promoted to applications engineering manager for all DPG product offerings. Neill began his career with the company in 1979 as a sales engineer, and has taken the roles including senior application engineer and, most recently, manager of project engineering.

Mike Nolan: Named senior applications engineer working in

the Pre-Sale Support Group, with concentrated responsibility for the Sterling HVAC and SpacePak product lines. Nolan began his 25-year history with the company in the design and drafting department of Smith boilers before transferring to the corporate engineering department, where he took a lead role on Sterling HVAC Products.

Mestek recognizes and appreciates the many achievements of these employees and the influence they've had on the successes across the company. It is confident that, in their new roles, the company is well positioned for continued growth and prosperity.

Visit www.mestek.com

Bill Lee, Lee Co., considers running for Tennessee governor

Bill Lee, chairman of Lee Co., says he's close to jumping into the Tennessee governor's race.

Lee told *The Tennessean* that he has been touring the state and meeting with 15 county and other Republican leaders. While a formal announcement may be weeks away, Lee says he wants to join the race "sooner rather than later."

"This is just about leadership around meaningful, purposeful work, and I started having conversations about public service," he told the newspaper. "Ultimately I just kind of asked what it would be like to wake up in the morning and instead of thinking, how do I make life better for 1,100 Lee Co. workers, [I'd think,] how do I make life better for 6.5 million people?"

Lee Co. was founded by Lee's grandfather. The company's services include plumbing, electrical and HVAC for residential, business and government customers. Lee said he wants voters to know he's "a regular guy."

"I have a plumbing license, I raise cattle and show livestock, I clean barns, I clean stalls," he said. "I'm a regular person who happens to own and run a big company and have CEO experience."

Source: *The Tennessean*

Byron Woodard named president of John Guest USA

John Guest USA announced Byron Woodard as its new president. Prior to joining John Guest, Woodard was the chief marketing officer at Ferguson Enterprises, and chief marketing officer and vice president of sales of North America at McGraw-Hill Financial.



Throughout his 22-year career, Woodard has garnered a track record of strategic, commercial and operational achievements within the plumbing, industrial, manufacturing, construction and HVAC industries. More specifically, he is bringing more than a decade of combined distribution, logistics and MRO experience to his new role.

As president, Woodard is responsible for the entire P&L of both John Guest USA and John Guest Automotive. Particularly, he is in charge of JG's business strategy,

top line revenue growth and the profitability of the company. This will also include his supervision of all sales, operations, marketing, finance, warehouse, human resources and customer service personnel.

Woodard holds a Bachelor of Science in Ocean Engineering degree from the U.S. Naval Academy, two post-graduate certificates in executive leadership and strategic marketing from Cornell University, and one post-graduate certificate in international business management from IMD in Switzerland.

Visit www.johnguest.com

Study estimates up to 170-billion-gallon water savings per year through water-efficient toilets

Water-efficient toilets could potentially save up to 170 billion potable gallons of water per year across five states facing water scarcity, according to new research released today by the Alliance for Water Efficiency (AWE) and Plumbing Manufacturers International (PMI).

The "Saturation Study of Non-Efficient Water Closets in Key States" focused on Arizona, California, Colorado, Georgia and Texas — all states that have experienced serious water shortages. The savings projected by the study (170 billion gallons of potable water yearly or 465 million gallons saved per day) could be achieved if non-efficient toilets in

residential properties are replaced with water-efficient ones. This five-state savings can be extrapolated to an estimate of up to 360 billion potable gallons of water per year saved nationally.

This research produces important direction for water managers nationwide, as 40 out of 50 states anticipate water shortages in the coming years, according to a Government Accountability Office survey of state water managers published in 2013, with most of these states already experiencing periodic shortages. The five states researched represent 28 percent of the national population and 47 percent of all housing units in 2015, so the report examines a large part of the residential water consumption in the United States. Toilet flushing is the largest single indoor use of water, representing 24 percent of total use in single-family homes. Replacing non-efficient toilets with efficient ones is an important strategy to stretch available water supplies.

"This study affirms the important and sometimes overlooked role that water-efficient plumbing products — and programs such as the EPA WaterSense label — play in assuring water sustainability for our nation," said Mary Ann Dickinson, AWE president and CEO. "We are nowhere near the potential of water savings we can achieve through water efficiency."

Barbara C. Higgs, PMI CEO/ executive director, said plumbing manufacturers are proud of the water-saving innovations they have brought to the marketplace. "Great water-efficiency innovations have already been made and are readily available. Now, it's time for consumers and businesses to do their part to replace non-efficient toilets, showerheads and faucets with water-efficient ones," she stated.

Non-efficient toilets defined as those using more than 1.6 gallons per flush

The five-state water savings estimate was calculated after the study's research determined that more than 13 million non-efficient toilets, with gallons per flush (gpf) of more than 1.6 gallons, remain installed in Arizona, California, Colorado, Georgia and Texas residences. These 13 million toilets comprise about 21 percent of all toilets installed in these states; therefore, about 79 percent of installed residential toilets in these states are already efficient at 1.6 gpf

or less.

Using the AWE/PMI study estimate of 170 billion gallons of water, these examples show how much water can be saved within residential properties located in the five states included in the study:

- Enough water saved to take 10 billion showers – more than one for each person on the planet
- Enough water saved to serve the indoor home water needs of a city of 100,000 for 45 years
- Enough water saved to fill 250,000 Olympic-sized swimming pools
- Enough water saved to fill 1,000 Rose Bowls
- Enough water saved to equal the water that goes over Niagara Falls in 2 1/2 days
- Current water-saving technology can make a tremendous impact

The AWE/PMI study demonstrates that current plumbing technology can make a tremendous water-saving impact, especially if toilet replacement programs can be accelerated. At the current four percent annual toilet replacement rate, the potential savings illustrated in this study will not occur for another 15 to 30 years unless replacement programs are accelerated.

This study's results also merit consideration within the current federal and state regulatory environment. At the federal level, proposed cost cutting at the Environmental Protection Agency threatens the WaterSense program, a voluntary public-private partnership initiative to encourage the use of water-efficient toilets, showerheads, faucets and other plumbing products. Through the use of the more than 16,000 WaterSense product models on the market, the nation has already saved more than 1 trillion gallons of water over the past 10 years.

Visit www.safeplumbing.org;
www.allianceforwaterefficiency.org

Kohler Signature Store first retail space to receive LEED Gold certification

The Kohler Signature Store by First Supply has become the first retail space in the U.S. to receive LEED Gold certification under the

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new LEED v4 guidelines. The U.S. Green Building Council (USGBC) awarded the 5,800-square-foot showroom located in Wauwatosa, Wisconsin, LEED Gold v4 for Interior Design & Construction Retail.

“This project demonstrates the progress made toward recognizing the value of the environment and the buildings where we work, shop and live,” said Joe Azzarello, senior staff engineer, sustainability for Kohler. “The three legs of sustainability — people, planet and profit — were incorporated into the store design, resulting in a beautiful and functional space that has a much smaller environmental footprint than similar spaces.”

KOHLER

Mahesh Ramanujam, president and CEO, USGBC added: “LEED v4 was created so that projects could obtain higher levels of environmental sustainability in order to continue to revolutionize the built environment. Kohler’s achievement of becoming the fourth project in Wisconsin to certify using LEED v4, demonstrates tremendous green building leadership and commitment to making the world a better place. Market transformation happens one building at a time and Kohler’s project is a prime example of how innovative projects can use local solutions to make a global impact on generations to come.”

Kohler and First Supply partnered with MSI General Corp. to design the building that is only the second retail site in the world to earn LEED Gold for LEED v4. LEED Gold certified buildings can reduce energy use by up to 50 percent, carbon dioxide emissions by more than 30 percent, water use by 40 percent, and solid waste by 70 percent.

In addition to the Wauwatosa showroom earning the first LEED Gold for LEED v4, the Kohler Signature by Expressions Home Gallery in Culver City, California, was the first retail space to receive overall LEED v4 certification. The latest version of LEED, v4 incorporates a more comprehensive approach to water efficiency and an expanded focus on the impact of materials on human health.

Visit www.kohler.com

Construction company uses John Guest products on latest project

Trilogy Plumbing Inc., which specializes in new construction, has chosen to install JG fittings in the construction of its first multi-million dollar custom home.

After learning about the benefits of both JG ProLock and JG Speedfit, Rich Langenwaller, vice president at Trilogy, showed great interest in the products. He enjoyed that tools weren’t required to make lead-proof connections and the products allowed for quicker installs. According to Langenwaller, “This [ProLock] is a high-end fitting, which I want to use on our high-end custom home.”

Up to 200 fittings can be used in a custom home while a one-bedroom apartment may have about 25 to 30 fittings.

Langenwaller was so impressed with the outcome that he immediately requested all part numbers used in the project so his future projects incorporate John Guest fittings.

Visit www.johnguest.com

National construction charity group unveils renovations to local homeless support facility

Las Vegas-based CARE Complex unveiled its renovated facility after volunteer contractors completed roughly \$300,000 worth of work on the weeks-long project and donated an additional \$10,000 to support the group’s operations. Construction charity organization AGC Charities Inc., with the leadership of the Nevada Contractors Association Young Constructors Forum, made renovations to the homeless support facility, and upgrades to a nearby by after-school support program for local youth.

“The amazing thing about this project was that the easiest part was getting contractors to show up and do the work,” said Scott Williams,

chairman of AGC Charities and president of Springfield, Oregon-based Hamilton Construction Co. “Thanks to the volunteers’ hard work, CARE now has a significantly improved facility that will help them better support those who need the help the most.”

The renovations included installing new heating and air-conditioning systems, building new changing rooms, upgrading electrical and plumbing systems, building and installing new client lockers and making other upgrades. In addition, the group made improvements to the facility operated by Gentlemen by Choice, an after-school support group for local youth. The volunteer contractors installed new lighting and video equipment, painted walls, donated new furniture and made other upgrades to the youth facility.

“We chose these two charity groups to support because they are the real deal; they are making a difference in our community every day,” said Nathan Cartwright, director of business development at Las Vegas-based GSL Electric and the lead project coordinator for the Young Constructors Forum. “These projects were a great way for the construction community to give back to a community that has been so good to us.”

New Fernco app finds products instantly

Fernco’s new app was designed as a solution when determining which Fernco coupling size should be used in the application.

The app offers an alternative to searching through the catalog or looking through coupling charts to find the appropriate product.

App users can enter information about the application and the app’s product selector will populate the correct couplings to use, as well as more information regarding the product. The user will have the option to enter either outside diameter or nominal pipe information.

To use the Fernco product selector, the user will need to know the pipe material, outside diameter or nominal diameter for pipe #1 to be connected and the outside diameter or nominal diameter for pipe #2 to be connected.

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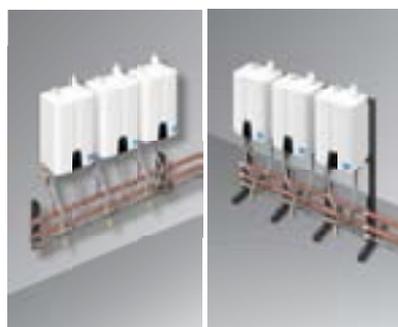
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A wide-angle photograph of a snowy mountain landscape. The foreground is a vast, flat expanse of snow. In the middle ground, a snow-covered slope rises, dotted with small, dark rocks. The background shows more snow-capped peaks under a bright blue sky filled with soft, white clouds. The overall scene is bright and clear, suggesting a sunny day in winter.

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CONTRACTOR PROFIT ADVANTAGE

One Bite at A Time

How to apply a proper profit margin.

BY RICHARD DI TOMA

DZ, a contractor from North Dakota, asks: “In the latest issue of *PHC News*, you talk about ‘per hour.’ but what about makeup of parts? Do you not charge markup, and only use labor as profit? I use labor and parts markup. For example, service labor is \$75/hour, and parts markup is based on time it would take to replace it under the labor warranty period. For example, a relay is probably \$45 markup to cover actual expense of warranty replacement, but install labor is \$60/hour and 40 percent across the board on material. These install jobs have more billable hours due to the longer term nature of install projects.”

It’s said the best way to eat an elephant is one bite at a time. First, allow me to address service labor. The reason I use the term “per hour” is that all contractors, whether they use time and material or contract pricing, calculate their labor costs in terms of the time to perform a task. That time could be in years, months, weeks, days or hours, but the common denominator is always hours and fractions thereof.

Contractors who use a T&M pricing method to calculate their price, based on the time and material they spent on a task, multiply the time spent by their hourly rate, which hopefully includes a proportioned amount for overhead costs and profit. Add that number to the selling price for material used, which includes the cost of the material and a markup above that material cost.

The problem with T&M pricing is that the consumer doesn’t know the cost they will incur until the task is completed. Obviously, this could lead to an uncomfortable confrontation when the final bill is presented and the client gets hit with sticker shock after the task is performed. In which case, an enforceable contract between the contractor and consumer may not exist since there was no “meeting of the minds” of the parties involved.

With contract pricing that is quoted and properly documented before the task is started, the propensity for an argument to ensue after the task is performed is greatly diminished since the consumer knew the price before the task commenced. As long as contractors fulfill their

The problem with T&M pricing is that the consumer doesn’t know the cost they will incur until the task is completed. Obviously, this could lead to an uncomfortable confrontation when the final bill is presented and the client gets hit with sticker shock after the task is performed.

obligations under the contract, consumers must pay the amount agreed upon.

With T&M pricing, your every move is critiqued by the client. “Why is it taking so long?” “Why does the tech keep going back to their truck?” “Why are they going to the bathroom on my time?” With contract pricing, those types of questions don’t arise because the price you and the consumer agreed upon is a known factor.

Regardless of which you use, one thing is certain: You must apply the proper numbers since wrong numbers can only produce wrong results.

DZ’s example states service labor at “\$75/hour.” He then states that install labor is “\$60/hour.” That sounds confusing. Which is it? To me it seems that he believes his cost for labor is \$60/hour, and his selling price of labor is “\$75/hour.” In either case, he’s using wrong numbers. For the umpteenth time, allow me to state, at present give or take a 5 percent variable, there is no place in the U.S. where the true cost (to contractor) of a qualified service tech in a properly outfitted service vehicle is less than \$100 per hour — if that business sells all their tech hours all the time.

Think about that statement. If you paid a tech \$25/hour and minimally added 25 percent to that number to cover salary related expenditures (e.g. FICA matching funds, retirement, and insurances for unemployment, disability, worker’s compensation, liability related to payroll, and health), the cost per hour would increase to \$31.25.

You would pay that hourly rate for 2,080 hours annually (40 hours/week x 52 weeks). If you lost just one hour per day to non-revenue producing tech duties, allow two weeks for vacation/personal time and six holidays, you would only have a maximum of 1,708 potential hours to recover your cost. That means the \$31.25 is really \$38.06 per revenue producing hour, if you sell all your hours all the time ($\$31.25/\text{hour} \times 2,080 \text{ hrs.} = \$65,000$, but $\$65,000 \div 1,708 \text{ hrs.} = \$38.06/\text{hour}$.)

Now consider the fact that no contractor sells all their available tech hours all the time. If you only sell 90 percent of tech time, the hourly cost rises to \$42.28. At 80 percent of tech time sold, it becomes \$47.57. Only sell 70 percent (which is probably average during good economic times) and the hourly cost to contractor rises to \$54.37. As economic times get worse (remember the last eight years) and you only sell 60 percent of tech time the costs continues to rise to \$63.43. At 50 percent of tech time sold, the cost jumps to \$76.11.

Each of those levels do not include the



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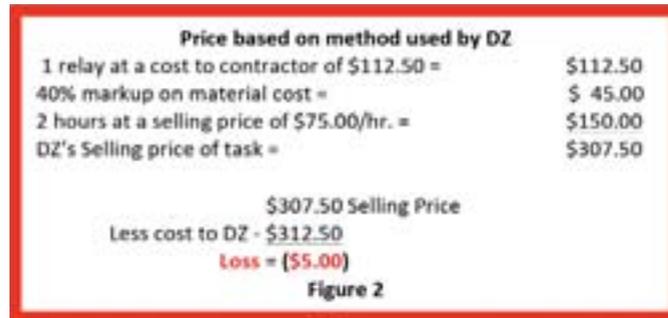
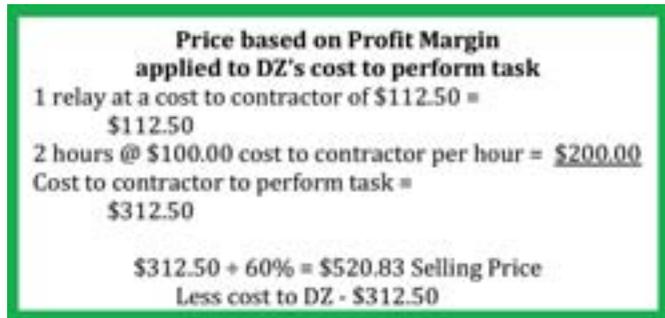


Figure 1 (left) shows the way I would calculate DZ's selling price. Figure 2 shows DZ's method of pricing.

overhead burden associated with business operational costs. Since overhead exists for all businesses, the costs associated with overhead must be calculated to arrive at your true cost. Regardless of the size of your business, you still have to pay for: vehicles and vehicular expenses; space for business operation; administrative expenses; and a myriad of miscellaneous expenses e.g. phones, computers, office supplies, tools, bank charges, customer relations, advertising, professional services such as accountants etc.

Those overhead items minimally cost \$75 to \$150 per tech revenue producing hour — if you sell all your hours all the time. When you add the minimum \$75 overhead burden to the lowest aforementioned labor cost of \$38.06, you have a cost to contractor of \$113.06 — if all tech hours are sold all the time.

If you don't believe your overhead is minimally \$75/tech hour, you are probably cheating yourself. But, even if you subtracted \$15/hour from the \$75 minimum hourly overhead burden, the cost of service labor per hour would be \$98.06. Therefore, DZ's example of a \$75/hour rate is wrong, and the results he gets using that factor cannot get him to attain the goal of any business — to bring in more money than it costs to run the business.

Therefore, the first number you must be concerned about is the true cost you incur for labor and overhead. The second factor is the profit margin that will get you where you want to go. This requires that you know the difference between a markup on cost and a profit margin.

Markup on Cost Example: If labor, overhead and material cost is \$200; if you sell all your tech hours all the time; and if you mark the cost up by 10 percent, your selling price would be \$220. ($\200×10 percent = \$20. By adding that \$20 to the \$200 cost, you get a selling price of \$220/hour). Your profit is \$20 if all tech hours are sold.

Profit Margin Example: If labor, overhead and material cost is \$200; if you sell all your tech hours all the time; and if you use a 10 percent profit margin, your selling price would be \$222.22 ($\$100 \div 90$ percent = \$222.22). Your profit is \$22.22 if all tech hours are sold. To maximize your profit, logic suggests using the profit margin method. The question you must answer is which percentage to use to get you where you want to go.

If your hourly tech cost is the minimum \$100 based on selling all available tech hours, but you sell only 70 percent of your available tech time, the \$100 cost to you per tech hour would really be \$142.86. This risk factor must be considered in choosing a proper profit margin percentage. In this example, you need a 30 percent profit margin to just break even ($\$100 \div 70$ percent = \$142.86).

As to DZ's inquiry, "But, what about makeup of parts? Do you not charge markup and only use labor as profit?"

I do not apply a markup on cost method. I apply a profit margin to my cost of labor, overhead and material needed to perform any task. Then, describe the task to the consumer and quote the selling price to the consumer in writing before the service is commenced.

Let's take a look at DZ's example of a relay. The basis of the cost of this example is: 1) \$112.50 cost to contractor for the relay (DZ's \$45 markup on material cost \div 40 percent markup on material cost = \$112.50); 2) all material is on the service vehicle; 3) Two hours of labor at the minimum \$100 cost to contractor — if all tech hours are sold all the time — to perform the task inclusive of: Travel time to consumer; speaking with the consumer; quoting the selling price; writing an invoice/contract; asking the consumer to accept the contract and its terms and conditions by signing the contract; setting up the work area with tools and material; removing the existing relay; installing the new relay; turning the heating system on and checking it through cycle to ensure all safeties are functioning properly before leaving; getting paid for the service; cleaning up the work area; thanking the client for their patronage; and leaving; and 4) application of a 40 percent profit margin (your percent varies dependent on your situation) to the labor, overhead and material cost.

Since no contractor incurs a cost of less than \$100/tech hour if they sell all tech hours all the time, DZ would minimally incur a cost of \$200 for labor/overhead plus a material expense of \$112.50. DZ would incur \$312.50 to bring in \$307.50 to his business. That's a \$5 loss — if he sells all tech hours all the time. If he sells less than 100 percent of his tech time, he loses more yet.

The answer to DZ's question: Choose a proper profit margin and apply it to your true cost of labor and overhead and also to your material cost to develop properly profitable selling prices. It's as simple as that.

To you, DZ, and to all contractors who want an opportunity to attain their contractor profit advantage, need my assistance, have an opinion on this article, would like information on the ways I can help you, or would like to order a copy of my *Readily Available Pricing Information Digest* pricing guide which is customized to your true cost of labor and overhead an, puts prices at your fingertips for rapid and profitable price quoting, give me a call. The initial call doesn't cost you anything, and, you just might discover some good ideas. ●

Richard P. DiToma has been involved in the PHC industry since 1970. He is a contracting business coach/consultant and an active PHC contractor. For information about the Contractor Profit Advantage or to contact Richard: call 845-639-5050; email richardditoma@verizon.net; mail to R & G Profit-Ability, Inc. P.O. Box 282, West Nyack, N.Y. 10994.

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PLUMBING & HEATING THOUGHTS

Legal Victory Offers Relief for Flint

Settlement calls for \$97 million to replace 18,000 service lines by 2020.



BY STEVE SMITH



The agreement also guarantees services such as on-demand bottled water delivery within 24 hours, increased availability of water-filter consultants to residents, Medicaid expansions through March 2021, and independent monitoring of the water lines after their re-installment by the state.

For a change, there's good news about Flint, Michigan. Almost three years after the city began pumping water from its namesake river as a source of drinking water, help is on the way for a lead crisis that poisoned thousands of residents.

On March 28, a federal judge at the U.S. District Court for Michigan's eastern district approved a three-year, \$97 million agreement that requires the state and city to identify and replace some 18,000 service lines free of charge by the year 2020.

"In my view the settlement agreement is fair, adequate, reasonable and consistent with the public interest, and it furthers the objectives of the Safe Water Drinking Act," U.S. District Judge David Lawson said from the bench. "I believe it is in the best interest of the citizens of Flint, and the citizens of the state of Michigan."

Generally speaking, the dollars will be used to address three main priorities:

- Set an established timeline to replace the lead-tainted service lines, which will continue to fall under federal court supervision and monitoring.
- Continue to distribute bottled water to residents unable to access clean drinking water.
- Fund health care programs for residents and, in particular, children affected by lead poisoning.

The news comes as many residents still do not trust the government to tell them the truth about the quality of the city's water.

Flint's water problem began when officials switched to the river in 2014 in order to save money, but failed to implement mandatory corrosion controls. This damaged the piping and caused lead to leach into the city's water system.

Making a grave public health situation even worse,

government officials routinely downplayed the residents' complaints about color, order and taste, until elevated levels of lead detected in the town's children made the issue impossible to ignore.

The water contamination also has been linked to the deaths of 12 people from Legionnaires' disease.

To this day, thousands of Flint residents are still forced to rely on bottled water and home water filters for drinking, cooking and bathing.

Considering this acrimony, it's no mystery to learn that the money comes by way of settling a lawsuit filed last year by a coalition of religious, environmental and civil rights activists that alleged Flint water was not safe to drink because state and city officials were violating the national Safe Drinking Water Act.

"This is a win for the people of Flint," Melissa Mays, a plaintiff in the case and one of the parents who first sounded the alarm about Flint's water, said in a statement. "When the government fails to uphold democracy and protect our rights to clean water, we have to stand up and fight. The greatest lesson I've learned from Flint's water crisis is that change only happens when you get up and make your voice heard."

Actually, the settlement isn't the only good news coming out of Vehicle City. The court agreement comes barely a week after the EPA formally awarded a \$100 million grant to Michigan to fund upgrades to Flint's outdated water system.

While a portion of those Congressional funds will go toward ripping out old piping that contributed to the city's lead crisis, Flint also intends to spend a large portion of the grant money modernizing its water treatment plant, replacing meters and fixing distribution mains.

Timeline and terms

Considering the beleaguered city has only been able to replace service lines in 800 homes to date, the terms of the settlement set a rapid pace.

By next New Year's Day, the government must replace 6,000 water lines. After that, at least 6,000 more new lines in each of the following two years must be finished.

The agreement also guarantees services such as on-demand bottled water delivery within 24 hours, increased availability of water filter consultants to residents, Medicaid expansions through March 2021 and independent monitoring of the water lines after their re-installment by the state.

Of the \$97 million, the settlement dictates that the state put \$10 million in escrow to pay for cost overruns.

Here are the specifics of the settlement:

- The city, compensated by the state, agrees to determine the composition of lines running from the street into at least 18,000 households and properties, and replace with copper those made of lead or galvanized steel, at no cost to the homeowners.

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- The agreement calls for replacement of 6,000 lines by Jan. 1, 2018, and at least 6,000 more lines each of the two following years, with all lines covered by the agreement replaced by Jan. 1, 2020.

- The state will expand its program of water filter education, installation and maintenance. The state will make its best efforts to have at least 90 filter education specialists at work throughout the city, eight hours per day, Monday through Saturday, with specialists also available on Sundays by appointment and for follow-up.

The news comes as many residents still do not trust the government to tell them the truth about the quality of the city's water.

- The state will advertise the work of the filter specialists on TV, radio and other media, including ads in Spanish.

- The state will provide the city with filter replacement cartridges so that residents will have free filter cartridges to use for one year after the replacement of their lead or galvanized steel water lines.

- The agreement does not call for door-to-door bottled water delivery, which the plaintiffs had sought, but calls for residents to be able to call the 211 city phone number and receive free water deliveries within 24 hours. The service can be discontinued if water monitoring for the six-

month period ending June 30 is below the EPA's "action level" for lead, the agreement says.

- The state won't be required to operate any water distribution centers after Sept. 1, provided water monitoring for the six-month period ending June 30 is below the U.S. EPA's "action level" for lead.

- The agreement requires the state and city to continue to operate at least nine community water resource sites where residents can pick up bottled water, water filters and cartridges until May 1. It permits the state to close three centers between May 1 and June 1, but only if demand has dropped off. And close up to two additional centers between June 1 and July 1, again if demand has dropped off.

- The state will continue its Medicaid expansion for Flint residents covering pregnant women and children younger than 21 up to 400 percent of the poverty level through March 2021.

- The state will continue elevated blood level case management services, for children with elevated blood levels, plus other services for children and nutrition services, through September 2018.

- Abandoned households are not covered by the agreement, though any household with an active water account on the effective date of the agreement is covered, even if the water bill is overdue.

- The agreement calls for extensive water monitoring following the line replacements to ensure the water is safe to drink, including the use of a third-party independent monitor. It also calls for extensive public reporting. ●



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The Benefits of Pipe Lining

What you don't understand about lead could be hurting your clients, and your business.

BY AMANDA STROUSE

Water quality, a popular political issue discussed everywhere from town hall meetings to PTA meetings to HOA meetings, are serious, modern-day threats to everyone's drinking tap water in the U.S. Homeowners want their voices heard and concerns put to bed. So, give them what they want: answers and solutions.

Professionals in the plumbing industry should proactively explain to clients that just because the water is clear, doesn't mean it isn't harmful. Just because their house is new, doesn't mean the water isn't tainted with toxins. Testing the water quality at the tap is imperative. By educating your clients, you are helping them and the rest of our country.

Understanding these things is important for the general public, because it helps protect them from dangerous contaminants in tap water and prevents them from making poor plumbing decisions, but also because they are already concerned. Various nationwide polls have shown a rapid increase in Americans who are increasingly worried about their water quality throughout the past decade. According to a national survey conducted in March 2016, 18 percent

of those surveyed said they are not at all confident that their tap water was safe for consumption, and more than half of respondents said they feel lead leaching into drinking water is a widespread, national problem.

There are reasons for their concerns. And there are substantiated reasons for them to distrust water utility companies.

A Guardian investigation in 2016 revealed that at least 33 U.S. cities cheated on their water testing performances/methods, potentially concealing high lead levels. A year ago, the EPA announced that 41 states had reported "higher than acceptable levels of lead in drinking water" in the previous three years. There also is more recent news that small water utilities companies do not have federal or state regulations to force them to test their water for lead or even to remedy the situation after lead leaching is found.

There has been an onslaught of disparaging news in regards to water quality, public trust in water agencies. Americans have to face that the unfortunate situation of high lead levels in Flint, Michigan, could happen in their home town. Thus, concern for the quality of tap water

has been on the rise.

The reality is that around 20 million Americans or more are drinking lead contaminated tap water, which can lead to health and cognitive problems, especially for children. As plumbing professionals, you have the ability to coax their worries by offering education, effective remedies and proactive solutions.

However, it is even more significant that plumbers are properly trained and educated about how and why lead leaching is a problem, as well as how to safely and economically bring lead leaching down to safe levels.

Under present EPA rules, utilities only have to test homes at the tap every three years, and these tests often involve very few homes. For example, Flint, Michigan had water tests conducted in 2014, but only 100 homes were tested. The water quality review passed, meaning that lead and other toxin levels were calculated as safe and no additional testing in homes was required. Yet in 2015, Flint was going through a catastrophic lead leaching crisis. In Baltimore, Maryland, a water quality report for 2015 shows the water utility tested the water of only 52 homes, although

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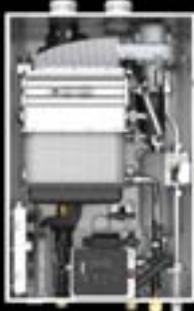
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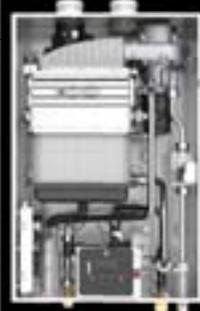
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VRP



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VHB



the city had more than 621,000 residents that year.

The only way a homeowner, landlord or property manager can reassure themselves that the water is safe for consumption is to have the water independently tested, then to take remedial action as required as it relates to their property to become lead-compliant.

Even if the domestic water transported from a treatment plant to a building or home meets the EPA guidelines for safe traces of hazardous materials inside the water, lead contributors on the private-side (such as the branch line from the main and the plumbing system inside a building or house) can easily escalate lead and other toxic levels, making the water dangerous for consumption. Buildings built before the mid-1990s are the most susceptible to having plumbing systems with lead contributors.

Other common types of water quality issues, other than lead leaching:

- Corrosion buildup
- Rust sediment
- Copper leaching
- Discolored water
- Low water pressure
- Spread of Legionella and other microbials

While the water companies and municipalities are left with the burden of removing lead water mains and other lead contributors in their public water infrastructure systems, plumbers must focus on private-side lead contributors. These include, but aren't limited to lead pipes, lead solder (often with copper pipes), galvanized pipes, brass faucets, brass valves and brass fixtures. Even a piping system containing lead solder can raise lead levels up to 60 times the legally safe limit. All types of lead contributors must be removed or relined.

Adding chemical treatments to the drinking water or removing plumbing components that have lead contributors may create an adverse reaction by increasing the amount of lead leached into the water. So, what's the best solution to lowering lead leaching to safe levels?

The answer is pipe lining.

A new study from The Water Research Foundation has found that certain pipe lining processes, such as epoxy pipe coating technologies, "can effectively reduce or eliminate release of lead from lead service lines." The study also found that benefits for epoxy coatings include fewer and shorter disruptions to the structure or surrounding area, reduced damage and cost-effectiveness, when compared to pipe system replacement.

Utility companies have already begun taking advantage of epoxy coating technology to rehabilitate pipes in place with minimal to no street, sidewalk or parking disruptions or destruction. Last summer, a world-leading epoxy coating technology manufacturer and installer worked with Providence Water in Rhode Island, to deliver the country's very first same-day lead service line remediation project that used modern technology.

In this project, the lead service lines that ran from the city main to private houses in Providence, Rhode Island were cleaned and relined using a patented epoxy coating process that has multiple patents for reducing lead leaching. These lead service lines leached lead, making the water harmful for consumption by the residents. Providence Water did not want to disrupt or destroy the century-old houses or the historical trees in their yards, which is exactly what would happen during a traditional repipe. Thanks to the epoxy coating applications provided

to the lead service lines, none of the houses or trees were disturbed or damaged, and independent water tests revealed that the epoxy coating brought lead levels to less than 1ppb (which is well below the EPA cutoff level of 15ppb), making the project a huge success and garnering the immediate attention of other utility agencies and water organizations.

Epoxy coating technologies are currently being utilized by cities and school districts in the United States (as well as the UK and other countries) as an economical solution to bring lead leaching into compliance. It's time residential and commercial plumbers, like yourself, follow suit and offer the solution your customers are all searching for: a way to make their water safe for consumption. ●

Amanda Strouse is on the marketing and public relations team for world-leading pipe lining technology innovator, ACE DuraFlo, the creator of the patented ePIPE product and worldwide group of installers that utilize the patented ePIPE process to restore pipes in-place. ACE DuraFlo's revolutionary epoxy coating system, ePIPE, is the industry's fastest curing epoxy coating, with a cure time of two hours. The LeadSmart program was developed in response to growing consumer demand over lead when tested at the tap, the potential liability for landlords and disclosure of lead. This program involves EPA-approved on-site testing, identification of lead contributors, a remedy plan consisting of the ePIPE technology and, once compliant, a property owner is issued a LeadSmart Certificate of Compliance, backed by a \$1 million errors and omission insurance program. ePIPE products are engineered to exceed EU and North American standards. For more information, contact us at www.epipeinfo.com or 800-359-6369.



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Flint Water Infrastructure Summit

Leaders and residents gather for a three-day conference that continues one of the nation's most important conversations around safe water.



BY SARAH CIMARUSTI

The Flint Water Summit, co-chaired by Mayor Karen Weaver and Governor Rick Snyder, was held at the Riverfront Front Banquet in Flint, Michigan, March 7-9. The conference highlighted the critical conversation surrounding our nation's aging water infrastructure. Attendees from around the world gathered to discuss innovations and new technology, lessons learned in Flint and how to meet the needs of communities across the U.S. The conference also provided the latest update on Flint, including its recent funding toward the three-year pipe replacement process, and the decision that led the city to choose copper as the piping replacement material.

Industry attendees included Plumbing Manufacturers International (PMI) members Dan Holmes, Barbara Higgins and Ray Valek; National Sanitation Foundation (NSF) International's Clif McLeannan; Andrew Kireta of the Copper Development Association; and David La France of the American Water Works Association (AWWA), who was a featured speaker at the event.

NSF International and PMI were some of the industry's first responders in Flint. NSF International, the public health and safety organization that tests and certifies residential drinking water filtration systems, oversaw the

filter selection in the lead reduction process. PMI contributed to the relief effort by donating plumbing products to replace older, corroded fixtures.

"PMI is interested in anything having to do with assuring safe plumbing and safe water, and the Flint situation obviously put both of these in the spotlight. Since then, [we've] been advocating for restoring aging underground water infrastructure, not only in Flint, but also across the nation. It was good to see momentum building for water infrastructure projects," said Barbara Higgins, CEO, PMI.

Others have made a similar statement in defining their role as leaders committed to safe water efforts. Conference speakers and exhibitors represented organizations including the EPA, Michigan Department of Natural Resources, Michigan Department of Environmental Quality, Detroit Water and Sewerage Department, District of Columbia Water and Sewer Authority (DC Water), International Code Council (ICC), Michigan State University, University of Michigan, Purdue University and the American Society of Plumbing Engineers (ASPE).

During the first two days of the conference, Mayor Weaver and Gov. Snyder established the need to work together to communicate with legislators about public and private

finance opportunities for continued improvements to Michigan's water infrastructure. They urged attendees to see the conference as a starting point for the necessary transitions that are needed in order to transform one of this country's most foundational yet overlooked sectors.

The EPA was also instrumental in this conversation. Robert A. Kaplan, acting regional administrator, U.S. EPA Region 5, was part of a presentation called "Flint Drinking Water Infrastructure and Response Actions," during which he discussed the need for a fresh look at the Lead and Copper Rule, the problem of oversized infrastructure, and the concern that comes with larger populations being more exposed to waterborne pathogens.

Kaplan pointed to the EPA's recently published "Drinking Water Action Plan" and urged attendees to take advantage of the Clean Water and Drinking Water State Revolving Funds (DWSRF), which he said accounts for half of the EPA's budget.

The Drinking Water Action Plan (bit.ly/2olzrJ2) is a national call to action that urges "all levels of government, utilities, community organizations, and other stakeholders to work together to increase the safety and reliability of drinking water." The plan works to address six priority areas:

- Promote equity and build



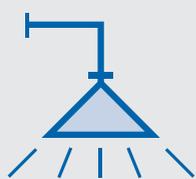
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Andrew Kireta of the Copper Development Association (left) and JoLisa McDay, water plant supervisor for the city Flint.

capacity for drinking water infrastructure financing and management in disadvantaged, small, and environmental justice communities.

- Advance next generation oversight for the safe drinking water act.
- Strengthen source water protection and resilience of drinking water supplies.
- Take action to address unregulated contaminants.
- Improve transparency, public education and risk communication on drinking water safety.
- Reduce lead risks through the Lead and Copper Rule.

The DWSRF program, as established in the Safe Water Drinking Act, is a federal-state partnership to help ensure safe drinking water and provide financial support to water systems, and to state safe water programs. In this partnership, “Congress appropriates funding for the DWSRF. The EPA then awards capitalization grants to each state for their DWSRF based upon the results of the most recent Drinking Water Infrastructure Needs Survey and Assessment. The state provides a 20 percent match,” (www.epa.gov/drinkingwatersrf).

During the presentation, “Effective Utility Management: the Next Step Toward Michigan’s Sustainable Water Infrastructure,” La France made a case for restoration of the nation’s water infrastructure, touched on the issue with most of our nation’s water utilities, which are unequally distributed, stating that only 8 percent of the nation’s water utilities serve 82 percent of the population.

Again in the spotlight, Flint touched on its own water utility transitioning. During the third day of the conference, which was open to the public, JoLisa McDay, water

plant supervisor for the city Flint, shared a progress report of the city’s infrastructure and water treatment plant through the lens of effective utility management. McDay kicked off the discussion by acknowledging World Water Day, and the need for the country to take action around the nation’s water utilities as they “strive to gain consumer confidence and deliver water that exceeds regulatory expectations and standards.”

McDay went on to discuss five keys to water management success. She first touched on ways that the utility can lead in organizational excellence through properly communicating with the public and hiring system operators that understand their responsibility in promoting and supporting public health.

“Community meetings have taken place to report progress as we champion more communication efforts and community engagement ... Transparency has improved as we talk about ethical conduct, but there’s still much work to do in this area,” McDay said.

Right now the utility has a system in place where it voluntarily reports outliers to regulatory agencies before an excursion or violation even occurs.

“This [reporting to regulatory agencies] is not a common practice ... We’re doing this because it’s the right thing to do. We want to be ahead of the game if something happens,” McDay explained.

Currently, the Flint water plant works with MDEQ, EPA, Arcadis and CDM Smith towards its goal of being “a sustainable and viable division of the Department of Utilities.”

Part of this organizational excellence is realizing that this is not a “one division, one person job.” Efforts need to be made to have skilled and committed people in place who check each other’s efforts.

This means that utilities need to make strides in hiring efforts, which are lacking in Flint and in utilities across the country.

“The industry overall suffers for lack of talent, whether it be — electrical utility, water utility, DTE, automotive industries — we’re all competing for skilled workers,” McDay explained. “The city of Flint does not have the resources to compete with the private sector. More and more municipalities and their utilities are developing work practices and certification standards where they can pay their employees more. Flint has an antiquated system of recruiting and retaining its employees.”

Employee development has been cited as one of utilities’ weakness in organizational success. If Flint is to exceed industry standards, it needs to recruit people with the right expertise.

The city continues to explore partnerships and innovative technology, and participate in community engagement efforts, which is how it will continue to lead in a conversation that hopefully the entire country will continue to listen and contribute to as cities begin to build best practices around water treatment management.

Day 3 also offered continued drinking water education for residents and allowed them the opportunity to meet with exhibitors with any questions.

Part of this included a presentation by Kireta, during which he explained why the city of Flint decided on copper as the replacement choice and gave residents a chance to interact with topics around this decision.

Following this city’s replacement decision, the copper industry helped Flint acquire nearly 200,000 feet of copper piping, at a savings of approximately \$1 million, for the next phase of the FAST Start program.

Other sessions held for the public included drinking water basics and home management. This concluded the three-day summit in Flint.

This conversation will continue to make waves across the nation. As it currently stands, Flint will use the recently awarded \$100 million grant from the EPA to “accelerate and expand its work to replace lead service lines and make other critical infrastructure improvements.”

Though the EPA has received drastic cuts, the DWSRF has remained fully funded and will serve as a critical base for drinking and wastewater infrastructure. ●

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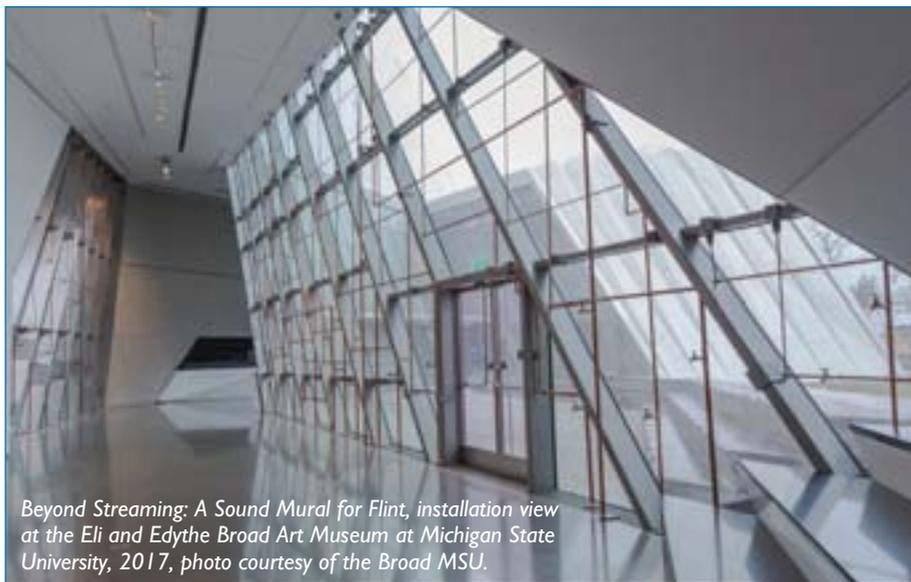
Flint Water Echos

Flint and Lansing students share water crisis experience through copper pipe art installation.

BY SARAH CIMARUSTI

PHC News made it out to Flint, Michigan to attend the Water Infrastructure Conference at the Riverfront Banquet Center March 7-9. The conference provided a status update on the city of Flint's water efforts, as well as shared lessons learned and new technologies for leaders and residents interested in the topics around aging infrastructure. For more Flint coverage, please turn to pages 24 and 34.

Following the conference, I decided to take a quick detour and



Beyond Streaming: A Sound Mural for Flint, installation view at the Eli and Edythe Broad Art Museum at Michigan State University, 2017, photo courtesy of the Broad MSU.

press my ears up to a certain set of pipes lining the Alan and Rebecca Ross Education Wing at the iconic Eli and Edythe Broad Art Museum at Michigan State University in Lansing, Michigan. Pipes run along two towering walls of slanted stainless steel slabs and long,

luminous bay windows.

The pipe project, "Beyond Streaming: A Sound Mural for Flint," features Chicago-based artist's Jan Tichy community-based initiative, as part of the MSU Federal Credit Union Artist Series. Tichy's exhibit, made entirely of copper pipes,

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connected high school students from Flint and Lansing to provide a creative dialogue on one of our nation's most pressing current issues, the Flint Water Crisis.

It's been three years since the city's switch to the Flint River water. Flint recently received a \$97 million settlement toward funding to replace 18,000 of its lead-tainted pipes by 2020. Though plans are in place, the community still has a long way to go toward the rebuilding of trust after being exposed to high-level of contamination and health problems, and creating public transparency and accountability.

Tichy and others who worked on this project were interested in shifting the public lens to young people who were directly impacted by the crisis. He's worked with more than 60 high school students from Carman-Ainsworth High School (Flint) and Everett High School (Lansing), leading workshops aimed for students to "explore how different forms of creative expression can be used to communicate ideas and messages, while also touching on themes of social and restorative

justice."

The installation is made of 1,460 feet of copper piping and 530 copper fittings. Each pipe features an audio recording of a student presenting a piece of writing that details their response to the water crisis. Exhibit participants turn spigots to hear each recorded response. There are 30 different stations of recorded lines from letters and stanzas including this one:

*Lead poisoning can stunt my growth
And mess with my mind
We would like help if you don't mind.*

And this one:

*Never shall I ever forget the day
My mom told me
I can't drink from the water faucet.
She told me the water was dirty,
and it wasn't safe.
I looked at her with disbelief.*

On a larger scale, this project exemplifies the young people who will inevitably inherit the water infrastructure struggles and work yet to be done in homes and schools across the nation.

The project runs through August 20. Visit www.beyondstreaming.org

for artwork and more information on the exhibit. ●



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| AWWA PREVIEW |

Uniting Water

American Water Works Association's Annual Conference and Exposition returns to Philadelphia for in-depth look at water management.

BY KYLE MILNAMOW

For the first time since the early 90s, the American Water Works Association (AWWA) will be hosting its Annual Conference and Exposition (ACE) 2017 in Philadelphia. Come June, attendees across the nation will gather to learn about solutions for managing water throughout the entire water cycle. This year's theme will once again be Uniting the World of Water.

PHC News spoke with Deirdre Mueller, AWWA's senior communications manager, about the upcoming conference, some special sessions and how first-timers and returning visitors can get the most out of their experience.

PHC News (PHC): What makes the ACE conference stand out every year?

Deirdre Mueller (DM): AWWA's ACE is the oldest, and one of the largest, water conferences in the country. We strive to provide timely, relevant content on topics facing the water sector. Key topics this year are financing infrastructure, asset management, lead service line management, water loss control, groundwater and membrane treatment.

PHC: With news these past few years on clean water and water conservation, what is this year's conference doing to educate visitors about these issues?

DM: Within two of the ACE17 tracks, there are sessions that explore topics

relevant to water conservation including engaging customers, pairing water conservation with energy conservation, modern metering and successful program development. For clean water, we have sessions on wastewater treatment, collection systems management, potable reuse treatment, watershed management for source water protection and process optimization.

PHC: Can you talk about the speakers and seminars at this year's conference? Are there any returning from last year?

DM: We work to keep the content fresh each year, with new perspectives and projects to highlight on the program. A couple of key events include: The Opening General Session on Monday, June 12, and the Water Utilities Issues Forum on Wednesday, June 14.

For the first time in many years, the ACE17 keynote session will feature legends from within the industry. Attendees can listen to stories from some of North America's most progressive water utilities. We'll hear how they got into the water sector and what drives them to succeed. We'll hear about the toughest challenges they've faced in their careers and how they've overcome those. Speakers include: William Stowe, Des Moines Water Works; Carla Reid, Washington Suburban Sanitary Commission; and Susan McCormick, Great Lakes Water Authority.

For The Water Utilities Issues Forum, attendees will participate in a conversation exploring an insider's perspective of life at the Flint, Michigan water utility from two members of our community who have been actively involved with the utility over the past 18 months.

John Young is a member of the Water Quality Committee of the Flint Water Intergovernmental Coordination Committee, which addresses Flint Water's water quality and infrastructure challenges, and is currently leading the



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PLUMBING

recovery effort. Young is the former president of American Water and has supported or assessed numerous water utilities including the Jefferson County (Alabama) Environmental Services Department, New York City Department of Environmental Protection, Detroit Water and Sewerage Department, Miami-Dade and PRASA.

Nick Pizzi is a member of the Infrastructure Integrity Committee of the Flint Water Intergovernmental Coordination Committee. The former assistant commissioner of Operation for Cleveland Water and director of water for Lake County Utilities, Nick is an expert in the areas of operator education, treatment plant optimization and assistance, and the production of written materials for operators.

It will all be moderated by David LaFrance, AWWA's CEO.

PHC: What will the conference do for Field Operators' Day? What about for Smaller Utilities Day?

DM: We have discounted pricing on both days. Also, operators can select the Field Operator Full-Conference at a discounted rate and experience the entire conference.

The Field Operator Full-Conference will cost members \$910; \$1,100 for non-members. Field Operators' Day is on Tuesday, June 13. It will cost \$125 for members and \$155 for non-members.

Operator interest sessions for the conference include: Leveraging Non-Revenue Water Data (TUE22); Utility Optimization – Innovations & New Technologies (TUE40); and Flint's Path from Crisis to Distribution System Optimization (TUE53).

Smaller-Utilities Day will be on June 14. It will cost \$125 for members and \$155 for non-members.

Some highlighted sessions include: Financial Sustainability as a Prerequisite for SDWA Compliance (WED02); Communicating and Evaluating Health Risks Associated with Inorganic Contaminants (WED13); and Innovations in Groundwater Management (WED31).

PHC: How can a first-time attendee get the most out of and plan ahead for ACE17?

DM: First-time guests can download the mobile app in May, and it will have the most up-to-date schedule, rooms, schedule changes, etc. They can also register for the First-Time Attendee

Breakfast. First-time attendees can also explore the Exhibit Hall to see the products/services that support the industry. Also, they can attend the ACE17 Wrap Party; it is free and open to all attendees.

PHC: What can someone who has gone to the conference multiple times expect this year?

DM: There are 16 tracks that cover all relevant topics including expanded content on water infrastructure financing, lead service line management and other hot topics.

We have expanded educational offerings on the show floor this year, including: six Innovation sessions, Wastewater and Collection Systems Management and Roundtable Solutions sessions presented by exhibitors.

PHC: What are the benefits of hosting the event in Philadelphia?

DM: We haven't been there since 1990, so it is a fresh city for many of our members. Additionally, it's a nice, centrally-located city, making it easy for folks along the Northeast Corridor to attend.

To learn more about ACE17, and to register, visit the forum's website at www.awwa.org/ace17. ●

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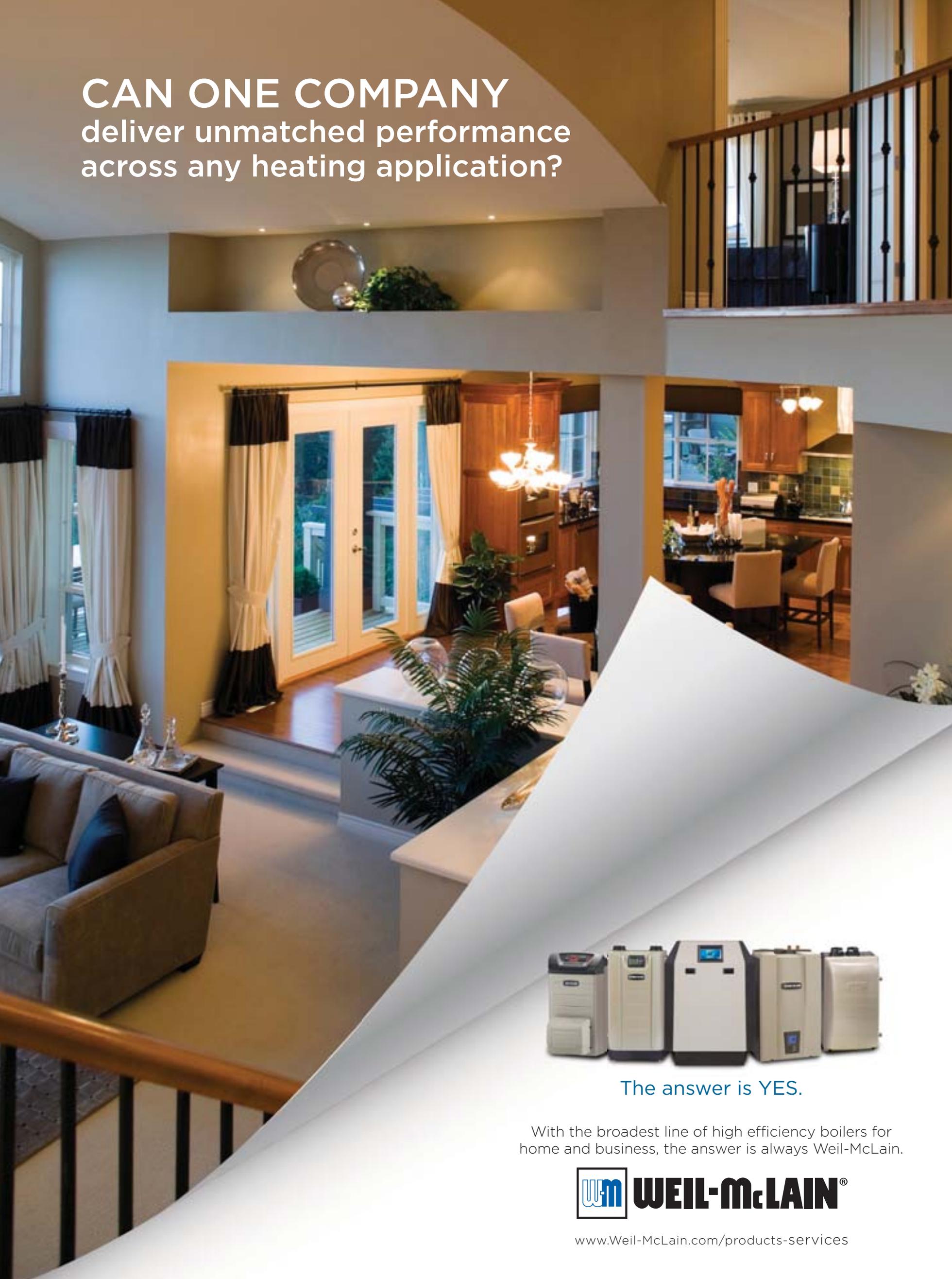
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Health Care Water Management in the Developing World



Photo Credit: WaterAid/Tom Greenwood

Sustainable technology, consideration of potential plumbing issues and strong support and leadership are essential for safer delivery.

BY LINDSAY DENNY

Hospitals and health centers in the developing world are in need of safe water. Actualizing that goal is easier said than done, even for water professionals. To complicate matters, most of these facilities will require on-site treatment, given the minimal treatment of water in the community. At the Center for Global Safe Water (CGSW), Sanitation and Hygiene at Emory University, we have been working on safe water in health care facilities for nearly 10 years — most recently in Cambodia and Uganda. From our experiences in the field, we have noticed a number of challenges and pitfalls that occur for those working on safe water issues in these settings. Along with plumbing engineers, we hope to work with implementers to tackle these issues with best-practice solutions. From water access to treatment and protection, we want to help ensure that the approaches and technologies used are appropriate and, most importantly, sustainable.

The three-step safe water process

Imagine a hospital in rural Cambodia. It sources water from a borewell, supplemented by a

nearby pond in dry season; accessing sufficient water is the first step. A 2015 World Health Organization (WHO) report on water, sanitation and hygiene (WASH) in health care facilities (HCF) in developing countries estimated that 38 percent of HCF in these contexts do not have access to an improved water source. Countries such as Cambodia struggle with this urgent need.

Further, this 2015 report does not take into account seasonality (and climate change), which can cause water scarcity in these regions. The situation in 2017 is likely worse; since the report was published, the global definition of “improved water source” has been revised for health care facilities. The new definition requires a water source on facility premises (the old definition of “within 500 meters” was drawn from the household definition of an improved water source and is unrealistic when considering the existing burdens upon the facility staff). To provide the most suitable water treatment system, it’s important to understand how the facility currently accesses water and if that source is sufficient to meet its needs throughout the year. Alternative or supplemental sources are often required to support

the facility.

The next step of process is the initial treatment of the water. The specific quality of water needed in health care settings depends on the intended use. In the developing world, providing water that is of drinking water quality is the first consideration. To achieve this level of quality, water treatment can vary widely and may include filtration, disinfection (chlorination or UV) and boiling. Treatment can happen at the point of use, such as at a hand-washing station for surgery or at a drinking water station. Or the facility may receive treated water from a point of entry system, serving larger parts of the facility through the pipe network.

Once the water has been treated, protecting the water from recontamination is the final step in providing sustainable safe water to the facility. To ensure water access during times of power outages or the dry season, water storage tanks are common. Water stored post-treatment or distributed through existing pipe networks is at a greater risk for recontamination, particularly if maintenance of the plumbing infrastructure is minimal.



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When providing safe water requires treatment systems, as often it does, taking time to select the appropriate technology should not be overlooked.

Challenges in safe water provision

Throughout the process of accessing, treating and protecting water for the health care facility, implementers will find themselves facing a variety of challenges. From as-builts to cross contamination, here are some recommendations for addressing these challenges in the field.

Budget and supply chain

When providing safe water requires treatment systems, as often it does, taking time to select the appropriate technology should not be overlooked. Installing a treatment system that the facility cannot afford to maintain, regardless of its effectiveness, will set the facility up for failure. By understanding budget constraints as well as other priorities that impact the health care facility's finances, the implementer and the facility can together determine the best option for water treatment. Because treatment systems typically are imported into countries like Cambodia, the supply chain for spare parts is crucial to making sure these systems last their full lifespan. Identifying supply partners in-country and connecting them to the facilities is critical. At the same time, ensuring that those spare parts are financially reasonable and that the facility can take responsibility of their recurring costs will impact

whether the facility will purchase these parts in the years to come.

As-built drawings

Facilities with piped water often do not have "as-built" drawing. Figuring out the pipe layout requires speaking with the person who built it or investigating the layout yourself. A building that is "dual-piped," with two systems of treated and untreated water, should be handled with the same precautions used in the U.S. in facilities where there are both potable and reclaimed water piping. Generally, the reclaimed water is run in purple pipes or, in the case of existing copper installation, the non-potable water pipe would be wrapped in purple tape to avoid confusion. Additionally, test ports should be provided to confirm that there is not a cross connection between the two systems.

Existing infrastructure

Facilities with older pipes can have a biofilm, causing recontamination of treated water. While laying new pipe may not be feasible, it is worth considering what affect the existing pipe will have on the integrity of the safe water. At a number of facilities where we have worked, some of which are more than 50 years old, we have needed to shock the system after the installation of the treatment system. It takes time and supervision, but reduction in the biofilm is

possible. It's important is to know what you are in for and include that in your plans.

Cross contamination

The demand for health care in the developing world is not decreasing, and facilities may need to expand over time. At one of our hospitals in Cambodia, treated water was extended from beyond the maternity ward to the nearby eye unit. However, the plumber mistakenly extended the pre-treatment rather than the post-treatment line. It was only after we tested the water several months later that the cross connection was discovered. By then the contamination had undermined the quality of the water throughout the system. Lines might even be extended to buildings off the facility premises, if community members decide they want treated water at the nearby school for example.

If as-built designs are non-existent or the facility staff have not been trained on the treatment system and its network, cross contamination is more likely than not. Test ports should be provided to confirm that there is not a cross connection between the two systems. These ports include a pressure gauge and normally a closed valve piped to a drain. If the treated water system is isolated and drained, it should read zero pressure when the test drain is opened, while the non-treated system should



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PLUMBING

maintain system pressure. If the treated water system does not read zero pressure, then there is a cross connection between the two systems that must be identified and repaired.

The role of healthcare staff

As you work to bring safe water to the health care facility, the leadership and staff need to be engaged. Facility directors understand the importance of clean water and the benefits of a water treatment system. However, they tend to be more concerned about providing essential health services with limited resources and budget. Water supply or quality often does not top their list of priorities. Gaining their attention and commitment to safe water from the start and re-engaging them throughout the installation process will have a big impact on the success of the treatment system. The facility's leadership and staff are ultimately responsible for the upkeep and maintenance of the system.

Meanwhile, if the facility has a maintenance staff on the payroll, they

may have limited plumbing skills and may be tasked with additional jobs like driving the ambulance. A pipe breakage can go unnoticed for months, if a maintenance worker doesn't know the signs. Taking ample time to thoroughly train the staff responsible for the system will go a long way to guaranteeing the longevity of the treatment system.

As you work to bring safe water to the health care facility, the leadership and staff need to be engaged.

Water supply and management at health care facilities in the developing world is not easy. However, with appropriate sustainable technology, consideration of anticipated plumbing issues, and strong support from facility leadership and staff, providing continuous safe water is possible. For those who are interested

in addressing the need for safe water in health care facilities, we commend and encourage you. We also hope that our experiences can help to ensure that your work will benefit these facilities in a sustainable way, while building capacity within the community.

An improved water source is one that by nature of its construction or through active intervention, is likely to be protected from outside contamination, in particular from contamination with fecal matter; includes piped water, borehole/tubewell, protected dug wells, protected spring, rainwater collection and bottled water. Definition from WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation. ●

Lindsay Denny is a public health professional at the Center for Global Safe Water, Sanitation and Hygiene at Emory University. She lives in Cambodia, managing the Center's Safe Water for Hospitals program, funded by the General Electric Foundation.



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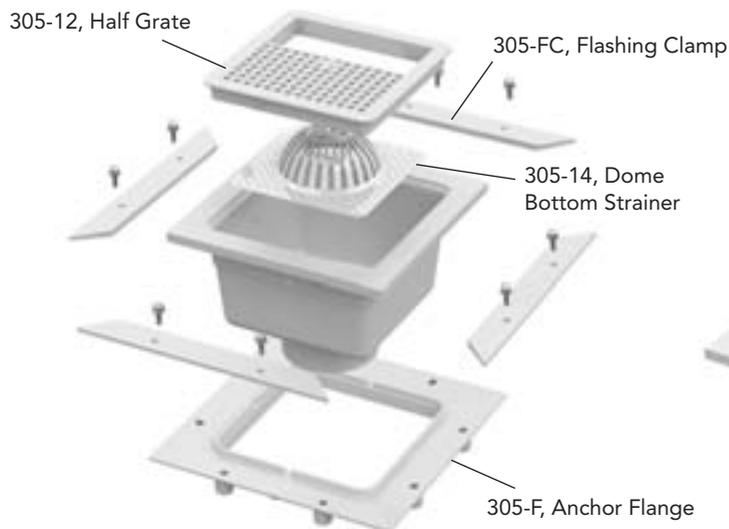


FIG. # 305
Shown with Dome Bottom Strainer

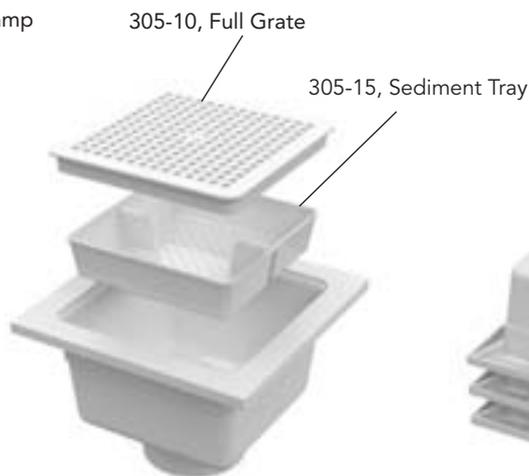


FIG. # 305
Shown with Sediment Tray



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One Design Does Not Fit All

Defining sustainability and usability in commercial bathrooms.



BY DAVID SCELSI

Designing a modern bathroom involves more considerations and more ways to accommodate them than ever before. Knowing what to choose is driven in no small part by the goals of the design, priorities of the user and particular needs of the application.

There are very few universal truths when it comes to bathroom design, and certainly no one-size-fits-all solution. But there are two main perspectives to take into account when designing a well-functioning, long-lasting bathroom.

Designing for sustainability

As sustainability issues continue to increase in breadth and intensity across nearly every facet of building design and construction, water conservation has become a leading issue in bathroom design.

According to the EPA, restrooms account for 28 percent of water use in office buildings, 35 percent in hospitals and 45 percent in schools, so cutting water consumption in basic needs like toilets and sinks can have a significant impact in overall conservation.

Technology in urinals, toilets and faucets allows them to operate far more efficiently than even 10 years ago, without sacrificing performance.

Urinals, for instance, can be flushed with a pint of water, an 88 percent water savings over the historical one-gallon. In the past several years alone, toilets have gone from a standard 1.6 gallons per flush (gpf) to 1.28 gpf, and some manufacturers are now producing models as low as 1.1 gpf.

Faucets are perhaps the easiest place to realize immediate water savings. A minimal investment of time and resources can dramatically reduce water flow in dated fixtures. Adding or updating aerators can cut flow to as little as 0.35 gallons gpm.

Additionally, choosing hands-free sensor faucets has been shown to cut water use by as much as one gallon per hand wash by activating water flow only when it's needed.

Other developments in plumbing, like waterless urinals, further enhance conservation efforts.

Hydrogenerators can be used to power sensor faucets and touchless flush valves. By harnessing the flow of water through a turbine, these devices can provide enough power to operate the devices for up to 10 years, eliminating the need for batteries or electrical connections.

While water is often the first consideration when it comes to bathroom sustainability, it's not the only one. A holistic approach to sustainability also entails looking at

what materials are used in all areas of the facility.

More and more manufacturers are offering products made of recycled materials, and many also incorporate sustainable practices into their own processes, allowing a facility to emphasize sustainability throughout the supply chain in designing and outfitting its restrooms.

No discussion of sustainability in the bathroom is complete without visiting the hand dryer vs. paper towel debate. Electric air dryers are often favored for their sustainability — reducing the waste and regular expense of paper towels — but there has been some pushback from users who feel like their hands don't get effectively dried and who want to use towels to grasp bathroom door handles on the way out.

Designing for usability

Three issues are primary when designing for usability: the needs of the facility, the budget and who will be using the restroom.

For example, while hands-free systems might be preferred in hospital or high-end office applications, they can add significantly to the budget of a project — often three to four times the cost of traditional manual faucets — and are likely ill-suited for an average middle school,

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where ruggedness and durability are paramount. There, a metering faucet that's hard to damage or vandalize might be a better option.

Likewise, a hydrogenerator that's an excellent choice in airport restrooms that are used heavily year-round might perform poorly in

a school that experiences extended periods of disuse, potentially causing power issues when school is back in session.

Maintenance considerations can also play a role in restroom design. A sensor faucet is virtually maintenance-free, aside from

maintaining the power supply as needed. A manual faucet can require periodic maintenance to replace cartridges, o-rings and other wearable parts.

Aside from product needs, the nature of the end users themselves can also make a significant impact on maintenance needs. Consider that same middle school, where a sensor faucet or flush valve with a visible electronic lens may become a target for gum, scratching or other instances of vandalism.

Small considerations can lessen the maintenance and ongoing costs of a bathroom. Vandal-resistant aerators, for instance, prevent users from removing the aerator, which leads to significantly higher flow rates — and thus higher water bills and more unplanned maintenance to repair or replace the parts.

For many types of facilities, particularly health care, hygiene considerations are also a driving force behind bathroom design choices.

Hands-free fixtures are a particularly popular choice in such settings. From flush valves and faucets to soap dispensers and hand dryers or towel dispensers, it's possible that an entire restroom can be practically touchless, reducing the risk of potential cross-contamination.

And the currently expanding trend of integrating sinks into countertops eliminates the seam where the two materials meet, a spot where dirt can collect and contaminants can multiply.

Materials selection can also impact hygiene. Quartz and solid surface countertops, for instance, offer non-porous surfaces that minimize bacteria growth and are low-maintenance.

Identifying bathroom design goals at the outset — whether they be sustainability, hygiene, durability or a combination of many factors — is key to creating a facility that'll serve the users' needs and withstand the test of time. ●

David Scelsi is marketing product manager with T&S Brass.



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Water Treatment Technologies

The use of reverse osmosis technologies allows hotels in Mexico to address water consumption.



BY ANGEL MARTINEZ

The need to address water demands worldwide has pushed science and technology to develop innovations that can help. We have to remember that even when two thirds of the planet are made of water, it is not suitable for human consumption.

The fact still remains that every living being needs water to survive. A citizen's average water consumption worldwide amounts to 74 gallons per day, says Arturo López Fernández, account manager for Dow Mexico Water & Process Solutions.

"The daily water consumption in Mexico is, on average, of 92 gallons per person. In tourist zones, this number increases to 159 daily gallons. Globally, Mexico is the fourth country with the highest rate of water consumption per person."

For the hotel sector, water is a highly valuable resource. In comparison to other sectors in the country, its demand for water is higher and even more important than it might appear.

"For instance, a 1,000-room hotel uses, per day, 264,000 gallons of water," López Fernández points out.

This number, he says, emerges from the users' habits. "A person that is on vacation can use double the water they use when at home. In fact, the tourism sector uses 1 percent of the

total amount of water worldwide."

Such numbers have made chemical and biological industries look for better options to keep water flowing. "It is evident that our efforts are focused on the hotel sector and on everything it represents, offering, mainly, products that contribute to water treatment and purifying processes, so that we can bring more drinking water to users and workers alike."

In this sense, López Fernández highlights that when it comes to hotels, different elements have to be taken into account. The development of a new hotel creates a relation not only with clients, but also with the population near the facilities. "In new and developing tourist zones there is a lot of investment. This situation brings out different issues, like the need for accessible roads for the people living nearby. And of course, this implies the availability of water as well."

Dow Water & Process Solutions develops and offers different technologies to bring drinking water to this important sector, through reverse osmosis or ultrafiltration. "These technologies are complementary to water treatment plants and other machinery dealing with seawater, wastewater and well water. In the Mexican tourists sector,

we are pushing into the market ultrafiltration technologies, which can be used to take out viruses, bacteria, colloids, colors, turbidity and any solid pollutants larger than 0.03 microns. This technology can be used in different processes; for example, in a desalination plant, it can be used as a pre-treatment solution, as well as in potable water production, and in wastewater, as a secondary treatment. So to speak, water that apparently is no longer useful because it comes from the sewage system can be transformed into drinking water again, thanks to the membranes our technologies feature."

López Fernández explains that reverse osmosis is not a new process; its origins go back to the second half of the 18th century; however, this is one of the options in which they have participated actively.

"This technology is used mainly in desalination processes, and we have taken the time to develop it; we have developed new membranes that allow for better salt rejection, with less pressure and energy demand."

With regards to wastewater recovery, according to López Fernández: "Ultrafiltration can provide up to 90 percent of water recovery. Meanwhile, with reverse osmosis, as it is a desalination process, the plant's efficiency varies,

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depending on inlet water quality and on the quality and quantity needed at the end of the process. What Dow manufactures is the heart of treatment plants, for we provide the element that separates salt or solids from water.”

In the hotel sector, he feels happy that investors are looking positively at both processes. However, there is still a long way to go with the government: “Nowadays, we are focusing on the development of new district projects in tourist regions. We are concerned about utilities. They have to be improved to bring new technologies to their treatment plants.”

He mentions hotels have put into practice some technologies to treat the water their guests have already used, so that it can be used again for other purposes, like gardening, showers and bathrooms. “In this sense, we believe the government must potentialize investment in tourist regions, so that the people get the water quality they deserve. Unfortunately, regulation does not allow wastewater to be treated for human consumption; it can only be used for secondary activities.”

Lack of information

Dow’s representative considers that scarce broadcasting of information

and little implementation of such technologies, not only in the private sector, but also in utilities and in the residential sector, as well as the benefits they might offer in water distribution, are an obstacle that has to be sorted out: “Today, if you have wastewater and someone tells you it has been treated by means of some technology to use it again, it is very unlikely you will use it, because you don’t know the standards of the technologies and how water was treated. Therefore, we have to bring all this information to the people. The goal is to change how people think. Nowadays, we have trustworthy technology with which we can treat water to use it again. If we manage to bring such ideas and knowledge to most of the people, we can get more investment in technologies to improve water quality in the whole country.”

López Fernández says there are more than 30 water treatment plants in Mexico City which already use reverse osmosis technologies to treat water from the inner wells of the city. In many of them, Dow’s technology is at work.

He adds that, as a company, Dow is committed to society. “(That is why) we have come closer to other companies and district governments responsible for water distribution to

understand their needs, share our knowledge with them and show them the solutions Dow has developed in this field.”

López Fernández assures one of the greatest satisfactions he’s had while working at Dow Water & Process Solutions, “has been to show these technologies to my country, because they improve the quality of many people’s lives.” ●

Ángel Martínez, associate editor at Especificar, has a bachelor’s degree in Spanish language and literature. He has been an industrial journalist for more than seven years, writing about energy, HVACR, buildings, sustainability and entrepreneurial culture.

This article was originally published in our sister publication, Especificar, TMB Publications’ leading B2B Mexican magazine for plumbing, HVACR, hydronic and fire protection contractors. Especificar was launched in January 2017. Read more articles like this at especificarmag.com.mx.



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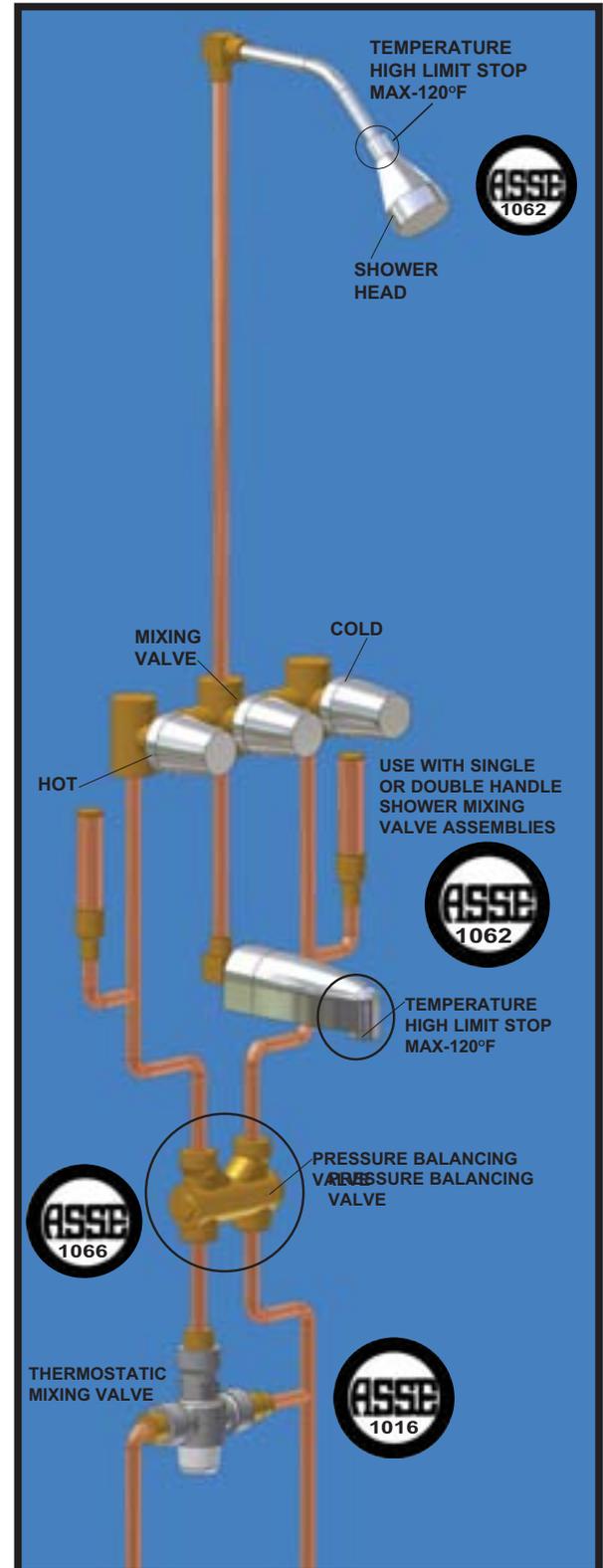
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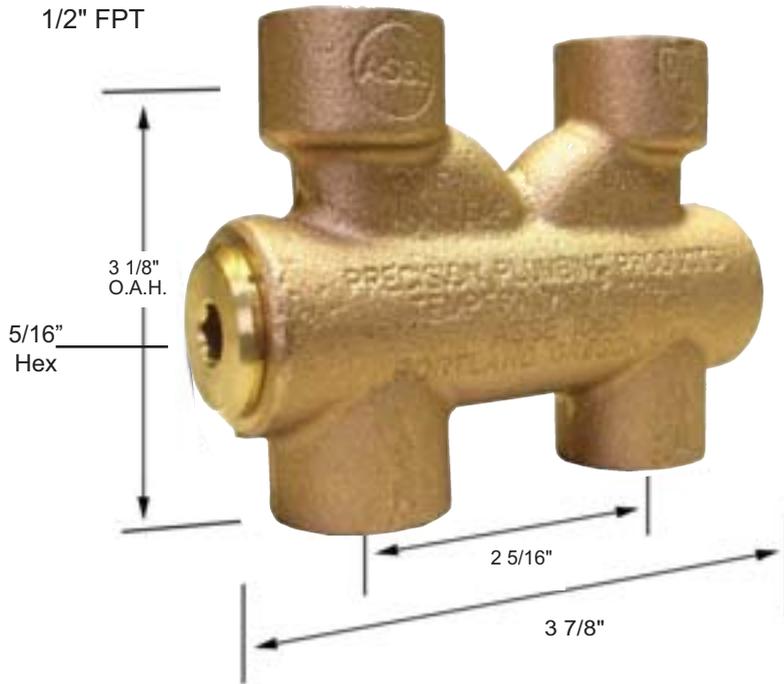


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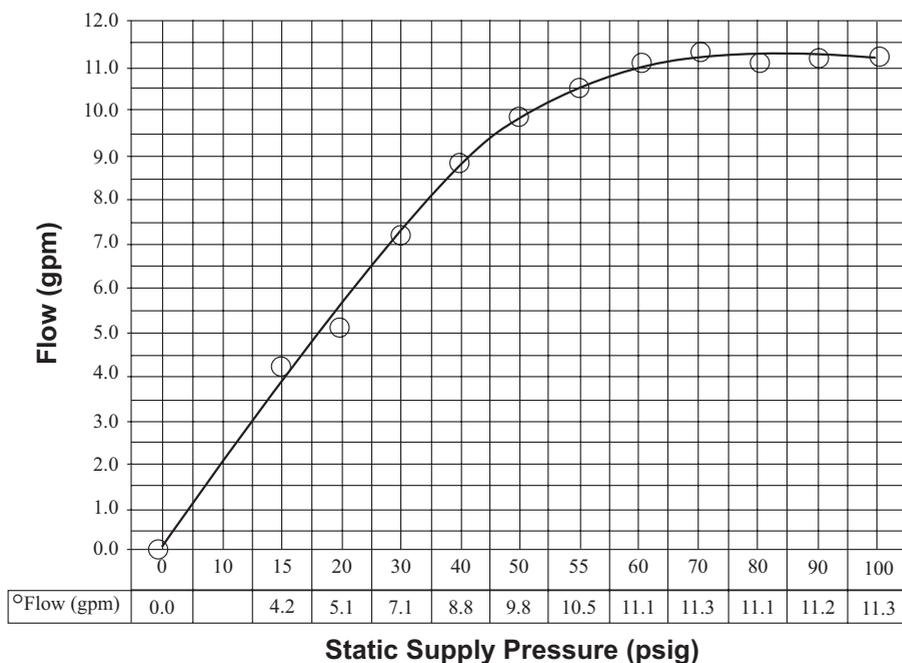
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Hot Water for Dairy Farms

The milking process is a lot more complicated than you would think.

BY HARVEY RAMER

Doing business here in the rural areas of South Central Pennsylvania, we find ourselves surrounded by agricultural operations. As you drive through the gently rolling country side, bordered by the Appalachian mountain range, you will see greenhouses, acres of produce fields, and every time you turn the corner, another dairy farm. There are only about 50,000 dairy operations left in the continental U.S., and it feels like they are all here in my backyard. Most of them are smaller family operations, but more and more of them are becoming commercialized and milk hundreds of cows, three times a day.

The one facility that I visit frequently for boiler maintenance, milks cows 24 hours a day, 7 days a week. The milking is all done via robots. Each cow has a computer chip attached to its ear. As they come through the milking station, the computer reads the chip and knows the cow by name. It then feeds that cow according to its predetermined, personalized diet. As it is being milked, the computer monitors the amount of milk and also if there is any mastitis present in the milk. If anything is off about the cow's milk production, the computer will automatically switch gates and redirect that cow into a sick pen, where it will be cared for by the farmer.

All that is pretty cool.

It amazes me how technologically-advanced the dairy industry is, considering the limited market of 50,000 customers.

There is one truth in all this though, the more technology a system has, the more things there are to go wrong. This is true almost anywhere. There are many things that can bring a dairy to a grinding halt very quickly and cost the farmer big bucks if not remedied right away. One of these is hot water for washing and sanitizing the milking equipment. Having a robust hot water production system is essential for these operations. Its primary purpose is to clean and sanitize the milking equipment and pipelines. Its secondary purpose is to provide heat for the concrete slabs and prevent manure slop from freezing to the surfaces during the winter. The third function is to provide heat for the mechanical rooms, offices and milking

parlors.

The wash cycle for milking equipment is an interesting and complicated process. It consists of three cycles. The first cycle begins immediately after the milking is completed, before the pipelines have a chance to dry. It is a rinse cycle, with the typical water temperature around 100 F to 110 F. If the water is too hot during this cycle, it will cause denaturation of proteins in the milk residue, and result in a protein film on the surfaces of the piping. Water that is too cold will cause the fats in the milk to crystallize and leave behind a greasy, hard-to-wash surface on the pipe walls. The second cycle follows right on the heels of the first rinse, and uses the lion's share of the hot water needed for all three cycles. This cycle needs 170 F water to start, and is not allowed to drop below 120 F by the end of the cycle. The hot water will typically be mixed with some alkaline cleaners. This cycle is considered the wash cycle and lasts about 6 to 10 minutes. The third is the sanitation cycle. It is a cool, acidified water rinse. The water will typically have a pH of 3 to 4 and is meant to remove all traces of the cleaners used in the second cycle.

The whole process will typically take less than an hour, and it uses quite a large amount of hot water in short order. Different setups have different requirements, but some of the larger ones I work on, have a 1-inch pipe from the water heater directly to a large stainless tank where the cleaning chemicals are mixed. The pipe opens and closes via a solenoid valve to fill the mixing tank with hot water. It is nothing to see a 100-gallon water heater depleted in minutes. The water solution from the mixing tank is then pulled through the milking system via a rotary vane vacuum pump. There is an air injector in the pipe just upstream from the mixing tank. The air injector opens and closes while the water is being pulled through, causing water surges through the pipeline and promoting better cleaning. The water needs to move through the pipelines with a minimum velocity of 5 feet/second, to get the proper turbulence and scrubbing action on the sidewalls of the piping.

This cleaning process is incredibly important to a dairy operation. If anything is wrong with the process, bacteria will start growing almost immediately. This can cost the farmer a lot of money. If the bacteria counts get to high, the milk company will fine the farmer for a portion of the payment they would otherwise have received for their milk. If the count is very high, but they catch it in time, they may have to dump their entire bulk tank of milk. Worst case scenario is that it doesn't get caught in time,



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and the farmer has to pay for the entire tractor trailer load of milk. That's a lot of money!

Most of the hot water generation setups I have been seeing lately on dairy farms are an incorrect application of modern technology, and the farmers are suffering because of it. A setup will normally consist of a preheat tank followed by an indirect water heater that is coupled to a ModCon boiler. The preheat tank is first in line and collects waste heat off the refrigeration system that cools the milk in the bulk tank. The water then goes into the indirect heater and is heated to 170 F.

The indirect tank poses the problem, due to the high water temperature requirement. The boiler has to be run at 190 F to get any kind of heat transfer to the water heater. This only gives you a 20-degree TD between the boiler water and the tank set point. This makes the recovery time very slow. With that being the case, the water heater has to be sized to hold the capacity, equal to the gallons of water used in the milking equipment's wash cycle. It's not a very efficient way to do things. It requires a tremendous amount of storage, and the boilers do not do well running at those temperatures continuously. The setups I keep seeing, typically will have an undersized boiler for the DHW load, and are grossly oversized for the connected space heating and slab warming loads.

A much better way to do it is to install direct-fired

water heaters with large burners. This allows much faster recovery after a tank draw down. In a boiler/indirect setup, you are limited in production due to the heat transfer process. The heat from the flame transfers to the boiler water, which is then transferred to the DHW in the indirect. Each step of heat transfer requires a temperature differential for the process to occur. The greater the temperature differential, the faster the transfer will occur. With the DHW setting at 170 F, this doesn't give enough of a temperature differential to transfer heat at the speed required to meet the demands, in most cases. With a direct fired water heater, the heat from the flame is transferred directly into the 170 degree DHW, and the transfer can occur much faster, allowing the burner to run at max capacity and greater efficiency. This will greatly increase the "first hour rating" of the water heater over the capability of an indirect water heater. That allows for smaller storage requirements, saving space and money. The space heating and slab warming zones can then be satisfied via a flat-plate heat exchanger tied to the water heaters. That prevents short cycling of the burners when there is only a demand for space heating.

So if you get hired to install a hot water production and space heating system for a dairy farm, these are all things that need to be considered before selecting your equipment. They will not be your customer for long if you can't give them a reliable source of hot water.

I recently got called out to a dairy farm that was experiencing an elevated bacteria count in their milk. The milk inspector had already diagnosed the problem as insufficient hot water during the wash cycle. The company that maintains the milking equipment had already been on seen and determined that it wasn't caused by any of their equipment. When I arrived, I was met with the setup as seen in Pic A. The water heater is a 95-gallon Phase III Triangle Tube indirect. The boiler is an HTP MC 120. The boiler is incredibly undersized for the indirect heater.

So the troubleshooting begins. As always, it begins with verifying the customer's complaint. The farmer was able to do a wash cycle for me, and I measured water temperatures from the heater's output. The water started at 165 F but very quickly dropped to 140 F, even before the second cycle began. Definitely not the way it should be even with the mismatched equipment. I was also monitoring the

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boiler while we were doing this. The boiler was modulating at about 25 percent, and the delta-T between the boiler supply and return pipe on the Phase III was only about 10 degrees.

My next discovery was that the boiler supply going to the Phase III was actually at a lower temperature than the boiler loop. It didn't take long to figure out why; there was a Taco 007 being used as the boiler pump. "007s seem to be the universal pump that are just right for every application" (sarcasm). The 007 was not moving as much water through the boiler as was moving through the secondary loop. This caused the secondary loop to run at a lower temperature and the boiler to not be able to run at full output.

I also found the temperature control knob on the

water heater turned up to the max. Typical. Just like homeowners turning the thermostats higher in a vain attempt to make the house heat faster, people will turn a water heater to the max in an attempt to get more hot water. Problem is, the max setting on the water heater is high enough that it generates a constant call to the boiler, which was set at 180 F. Which brings me to the boiler control; it was still operating on the factory settings. 180 F set point with a 30-degree differential. That differential allows the boiler to drop to 150 F, 20 degrees below the required temp for DHW, before restarting the burner.

So after correcting all the settings and installing the proper-sized boiler pump, I decided to clean the DHW side of the Phase III. I wanted to clean off any scale deposits from the inside of the heater. I cut open the supply and return pipes and installed purge valves. I am of the opinion that every device that generates high temperature DHW needs to have purge valves installed for cleaning. You will need them sooner or later. As I was installing the valves, I noticed some mineral deposits on the one copper joint coming out of the water heater supply. I thought "uhh-oh," but not having the correct fittings on

the truck to make the repair, I decided to proceed with the cleaning and run to the supply house while the heater was being descaled. Efficient use of time, right? But unfortunately, that wasn't to be. I wasn't running the descaler through the heater for more than two minutes before that fitting began squirting out water like geyser.

I told myself I did the right thing; my plan could have worked.

So now I have to replace the supply pipe on the heater, and I only have a little bit of time to get it done before the next milking. I removed the offending section of pipe from the heater supply and found this!

The dip tube for the heater was stuck up in the supply pipe. While all the rest of the issues contributed, this was the main perpetrator to the lack of hot water.

After a quick trip to the supply house, I had what I needed to put everything back together and clean the heater. As I worked, I reflected on my earlier failed plan due to the leaking fitting. My disappointment had turned into what I considered a win. Funny how things work in our favor sometimes.

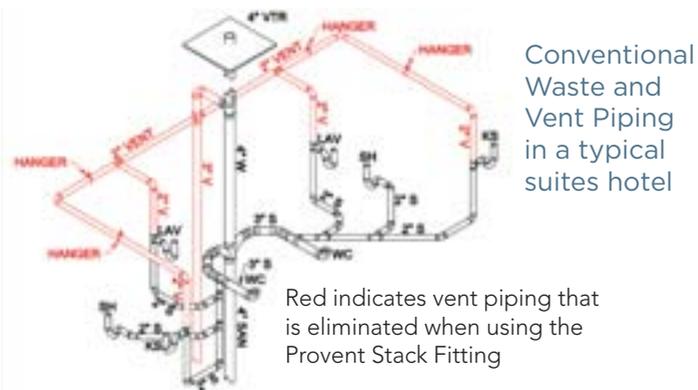
After the dust settled, I checked in with the farmer. His bacteria counts have dropped to a lower level than they have ever been before. That's good for everyone. ●

Harvey Ramer is the owner of Ramer Mechanical (RM) LLC. RM specializes in radiant heating and hydronic heating systems. The company also provides other mechanical services to the residential and light commercial market. Ramer also provides heating system design services and consultation across the country.

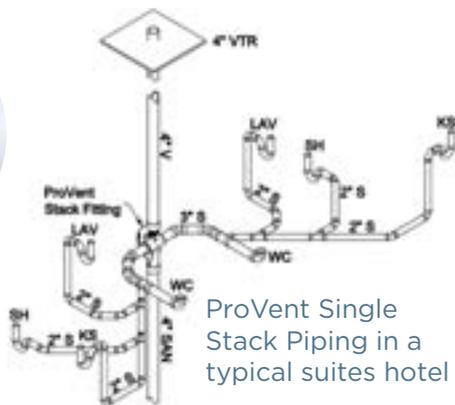
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Steady Growth Buoy Industry

The boiler industry is going full steam ahead with advancements that provide comfort and more.

BY SHARON J. REHANA



Five Buderus SSB399 commercial boilers cascade in Banff Canada Elementary School. Photo courtesy Bosch Thermotechnology Corp. and Lowe Agencies Sales & Marketing Inc., Alberta Canada.

In today's marketplace, manufacturers must constantly look for innovative ways to grow their business. With buzzwords like "energy efficiency," "smart" and "connected," consumers are looking for products that will deliver comfort with ease, minimal cost and maintenance.

On the other side of things, manufacturers need to keep in compliance with standards and regulations. With some of that hanging in limbo, it can be a tricky balancing act when it comes to planning for the future.

So what does all of this mean for the boiler industry?

We spoke to a number of manufacturers — AERCO, Baxi, Bosch, Bradford White, ECR International, IBC Technologies, Laars Heating Systems, Navien, Noritz, NTI Boilers, Parker Boiler, Raypak, VESTA and Weil-McLain — to get a better understanding of what the industry is doing and where it aims to go in the future.

We started off by asking if there are recent regulations that will likely impact the boiler industry. And if there are, do they anticipate any changes with the new Trump administration?

Most manufacturers addressed the Annual Fuel Utilization Efficiency (AFUE) regulations. AFUE refers to the portion of energy in the fuel that is converted to useful heat. The standards for each type of boiler include a requirement for AFUE and/or design requirements. Congress established the current standards for residential boilers as part of the Energy Independence and Security Act (EISA) of 2007, and they took effect in 2012.

In 2016, the U.S. Department of Energy (DOE) finalized new standards for residential boilers that will raise the minimum efficiency levels from 82 percent to 84 percent for gas-fired boilers and 84 percent to 86 percent for oil-fired hot water boilers. The new standards will take effect in 2021.

Lew Klein, senior marketing communications manager for Weil-McLain says, "Of course, the proverbial elephant in the room we all recognize is the higher AFUE standards established by the DOE, effective in January 2021. Manufacturers must factor this in when reviewing their current product lines and in all phases of new product design and development. Then there is the sheer volume of new rules that cover not only efficiency levels, but test procedures as well. For manufacturers, this requires additional resources. Then, for us, it's balancing the innovative roadmap we establish with the compliance aspects."

Brian Fenske, specialty channel sales manager for Navien agrees. He says though the residential AFUE increase requirements already passed before the new administration took office, "The commercial boiler thermal efficiency increase of 80 percent to 84 percent, which would

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have been effective in 2020, stalled before passing and is now frozen by executive order.”

“In addition,” Fenske adds, “there is no Federal Tax Credit in place for high-efficiency boiler installations or replacements.”

Jennifer Loran, senior marketing specialist for ECR International Inc. addresses the new regulations as well, but she says, “The new administration has been vocal with regard to reviewing and possibly reorganizing current programs and existing legislations.”

Chuck O’Donnell, director of marketing for Laars Heating Systems says, “With the government freeze of new or pending regulations, we expect that the pace of regulatory action to slow considerably. We hope to see more meaningful engagement at all stages of regulatory development between our industry and the rulemaking bodies under the new administration.”

Rich Corcoran, vice president of sales and marketing of commercial products at Raypak says, “Raypak supports the DOE rulemaking on commercial boilers, which would raise the minimum efficiency from 82 percent thermal efficiency (for 300K = 2,500 BTU/hr boilers) to 84 percent thermal efficiency, and from 82 percent combustion efficiency (2,500 – 10,000 BTU/hr) to 85 percent. The DOE is proposing adding another classification greater than 10MMM, and will leave the level at the current 82 percent combustion efficiency. Also, there is an EPA Energy Star program that was launched December 2016 for commercial boilers with efficiencies greater than 94 percent thermal efficiency for units up to 2.5 million BTU/hr, but no program for larger units. NRCAN in Canada is looking to initial efficiency rulemaking in 2017 on residential and commercial boilers, and water heaters under Amendment 15. They have expressed their desire to have minimum efficiency values higher than the DOE, so I would expect condensing technology for all category levels.”

Though these regulations will impact all manufacturers, some consider them par for the course.

Mike Thomas, president of Marathon International, the exclusive distributor of Baxi products in North America says, “We believe that heating the nation in an economically and environmentally responsible fashion will remain a priority for federal and state government leaders. Energy



The CB Combination Boiler from Noritz, which delivers hot water to both plumbing and hydronic heating applications, is shown here being installed.

supply, conservation, sustainability and affordability will continue to serve as important guides to energy policy decision-making, but consumer choice will remain the critical consideration. Baxi research shows that reliability ranks even higher than efficiency, incentives, warranties, training and ease of installation.”

Nate Warren, business development manager of specialty products for Bradford White Corp. says, “Recent regulations have influenced a shift towards more advanced, higher efficiency designs. In 2016, a regulation was passed, calling for a higher efficiency rating of all residential boilers beginning in 2021. The new administration is in the process of doing the same for all commercial boilers to increase their efficiency rating. Product changes are not the only regulations impacting the boiler industry. Effective January 2017, a new test

procedure was implemented, calling for all boiler manufacturers to retest and recertify the ratings of all commercial boilers. With so many changes in effect, Bradford White remains committed to supplying efficient and effective boilers to our customers.”

Douglas Dodds, managing director of North American sales and marketing for IBC Technologies adds, “I believe the die has been cast for condensing products, and they will continue to take market share. The key to the long-term success of high-efficiency boilers is cost (initial and annual operating) and reliability.”

“There are a few scenarios with federal and state regulations that may impact the market,” says Nery Hernandez, product solutions manager for AERCO International Inc. “For example, Utah is considering commercial boilers have reduced low NO_x emissions,

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following the lead of other states such as California. We see additional states considering similar guidelines. At the federal level, there has been discussion of the EPA loosening regulations. If this policy shift occurs, it may affect how some decision-makers evaluate boilers. We believe, however, that most people in the market will still prefer high-efficiency solutions because of their superior return on investment (ROI)."

Other manufacturers are focusing on international trends and how those impact the future of regulations in the industry.

Dan Moffroid, director of product management of boiler and hot water products for Bosch Thermotechnology Corp. says, "One of the main regulatory topics we track is whether or not North America will follow some of the trends occurring in Europe. These include a complete conversion to condensing boilers in some markets as well as other requirements impacting pumps and controls contributing to higher system efficiencies. We are eager to see how the new administration manages these topics, as well as the ongoing discussion of implementing higher taxes on imported goods, which would have a big impact on many boiler manufacturers operating in the U.S., including Bosch."

Having to comply with new standards is one thing, but how it's done is another.

Next, we asked the manufacturers how they've used technology to meet recent updates in codes and standards.

"Our recent technological advances have been more related to meeting customer demands rather than updated standards. With each passing day our installers ask for our products to be faster and easier to install, and our consumers want easier control of their heating systems. Our focus has been in this area — using technology to simplify everything from the installation to product use to maintenance and service." — *Moffroid (Bosch)*

"Utica Boilers (a brand of ECR International) has been adding LWCO (Low Water Cut Off) protection on the majority of our boilers. This feature reduces potential failures and makes it easy for the installer to comply with codes." — *Loran (ECR International)*

Michael J. Leeming, national sales manager for Parker Boiler Co. echoes that sentiment. He says, "[We've been] adapting to what



Navien NHB Boilers installed at a Massachusetts multi-family complex.

the customers want, which is more automation, the ability to control and view their boiler on a online dashboard, and HMI (touch screens) on the equipment."

Jack Ernest, vice president of VESTA says his company is focusing on "software enhancements for easier troubleshooting and communication."

"Bradford White Corp. has built a state-of-the-art combustion lab at Laars Heating Systems Co., our manufacturing facility in Rochester, New Hampshire. The lab allows our engineering staff to measure and record a broad spectrum of product performance with incredible precision. Our engineering team uses this data to help ensure our current products meet the tighter tolerances required by today's standards."

— *Warren (Bradford White)*

"We've moved toward stainless steel condensing to meet higher efficiency market demands — not necessarily due to codes and standards. Most changes in technology are being driven by market demands, not codes and standards." — *Corcoran (Raypak)*

For most manufacturers, technology and energy efficiency go hand-in-hand and have been part of the company protocol for years.

Steve "wheels" Wieland, regional sales manager of NTI Boilers says, "Our team of engineers are constantly reviewing and updating our technology to stay up with all recent code and standards changes."

"AERCO has designed Low NO_x burners for years, allowing us to meet the market trend for lower emissions. Our progressive thinking also led to high-efficiency technologies that have a clear ROI, so our customers see economic and operational benefits to our solutions, in addition to environmental advantages. This approach positions our boilers well in the market, even if the EPA guidelines change."

— *Hernandez (AERCO)*

"Baxi has been the leader in boiler technology advances since the 70s when it developed compact wall-hung boiler technology. It later was first to introduce the all-in-one, combination heating and domestic hot water modulating boiler. Baxi was also one of the first to introduce



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modulating, condensing high-efficiency boiler technology. More recently, it introduced gas-adaptive, self-calibrating boiler technology with comprehensive Baxi Luna Duo-Tec GA technology.” – *Thomas (Baxi)*

Jason Fleming, vice president of sales and marketing for Noritz says, “We are already meeting these standards, so we have been unaffected. We always strive to stay ahead of the technology game instead of scrambling to catch up as changes are made.”

“Throughout our 136-year history, Weil-McLain has both employed and created the latest available technologies to develop boilers in response to the ever-evolving codes and standards, particularly regulations that relate to high efficiency and the environment. A prime illustration of this mantra is the recent introduction of our 95 percent AFUE Evergreen boiler that delivers optimum comfort and performance while achieving advanced efficiencies and a reduced carbon footprint. For example, for residential and light commercial customers who require a multiple boiler setup, the Evergreen offers the ability to cascade eight boilers together and ZoneStacking up to 24 programmable zones with no external panel required. In commercial applications, optimal energy efficiency yields reduce energy costs with up to 96.5 percent combustion efficiency. Our SmartSequencing feature maximizes energy across all boilers on a system, reducing energy costs. The unit also is certified as low NO_x by the South Coast Air Quality Management District (SCAQMD) with less than 20 ppm. Evergreen was designated as Most Efficient 2015 by ENERGY STAR.” – *Klein (Weil-McLain)*

Using technology to comply with codes and standards seems like an obvious practice, but we were curious about what new developments there’ve been in boiler technology. We asked the manufacturers to tell us about any new developments in boiler technology that their company made recently.

“Many new technology developments have been designed into the new AERCO Benchmark Platinum high-efficiency, condensing boilers. The boilers feature a dual return capability that takes full advantage of diverse load demands specific to a site. Most traditional boilers offer a single return that forces the blending of hot and cold water temperatures. Benchmark

Platinum’s dual returns keep cold water separate, creating a larger condensing zone in the heat exchanger that improves boiler efficiency up to 7 percent. Another advancement is AERtrim, AERCO’s patented advanced O₂ Trim technology that monitors actual site conditions and self-adjusts its combustion process to ensure the boiler is operating at optimal O₂ levels and peak system efficiency. A system with proper O₂ levels delivers greater uptime reliability, produces lower emissions and creates the ideal environment for condensing to occur, which saves money with an additional 1-2 percent in seasonal efficiency gain. It also lowers operating and maintenance costs by ensuring the system is operating at peak performance. Remote monitoring, such as OnAER, is another key advancement. It continuously monitors the overall health of a boiler system to help more efficiently maintain and protect a boiler investment.” – *Hernandez (AERCO)*

Baxi recently introduced gas-adaptive, self-calibrating boiler technology with the Baxi Luna Duo-Tec GA technology. “We have introduced common venting for multiple commercial boiler installations. Based on the success of our all-in-one residential Baxi Luna Duo-Tec GA series (both combi CH and DHW, and CH-only), we have now included more built-in components to our commercial Luna Duo-Tec MP models. Those components now include a built-in pump, pressure relief valve, low water cutoff, frost protect, 0-10 V interface in the PCB, as well as program modes for automatic de-aeration, anti-Legionella, anti-wind, chimney sweep and commissioning functions, for example.” – *Thomas (Baxi)*

“A key focus area for Bosch is being a technology leader in the Internet of Things (IoT). Our boilers can currently be controlled by the Bosch Control smart thermostat, and in Europe we have already launched the Bosch Smart Home system. There is future consideration of introducing it in North America, as well. This will allow, for example, your boiler to communicate with other areas of your home. Imagine you are feeling a little warm in early spring so you open your window. The boiler would know and automatically shut down to further reduce energy usage.” – *Moffroid (Bosch)*

“One of the most interesting new

features is our VSPC variable speed pump control. It’s standard on MagnaTech boilers and optional on 285-1200 model Brute Series boilers. The VSPC maintains a constant boiler Delta T by adjusting a variable speed boiler circulator in conjunction with the firing rate. By maintaining a constant Delta T, the VSPC reduces the pump’s electrical consumption at lower firing rates. Considering most condensing boilers only operate at their full capacity for a very small fraction of the year, the VSPC can produce electrical savings of up to 70 percent.” – *Warren (Bradford White)*

“The recently released MAC high-efficiency boiler, from Utica Boilers, features a control system called AI (Artificial Intelligence). The AI control is able to determine the fuel being supplied to the boiler — liquid propane or natural gas — and automatically commissions the boiler. The control continuously calibrates combustion by adjusting air/fuel ratios. The proper gas air mixture optimizes combustion resulting in fuel savings and reduced maintenance costs.” – *Loran (ECR International)*

“We introduced our own wireless portal to allow for remote access and monitoring of our boilers.” – *Dodd (IBC)*

“The Laars unique VARI-PRIME control functionality balances combustion, air flow and water flow to optimize boiler efficiency per indoor and outdoor conditions. The result is a large reduction in the boiler’s gas and electrical energy consumption and therefore a smaller bill for the building owner. VARI-PRIME is currently available on MagnaTherm and NeoTherm lines, but will soon be available on many of our residential condensing boilers as ECM pump technology finds its way into the residential market.” – *O’Donnell (Laars Heating Systems)*

“Noritz will be launching the NRCB unit in September, allowing simultaneous use of space and domestic water heating. This will be a nice addition to our combination boiler offering. Plus, its Wi-Fi capability will allow for wireless control and diagnostics.” – *Fleming (Noritz)*

“With the increase popularity in modulating/condensing boilers we find that new options are always becoming available. We test as many as we can to guarantee function and dependability. It’s through this testing that we recently released a 10:1 turndown ratio on the new VMAX153 Series boilers.”

– *Wieland (NTI Boilers)*

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“We have developed a new low-emission, high-efficiency steam boiler that uses 50 percent less floor space than its predecessor.” – *Leeming (Parker Boiler)*

“We’ve developed a hybrid condensing tankless style unit with a 3-gallon buffer tank to meet the amazing concept of the hybrid tankless-water-heater.” – *Ernest (VESTA)*

Technology is not the only thing that’s trending. We asked the manufacturers: what are some trends in regards to space, size and materials that impact manufacturing?

“Like the automotive industry, the high-efficiency boiler market will continue to make more efficient products for less money.” – *Dodds (IBC)*

“The biggest trend can be seen in the materials used to design and manufacture boilers. The market is integrating the finest materials to ensure high reliability, long life and low maintenance. By incorporating higher-end materials, boilers are delivering a greater level of performance that is now expected in the market.” – *Hernandez (AERCO)*

“One of the worldwide trends we are tracking is 3D printing, which we currently use in our R&D labs for prototyping, and may eventually reach the factory floor for selected parts. Another trend is Industry 4.0, which we have already implemented in some factories to modernize our processes and reduce unexpected production interruptions.” – *Moffroid (Bosch)*

“We use a lot of stainless steel as certain grades are more resistant to different operating characteristics — not only in the heat exchangers of our condensing boilers and volume water heaters, but also in flue and jacket components for various products throughout our product line. Our manufacturing facility in Rochester, New Hampshire has been expanded and re-designed to cut, form and weld the various grades and gauges of stainless steel.”

– *Warren (Bradford White)*

“Our newer compact boiler designs meet the demands of a market that is trending towards products that take up less space, weigh less and use different materials in the construction of the heat exchanger.” – *Loran (ECR International)*

“Space and size is always a consideration. If one contractor is able to install a unit, it saves him or her time and money. Noritz’s use of 304 austenite stainless steel for both primary and secondary heat

exchangers is helping make it an industry leader.” – *Fleming (Noritz)*

“In general, smaller is better (in regards to boilers/water heaters/pool heaters). Stainless steel is making major inroads — even though aluminum would work effectively. Trends are moving toward larger input boilers in packaged designs.” – *Corcoran (Raypak)*

VESTA’s Ernest believes the trends we see today highlight the benefits of the tankless water heating products, which include “condensing, space and ease of installation.”

“One significant trend is the need to develop boilers that offer improved maneuverability when faced with confined spaces. Another trend is the ability to meet more stringent weight restriction. Such challenges especially apply to retrofits and newer buildings where space is at a premium. We are also witnessing the need for compact size in the combi-boiler market, and the industry is responding.” – *Klein (Weil-McLain)*

Next, we asked what are some ways in which installation costs, time, etc. have been addressed?

“AERCO has always emphasized developing efficient solutions that save time and money during all phases of a boiler’s lifecycle. Our compact boiler design lowers installation costs because they fit through a standard doorway and in standard elevators, eliminating the need for expensive cranes or knocking down walls.” – *Hernandez (AERCO)*

“The all-in-one Baxi wall-hung boiler has always made installation faster than other boilers that require timely installation of components that are not included. By adding automatic gas adaptivity, auto de-aeration, self-calibration at commissioning and continuously for the life of the boiler, we have set a new standard for high-efficiency heating solutions.” – *Thomas (Baxi)*

“More and more of our products are incorporating a low loss header in direct response to requests from our installers. This type of plug-and-play solution allows them to spend less time on the jobsite and provide more value to their customers, which is a win-win solution.”

– *Moffroid (Bosch)*

“There are quite a few time-saving features throughout the Bradford White Branded Boiler line. For example, our Brute Series line of condensing boilers and volume water heaters all feature quick set-up control menus, which groups the basic settings together

for quick adjustment and start-up by the installer. Another feature is top-mounted piping, water, and electrical connections on Brute Series 80-850 models. It’s a space-saver for stand-alone units, but it also allows two units to be installed at floor level with a significantly smaller footprint.” – *Warren (Bradford White)*

“The MAC and UCS, from Utica Boiler’s high-efficiency condensing boiler line, will feature a labor saver primary/secondary manifold and a built-in boiler loop pump. In addition, low-water cutoff is standard. These features simplify the installation for the contractor by reducing piping as well as electrical wiring requirements.” – *Loran (ECR International)*

“We offer an express set-up on our touchscreen controller with factory presets that allows for fast, efficient programming.” – *Dodds (IBC)*

“The attraction to lighter weight, compact wall-hung boilers has certainly assisted the installation process and requirements. Easier to transport and install, Navien products have reduced installation requirements and manpower required. With simple venting options, factory manifolds available and forgiving gas supply requirements due to our advanced combustion system, it’s never been easier to install our boilers.” – *Fenske (Navien)*

“Our combination boilers are smaller than traditional cast iron boilers, which helps reduce installation costs and allows the use of PVC or CPVC instead of stainless steel venting for further savings. Items we offer, such as isolator and manifold kits, make the plumbing easier and more time-efficient for the installer. Noritz also includes an outdoor temperature reset with all CB units, which saves time and money spent on programming and operation.” – *Fleming (Noritz)*

“At NTI we are constantly listening to what our contractors want to have. For instance all of our boilers are fully serviceable from the front, have an 120 V outlet on the side, vent connections that accommodate multiple types of pipe, and have service switches.” – *Wieland (NTI Boilers)*

“We have been selling more packaged skid-mounted systems. It gives the owner single source responsibility once utilities are properly installed.” – *Leeming (Parker Boiler)*

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our products “plug-n-play” where you install the unit (properly) and simply turn it on, and it operates correctly and well. Raypak tries to provide good troubleshooting/ diagnostic tools on our products. Additionally, Raypak is an industry leader in outdoor installations; we have done this for almost all Raypak products. Raypak has strived to ship replacement parts orders better/faster than other manufacturers to provide better customer service when issues occur.” – *Corcoran (Raypak)*

“One key item is our ‘Self-Calibration-Mode’ at start up.” – *Ernest (VESTA)*

“The many high-tech advances offered in boilers today can present challenges for contractors and others not totally familiar with the technologies. That’s why it’s imperative that manufacturers create products that can help facilitate the installation process. Thankfully, the same advances in technology can provide just that. Take a look at our SlimFit boiler; it has a set-up wizard that offers simple, intuitive controls that help walk the contractor through menus during the installation process. It’s also worth noting here that in addition to ease of installation, the newer products feature significant advancements in boiler control that include remote control and diagnostics, boiler-to-boiler communications, modulating from maximum input to minimum input, rotating lead lag and integration with building automation systems and smart homes.” – *Klein (Weil-McLain)*

These manufacturers have put in a lot of time and thought into producing products that not only meet regulations, but also live up to the customer’s expectations and wants. We asked what customer feedback have you received about boilers and the market?

“The majority of customers are seeking to control costs. So they expect solutions that are easy to install, highly efficient during operation and extremely reliable for extended boiler life. Customers also expect greater intelligence from their boiler solutions, so they can be monitored remotely, as well as easily integrated into plant management solutions and boiler management systems (BMS). These features have become standard to meet market needs.” – *Hernandez (AERCO)*

“In the compact wall-hung category, contractors and consumers alike are placing a higher value on reliability than on efficiency, incentives, warranties, training

and ease of installation. We get very positive feedback from our contractors on not only reliability of boiler performance, but especially on after-sales technical support. We do not solve a boiler operating issue by replacing it; we help our installers and service technicians find and fix a problem with a high level of success. That builds trust and confidence, not only in the product but especially the Baxi people working in partnership to deliver reliability to the end-user.” – *Thomas (Baxi)*

“Our customers are seeing a crowded boiler market and want to work with a reliable partner. The targets haven’t changed in terms of needing a reliable product at a fair price with excellent customer service. But some of these priorities are getting shifted around in a crowded field, which is creating some unwanted instability in the market. We are happy to be one of the leading manufacturers in all of these areas and continue to push the envelope, as we have for several decades in North America.”

– *Moffroid (Bosch)*

“We have found that is it important to keep things simple and efficient for our customers. They want a straightforward installation and setup of our products, whether it is in a new application or a replacement situation.”

– *Warren (Bradford White)*

“Contractors have realized that the high-efficiency segment of the market is where the growth potential is. The condensing line, from Utica Boilers, includes models with unique features that make it faster and easier to install and setup these boilers. Intelligent controls, simple piping and quick connections are some of the ways we accommodate them.”

– *Loran (ECR International)*

For Dodds (IBC), the feedback comes across simply as, “Easy set-up, and ease of service are important when selecting a boiler.”

“Residential and commercial customers both look for feature-rich controls that are intuitive and easy to use such as the large color touch screen user interfaces found on all Laars high-efficiency commercial products. Additionally, users are looking to optimize total installed efficiency of their boiler installations. A key attribute to this is tying boiler modulation rates together with outdoor reset measurements and variable speed pumping. In response to this need, Laars developed the proprietary VARI-PRIME control system that seamlessly matches the firing rate of

a Laars boiler to its variable speed boiler pump’s flow to minimize operational expense.” – *O’Donnell (Laars Heating Systems)*

“The attraction to wall-hung, compact, lightweight and high-efficient boiler products has been appealing to installing heating contractors. Consumers appreciate the space-saving, off-the-floor boiler design, also.” – *Fenske (Navien)*

“In general, customers have praised the ease-of-installation and set-up resulting from the available pre-selected defaults. However, no heating system is the same, so it’s still important to adjust the CB for optimized performance at each installation location.” – *Fleming (Noritz)*

“There is a clear need and desire for technical training that provides installers with installation, service and maintenance knowledge. There is a market shift toward high efficiency solutions and compact, pre-mixed solutions.” – *Corcoran (Raypak)*

“Federal and local utility rebates continue to drive opportunity and provide the consumer savings.”

– *Ernest (VESTA)*

“Specific to Weil-McLain, AquaBalance was introduced late last year and showcased at the 2017 AHR Expo; both customer response and sales have been excellent. And when Evergreen was launched in 2015, we initially could not keep up with the demand. This underscores our belief that products that offer meaningful innovations with high-efficiency benefits will appeal to the marketplace. Tempering this, obviously, is the fact that three warm winters in a row have not helped sales of heating products overall.”

– *Klein (Weil-McLain)*

If you’re in this industry, the hope is to be able to ultimately deliver comfort to the end-user, your customer. But comfort means different things to different people. So we asked the manufacturers what it meant to them.

“Comfort means living in a care-free way. It means being confident that professional people are always readily available should I need their help. It means sleeping well at night. From a gas-fired Baxi boiler property owner standpoint, comfort is even warmth and reliable performance.”

– *Thomas (Baxi)*

“Comfort should not require effort. To be fully comfortable, an owner must have peace of mind. In terms of a heating system, this means not worrying about whether

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the system is working properly, may break down this winter or next, or is using more energy than necessary. It also means not having to constantly make adjustments as the weather outside changes or as you move from room to room. This concept of “invisible comfort” is something we are pleased to offer our customers with the reliability of a Bosch boiler and a suite of programmable controls.” – *Moffroid (Bosch)*

“Comfort is knowing that we put tremendous quality into designing, engineering and building our products to ultimately provide the best variety and performance for our customers.” – *Warren (Bradford White)*

“The heating or cooling system in a structure, that provides its occupants comfort year-round, should be reliable and undetectable. No drastic swings in temperature should be occurring — that’s comfort.” – *Loran (ECR International)*

“Warm, even radiant heat. When it comes to comfort, conventional forced air heating cannot compete.” – *Dodds (IBC)*

“Comfort can mean many things but words such as ‘reliability,’ ‘ease-of-use,’ ‘peace of mind’ in product performance and, as we know in this industry, hydronic heat, offer unparalleled heating comfort to those occupying the living space.” – *O’Donnell (Laars Heating Systems)*

“Comfort in its truest sense should be felt and not be seen or heard. Regarding heating and boilers, delivering this comfort without noise, drafts or unsightly diffusers or emitters. A perfect example of this would be a low-temp, highly efficient radiant heating system powered by a high-efficient gas-condensing boiler. – *Fenske (Navien)*

“To me, comfort means not having to think about heat for your home or hot water. You can count on a consistent temperature that is achieved with little variation.” – *Fleming (Noritz)*

“That my shoes are not too tight. I’m just kidding. I am comfortable, and most of our customers are too. Parker Boiler products last a very long time with little or no failures.” – *Leeming (Parker Boiler)*

“Comfort is made up of many things, which include the temperature, humidity, energy expended, cost of the energy expended, the space required, warranty, availability of replacement warranty parts, knowledge and professionalism of the installing service contractor.” – *Ernest (VESTA)*

“You want to achieve warmth and comfort in the best possible way. We see boilers as delivering the better overall experience due to the type of heat they provide: more even heat, softer (not dry) heat and heat delivered effectively in any and all parts of the home and space.” – *Klein (Weil-McLain)*

Our manufacturers are optimistic about what lies ahead in the industry, here’s what they had to say about an outlook for the boiler market:

“We see a bright future. AERCO is experiencing growth as decision-makers see the benefits of high-efficiency solutions such as those offered by AERCO. We are also well-positioned to meet the market demand for more ‘connected’ boiler solutions. Facility managers need intelligence and access at their fingertips, and by integrating tools such as OnAER Remote Monitoring, AERCO is meeting that requirement. Another reason for a favorable forecast is that we see the economy growing, which we expect will lead to more capital investments.” – *Hernandez (AERCO)*

“We have no reason to believe that the outlook for reliable high-efficiency wall-hung boilers is anything but promising. As more property owners and renters throughout the U.S. and Canada become more familiar with the space and cost-saving benefits of a high-quality wall-hung boiler, like Baxi, the category will begin to move closer to the European experience where the technology is, by far, the most preferred heating solution.”

– *Thomas (Baxi)*

“We are expecting moderate growth in the boiler market this year, driven partially by new construction, but more by a higher replacement market supported by an improving economy. We’re also hoping we experience a colder winter than the last one in many areas of the U.S.” – *Moffroid (Bosch)*

“As boilers become more refined and efficient, we see steady growth in both replacement and new commercial applications. On the residential side, the expectation is that the replacement market will remain steady and consumer confidence strong, with a wider variety of new, more efficient products available for today’s homes.” – *Warren (Bradford White)*

“I am optimistic that the high-efficiency wall-mounted boiler market will continue to grow as the trade becomes more familiar with the technology.” – *Dodds (IBC)*

“Our outlook focuses on continued growth in the condensing boiler market segment. The popularity of combi-condensing boilers will continue to spur this growth trend.” – *Loran (ERC International)*

“We expect 2017 to unfold much like 2016 did with continued interest/growth in our high-efficiency condensing product lines in both the residential and commercial markets. Both new home construction and residential replacements are showing growth in the use of condensing units, especially combi units. We’re also seeing commercial construction expansion where high-efficiency products are being specified. However, there continues to be a strong demand for our near condensing, fan-assisted commercial product due to the overall value offered.” – *O’Donnell (Laars Heating Systems)*

“Generally, boiler sales have been flat with minimal increases year to year, but I am convinced this is changing. With the efficiency choices and space-saving designs, boilers as the main source or ancillary heat uses will continue to increase in use and popularity. While the economy improves, discretionary spending increases on items such as residential additions, finishing basements and add-on rec rooms, all perfect for comfortable hydronic heating.” – *Fenske (Navien)*

“The boiler market has been a little soft this year, but we see this as an opportunity to introduce Noritz to the market as a true boiler alternative. Finding new uses for the combination boiler has shown very positive signs for continued growth in this category.” – *Fleming (Noritz)*

“Good,” says Leeming (Parker Boiler), “our sales keep growing.”

“We see the demand for tankless condensing boiler and combi-boiler market growing.” – *Ernest (VESTA)*

“Weather always is a factor, as we have experienced mild winters in recent years. However, the high-efficiency market will continue to grow as green energy resources grow — as well as the rebates to fund them. Standard efficiency boilers will remain steady for the foreseeable future — at least until the more stringent DOE laws take effect.” – *Klein (Weil-McLain)* ●

To learn more about the products these manufacturers produce, turn over to our special boiler product section on page 86, or visit each of the manufacturers for more information.



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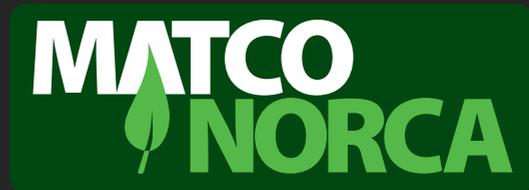


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aerco.com



Baxi Luna Duo-Tec MP

During a recent field trial of the 95 percent AFUE Baxi Luna Duo-Tec MP wallhung commercial boilers, the Baxi certified installer of a 3-boiler, common-vented application achieved 99.9 percent energy efficiency. The Luna Duo-Tec 1.110 MP has a 10:1 modulation ratio (348 M < 36 MBH) and a built-in pump, and the Luna Duo-Tec 1.70 MP has a 7:1 modulation ratio (216 M < 32 MBH) with a built-in PWM modulating pump. Other built-in features for each NO_x compliant Luna Duo-Tec MP boiler include:

- 50 psi ASME pressure relief valve,



low water cutoff, frost protection, mono-electric spark/ionization electrode, external LWCO contact.

- Program modes: automatic de-aeration, anti-wind, anti-Legionella, chimney sweep and commissioning functions.
- Steel Heat Exchanger; insulated internal casing; 0-10V interface provided in PCB.
- Cascade Management & Building Automation; remote control capability. **BAXI**

www.wallhungboilers.com

Bosch Buderus SSB Series

The Buderus SSB Series is a new sealed combustion, high efficiency stainless steel boiler line with condensing technology. The line consists of eight models in four separate cabinet sizes, with inputs ranging from 85 MBH up to 1,024 MBH, which are applicable for use in small studio units up to commercial buildings. The series is designed as a modular platform for quick and easy installation in various applications, and to reduce the number of unique spare parts in inventory. Residential and light commercial models are rated at 96 percent AFUE/Thermal Efficiency. These boilers, which can be cascaded, feature a proprietary ASME SA-240 stainless steel type 316L heat exchanger and an integrated premix burner for optimized combustion. They can be vented using CPVC, PVC, PP, PP Flex, Stainless Steel AL29-4C, IPEX type IIA & IIB for use with single-pipe, two-pipe, or concentric configuration. Buderus SSB boilers have a 5:1 turn down ratio, an onboard control that includes a combination of weather compensation, mod-bus and BACNET connectivity, a two-wire cascades link, plus terminal wiring, and optional 0-10VDC interface module. They also feature a factory installed low-water-cutoff and safety temperature high limiter with a manual reset to speed installation. Also factory-installed in the larger units (sizes 512 to 1024 MBH) is CSD-1 -compliant low and high gas pressure switches. The two largest commercial size units feature side-by-side twin heat exchangers for efficiency and redundancy. **BOSCH THERMOTECNOLOGY CORP.**

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Every commercial heating system is unique and requires a boiler that can adapt and respond to system fluctuations, while maintaining the energy conservation standards important to today's building owners. Such a boiler now exists in the innovative Bradford White Brute MagnaTech. Traditional boiler pumps are typically sized for the maximum capacity

— a pump's power consumption can drop by as much as 50 percent with only a 20 percent reduction in speed. In contrast, the Brute MagnaTech utilizes Variable Speed Pump Control Technology to match the modulation rate of the unit's combustion system to the rate of a variable speed boiler pump. This unique on-board control allows the Brute MagnaTech to mirror the heating system's profile during varying load conditions and optimize overall efficiency.

BRADFORD WHITE CORP.
www.bradfordwhite.com



ECR International UCS 380

The new UCS 380, from Utica Boiler, is a high-efficiency, condensing hot water boiler perfect for commercial applications. Featuring a 95 percent thermal efficiency rating, the UCS 380 may qualify for state, federal or local utility company rebates. With an impressive 10.5:1 modulation turn down ratio, the UCS 380 can meet varying load demands

saving energy and reducing fuel costs. The boiler features a built in boiler loop pump, a low water pressure sensor and includes a LABOR SAVER Primary/Secondary Manifold. Plug-N-Play, CSD-1 kits are available where local code require. They include manual-reset, high temperature limit and LWCO. The compact floor standing design also features built-in leveling legs. The UCS 380 is competitively priced without sacrificing features.

ECR INTERNATIONAL.
www.ecrinternational.com



IBC SL G3 Series

The new SL G3 Series condensing fire tube boilers boast inputs ranging from 115,000 to 399,000. Other features include up to 10:1 turn down ratio; built-in approved low water cut-off with manual reset high limit; true native BACnet; advanced touchscreen controller; built-in zone pump control — up to four zones; an exclusive moisture management system; five-year standard parts warranty; and a lifetime heat exchanger warranty. The easy-to-use boiler control has a visible flame current for troubleshooting, and provides detailed error messages. The series is easy to install and service with supply and return connections on both sides of all three models, and the longest vent lengths, up to 200 feet in 2 inch, and 480 feet in 3 inch. The smaller cabinets reduce the footprint, and the efficient design allows for easier parts access. With only two fans and a universal controller, servicing all models just got a lot easier. **IBC TECHNOLOGIES.**

www.ibcboiler.com

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BOILER PRODUCTS

Laars Mascot FT Boiler

The Mascot FT boiler offers an Energy Star “Most Efficient” qualified rating of 95 percent AFUE. The system features a robust fire tube heat exchanger and is fully modulating to save fuel. The natural gas or LP-fired unit is offered in many sizes and configurations: 120, 140, and 199 MBH combi or as an 80, 100, 120, 140, and 199 MBH heating only boiler. Combi models include an integrated mini-indirect tank resulting in superior DHW performance by minimizing temperature fluctuations and providing hot water quickly. Packed with features, the Mascot FT can be ordered as a floor-standing or wall hung unit, includes an easy-to-use advanced control system, a fully coated control board protected from moisture, gas leak detection system that will shut down boiler if gas leak detected for added safety, outdoor reset, domestic hot water priority, primeless condensate trap, zero clearance installation, and venting up to 100 feet. **LAARS HEATING SYSTEMS.**

www.laars.com



Lochinvar Noble Fire Tube Combi Boiler

The Noble Fire Tube Combi Boiler for residential applications is available in three models ranging from 110,000 to 199,999 BTU/hr. It offers easy installation and serviceability, true instantaneous response time and a user-friendly interface. In addition to 10:1 turn down and 95 percent AFUE, the Noble Fire Tube Combi Boiler is designed, engineered and assembled in the U.S. The boiler is equipped with Lochinvar’s SMART CONTROL and features an intuitive setup wizard to guide contractors through programming parameters quickly and easily. The backlit, user-friendly LCD display provides diagnostic information and system status in plain English, not codes. The boiler’s patented control technology, featuring pre-heat and domestic hot water response modes enable this combi to deliver hot water almost instantaneously during frequent use cycles, like washing dishes. For space heating, the Noble boiler’s Air Handler Interlock provides comfort and energy savings. By switching from space heating to domestic hot water mode, it immediately stops non-heated air from circulating so homeowners stay comfortable. Critical components such as the built-in circulator are easily accessible making service and maintenance for quick and easy for contractors. **LOCHINVAR.**

www.lochinvar.com

Navien NHB

Ideal for both commercial and residential use, the Navien Heating Boiler (NHB) series is available in four sizes: NHB-55, NHB-80, NHB 110 and NHB-150 with turn-down-ratios respectively of 7:1, 10:1, 11:1, and 15:1. The noteworthy 15:1 turn-down-ratio in the NHB-150 is achieved with Navien’s advanced burner system made possible by the newly developed dual Venturi gas delivery system. The two largest condensing boilers, NHB-110 and NHB-150 can be cascaded up to 16 units and common vented up to 8 units. “Our NHB heating boiler product is much more than just another high-efficiency condensing wall hung boiler,” says Brian Fenske, specialty channel sales manager for Navien. “Yes we have 95 percent AFUE, outdoor reset as required, and a few other similar operational features like the other brand choices available. But then so much more! This product offers the installer an opportunity to achieve a true high-efficiency installation,” Fenske says. **NAVIEN.**

www.boilersmadesmart.com





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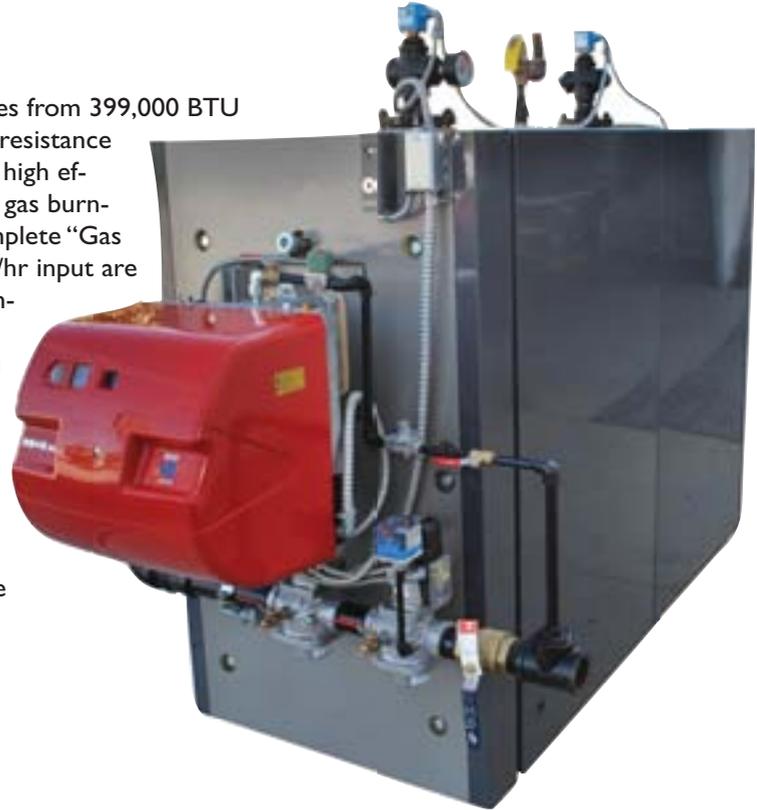
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HYDRONIC PRODUCTS

Parker Boiler TC Series

The TC Series of condensing hot water boilers is available in sizes from 399,000 BTU up to 5,443,000 BTU input with stainless steel construction for resistance to corrosion at low operating temperatures, built for extremely high efficiency to 98 percent. The units are available with conventional gas burners or low NOx power type burners, and are ETL Listed as complete "Gas Fired Boiler Assemblies" per UL 795. Units under 2.0 MM BTU/hr input are SCAQMD 1146.2 certified. The TC 205 Series is a modern stainless and carbon steel condensing boiler, packaged with conventional boiler controls for simplicity and high efficiency operation for use in closed system heating application. The stainless and carbon steel boiler features stainless steel flue passages for resistance to corrosion at low operating temperatures, and extra large amount of heating surface. The sealed combustion chamber allows for low excess air levels and high efficiencies. Low and medium temperature return connections increases overall boiler efficiency by allowing cool water to chill flue gasses to the greatest extent. **PARKER BOILER Co.**

www.parkerboiler.com



NTI Boilers VMAX153

The newest addition of NTI's MAXIMUM line of boilers is the VMAX153 stainless steel firetube boiler. It is available in a boiler (VMI53) or a combi (VMI53P) version with 16-gallon Stainless Steel indirect water heater built in. Designed for maximum value with a built-in primary loop, circulator and high-energy spark ignition as standard features; maximum vitality with a stainless steel down-fired heat exchanger that ensures a long product life and an enduring source of home comfort; and maximum versatility with universal flue connections and is easily converted from natural gas to propane. It features 10:1 turn down ratio, high energy spark ignition, zero clearance installation, test ports on intake and exhaust, LP conversion kit, universal vents, 120 V outlet, service switch, nearly unlimited venting options, and a limited lifetime heat exchanger warranty. Primary/Secondary piping is built in. On the standard non-combi (VMI53) version the internal boiler circulator will also pump to your indirect water heater saving both time and money. **NTI BOILERS.**

www.ntiboilers.com

Noritz CB Combination

The CB Combination boiler delivers hot water to both plumbing and hydronic heating applications and manages to switch between those uses without a perceivable difference in performance on either side. Its 95 percent AFUE make it an extremely energy-efficient appliance that meets "Energy Star Most Efficient" standards. Delivering up to 9.2 GPM of domestic hot water, the CB Combi provides nearly twice as much flow as competitor models. A flow control valve, not offered by competitors, allows the unit to deliver the maximum possible domestic hot water flow rate at stable temperature regardless of incoming water temperature. The Combi also includes terminals for driving an external or booster pump (up to 2 amps) without the need for a relay, as well as an outdoor temperature sensor that is included standard with the unit. **NORITZ.**

www.noritz.com



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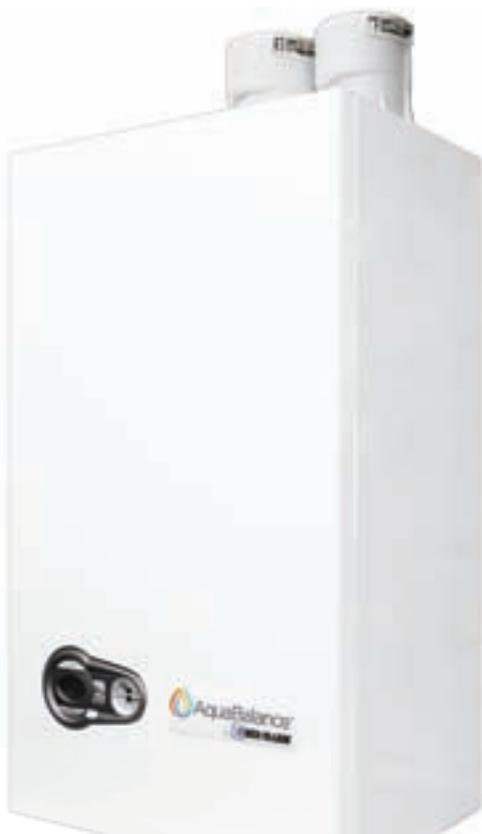
www.raypak.com



VESTA VRC Revolution Combi Boiler

The VRC Revolution Combi Boiler is a high efficiency, condensing boiler that provides abundant heat for both space heating and DHW. One unit takes care of it all. The boiler has an AFUE of 95 percent, 10:1 turn down ratio and a self-calibration mode, which is customizing of unit operation parameters. The boiler uses existing 1/2-inch gas pipe up to 24 feet. A negative pressure gas valve provides constant performance at the low gas pressure situation. Other features include a built-in circulation pump, 2-inch PVC vent up to 60 feet (3-inch venting up to 150 feet), full stainless steel heat exchanger construction, an exhaust gas temperature sensor for safe operation, and simple conversion to propane (LP orifice is already in the box). The environmentally friendly Low NO_x combustion system is SCAQMD 1146.2 compliant. **VESTA.**

www.vestahws.com



Weil-McLain AquaBalance

The AquaBalance combination boiler features leading-edge hydronic technology for smaller space residential applications. It combines the warmth of high-efficiency space heating and the convenience of on-demand domestic hot water in a reliable, space-saving package. With a capacity of 155,000 BTU/hr input, the combi-boiler produces a constant supply of hot water with up to 4 GPM at 70 F temperature rise. Featuring 94.4 percent AFUE energy efficiency, and the industry's latest stainless steel, titanium-infused heat exchanger technology, AquaBalance is ENERGY STAR-rated to deliver maximum operational cost savings. Ideal for retrofits or new construction in single-family homes, apartments or condominiums, AquaBalance offers a high-efficiency condensing technology with power to supply hydronic heat for up to a 2,500 square-foot home and enough hot water to run two showers and a dishwasher simultaneously. It features an aesthetically pleasing design and user-friendly controls to make operation easy, and it streamlines the installation process by eliminating the need to hook up a separate boiler and hot water tank. **WEIL-MCLAIN.**

www.weil-mclain.com

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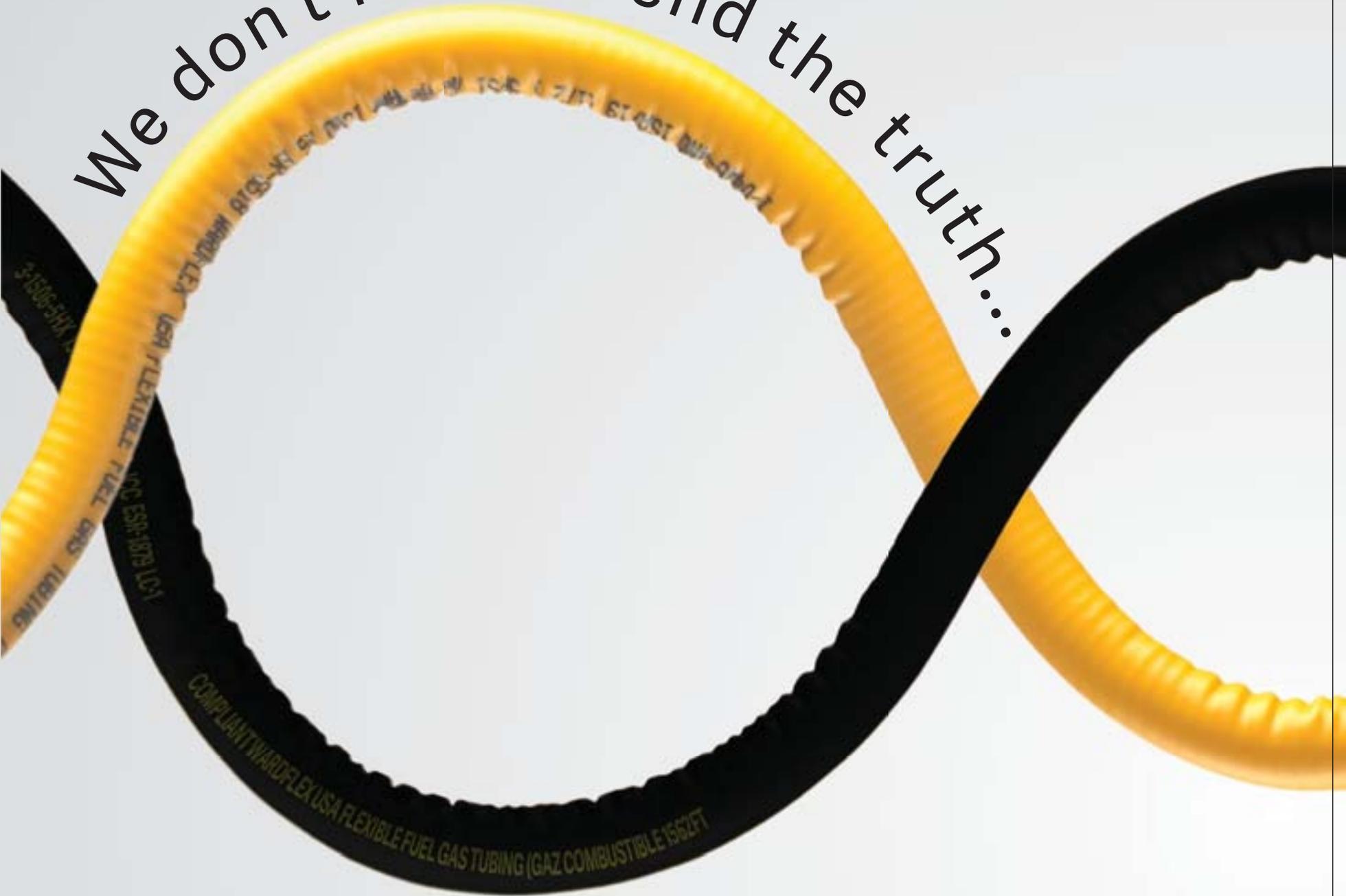


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WARD Flex **MAX**

WARD Flex



Our competitors still in fact sell Yellow CSST.

TRUE

FALSE

Despite misrepresenting Yellow CSST, they continue to sell it in other countries.

WARD Flex has the only dual CSST offering.

TRUE

FALSE

Only Ward offers both Black and Yellow CSST, giving the choice to the customer.

Our fitting is the most advanced in the industry.

TRUE

FALSE

There's no guess work involved during installation thanks to our advanced seal.

We'd rather earn your business honestly.

TRUE

FALSE

Ask us anything—we're the experts and for our competitors—**THE TRUTH HURTS.**

ACCA Debuts Revamped IE3 Show in Nashville

Event draws more than 1,500 people over three and a half days, and also featured a day-long trade show with more than 200 exhibiting companies and 27,000 square feet of space exhibit space.

BY STEVE SMITH

Radiant contractor Dan Foley can pack a lot into a three-ring binder — namely, proof of 25 years of professionalism and expertise in completing some of the industry’s most elaborate hydronic and radiant heating systems.

Then, of course, there are the schematics of piping and wiring, a tubing drawing and a narrative of how the heating system should operate.

“I can’t remember what I had for lunch today,” said Foley of Foley Mechanical, based in Lorton, Virginia, “So how am I going to figure out what I installed five years ago?”

Foley presented a radiant and heating documentation seminar at ACCA’s IE3 Show, which took place March 20-22 in Nashville. His presentation was part of the group’s Learning Labs, which featured a radiant and hydronics track and 20 other workshops focused on commercial contracting, residential contracting and building performance.

The event drew more than 1,500 people over the course of three and a half days. The event also featured the Marketplace Festival, a day-long trade show with more than 200 exhibiting companies and 27,000 square feet of space exhibit space.

Documentation

Documentation is part and parcel of the mega-homes that Foley typically heats. His largest to date is 42,000 square feet, with many other residential projects basically functioning like commercial construction. But regardless of size, Foley encouraged all heating contractors to back up their work with words and drawings.

For Foley, a hand-drawn sketch on a notepad is better than nothing at all. His presentation included plenty of pictures of other contractors’ radiant work that he had been called in to fix. “Sawzall surgery” is what Foley called it when he went to troubleshoot other troubled installations.

At the very least, basic documentation will help other members of a contractor’s own team



The event featured the Marketplace Festival, a day-long trade show with more than 200 exhibiting companies and 27,000 square feet of exhibit space.

handle maintenance. It’s also well worth including commissioning work, particularly when owners or general contractors of large-scale heating projects require a third-party to conduct testing and balancing.

Foley shared some easy-to-use programs that can be downloaded from manufacturers such as Taco Home Comfort and Uponor. For CADD work, Foley recommended hiring a professional.

“It’s not something you can do once and then remember how to do it again six months later,” Foley added.

Contractor Makeover

One of the show’s most entertaining sessions was the Contractor Makeover held at the event’s MainStage and meant for all to attend.

Dozens of contractors applied for the Contractor Makeover Session that was led by ACCA’s “Dream Team” of contractors:

- Bobby Ring of Meyer & Depew Co. in Kenilworth, New Jersey;
- Wade Mayfield of Thermal Services in Omaha, Nebraska;
- Tim Cropp of Cropp Metcalfe Services in Fairfax, Virginia; and
- Hugh Joyce of James River Air

Conditioning in Richmond, Virginia.

Contractor Clint Jones, Services Unlimited of Raleigh Inc. in Raleigh, North Carolina made the cut. Jones’ business is currently at 90 percent new construction and 10 percent service and replacement, and Jones wants to move away from that over-reliance on new construction.

The Dream Team conducted a thorough review of SURI’s operations, marketing, staffing and goals, and provided Jones with a sound strategy to help him complete his makeover.

To ensure that Jones has the plans, resources and confidence to create a major change for his company, the Dream Team donated \$2,500 worth of marketing materials from Nuke Digital; Emerson provided five of its home monitoring service kits; and Davisware donated \$20,000 worth of software. Emerson is an ACCA Corporate Partner and Davisware is a long-time ACCA supporter.

The Dream Team, and ACCA, will continue to check in with Jones up until next year’s IE3 when a one-year follow-up will take place.

Honors and awards

This year, ACCA recognized its

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HYDRONICS

award winners during the Industry Champions breakfast on March 21.

Some of the top contracting companies in the industry were honored with the 2017 Contractors of the Year awards. Residential winner Lee Company in Franklin, Tennessee and commercial winner James River Air Conditioning in Richmond, Virginia, were recognized during the breakfast.

Richard Dykstra of Dykstra Home Services in Crestwood, Illinois, was presented with the Skip Snyder Humanitarian Award for his work with a variety of philanthropic efforts including preparing meals and feeding the homeless in Chicago; replacing rooftop HVAC units at the William Leonard Public Library in Robbins, Illinois, and the Journey Crisis Counseling Center in Mokena, Illinois, with donated equipment; and donating money and equipment to local schools and their sports programs.

Jack Bartell of Virginia Air Distributors in Richmond, Virginia, was presented with ACCA's Distinguished Service Award for

his hard work and dedication to developing and promoting ACCA's standards, quality installation practices and contractor accreditation.

New this year, ACCA and Federated Insurance teamed up to present the Super S.T.A.R. Safety Award.

The new award honors an ACCA contractor member and Federated Insurance client who make managing employee and customer risks a top priority in their company's success.

Recipients have both leading programs and practices in place that focus on the four components that make up the S.T.A.R. acronym: Safety, Teamwork, Action and Responsibility.

This year's recipient Bruce Beckwith of Beckwith Heating & Cooling in Akron, Ohio, received the award due to his company's consistent and thorough commitment to proactively managing all on-the-job employee safety risks. Some of those programs include pre-employment driving record screening; a drug-free workplace program that includes drug testing; GPS and back-up cameras

installed on all vehicles; and weekly safety training programs.

Finally, ACCA honored Laura DiFilippo of DiFilippo's Service in Paoli, Pennsylvania, with the association's highest honor, the Spirit of Independence Award.

The award is presented to an individual who has made significant and lasting contributions to the strength, success and independence of HVAC contractors in the industry.

DiFilippo was honored for her continuous service to ACCA and the industry. As the first and only female chair of the ACCA board of directors, she led the association through changing times, and even after her term helped ACCA navigate changing to an open membership model.

Next year's IE3 Show will take place Feb. 12-14, at the Gaylord National Harbor in Washington, D.C. The programming will again feature Learning Labs for residential and commercial contractors, plumbing and hydronics contractors, and building performance professionals. It will also feature the Marketplace Festivals. ●

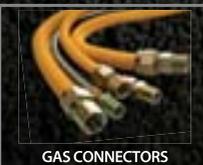
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Standardizing Hot Water Systems

Red Robin solves hot water woes with proper sizing and equipment selection.

BY NAVIEN

Few businesses use as much hot water per square-foot as a restaurant during peak dining times. Between the bar and the kitchen, there can be more than a dozen sinks — some singles, doubles and triples, as well as vegetable washing stations and, of course, a commercial dishwasher and pre-rinse area. And as if that's not enough, many municipalities have food service codes that mandate a minimum water temperature be used for specific cleaning processes.

It all adds up to a colossal domestic hot water load. Red Robin restaurants, known nationwide for their gourmet burgers, can use upwards of 20 gallons of hot water per minute when running at capacity. Most restaurants are similar; Red Robin locations aren't unique in the amount of hot water they use.

But the successful chain is unique in the way it has handled its hot water production recently, to the point that it now builds its restaurants around its water heating equipment. Literally.

Red Robin's current standardized system serves its facilities nationwide almost flawlessly, but that wasn't always the case. There was a lot of learning involved, a little trial-and-error, and no shortage of retrofit work before they reached a solution that stuck.

Underestimating demand

In 2013, Brian Fenske, Specialty Channel sales manager at Navien, received a call from Red Robin's director of facilities, who was painfully aware of the hot water problems that the restaurants throughout Oregon and Washington were battling. The year before, he had helped to size a tankless application in

Edmonton, California, where several Navien tankless units were then used to replace a gas-fired storage-type system.

In 2014, Navien's Northwest regional sales manager, Barry LaDuke and local Red Robin managers hosted Fenske's visit to several restaurants throughout the Pacific Northwest. After touring five Red Robin locations in the region, Fenske found that four of the five restaurants were facing problems caused by an undersized hot water system. Each one used the same gas-fired, tankless water heaters.

"The biggest problem was that they were using two or three 199 BTU/hr tankless units when, in reality, they needed four or five to meet the demand," Fenske says. "The fifth site had four water heaters, which might have been sufficient if not for some other installation errors."

In nearly every situation, he found that the big dishwashers weren't equipped with a pressure reducing valve. This not only created pressure drop issues throughout the kitchen, but led to excessive hot water use as well.

Fenske explained why the restaurants were experiencing so many problems, and the words resonated. In 2015, several upper-level Red Robin managers visited Navien in Irvine, California, to learn how the use of new NPE tankless water heaters could solve the problems.

"After seeing the high-efficiency NPE-240A units in person, and learning about how proper design and installation plays a huge role in system performance, Red Robin made a decision to work with us going forward," Fenske says. "They planned to convert any problematic installations to Navien units, while standardizing on the NPE-240A for construction of all new restaurants going forward."

Chipman Design, Red Robin's architect based in Chicago, modified the building design for new restaurants in order to facilitate good access to the robust hot water system. A shallow mechanical room is included at the back of the



buildings with outdoor access. This not only consolidates all plumbing components (water heaters, softeners, etc.), but provides easy access for service personnel without the need to walk through the kitchen.

Growing with a brand

One of the newest Red Robins is in Lakewood, Colorado. It's so new, in fact, that if you look at W. Colfax Avenue on Google Earth, you'll only find an empty grass lot where the building now stands. Long before general contractor Catamount Constructors Inc. had broken ground, the building's blueprint included Fenske's hot water system design.

"All new Red Robins are using either five or six Navien NPE-240A units, piped and plumbed in parallel," Fenske explains. "Based on their anticipated patronage, lower gas BTU contents due to Colorado's high elevation and the fact that the Denver area has colder groundwater than many places in the country, they went for the optional sixth unit here."

The NPE-240A is a 199.9 BTU/hr condensing, wall-hung tankless water heater that offers a 10:1 turn down and dual stainless steel heat exchangers. It features ComfortFlow technology, which pairs a 1/3 gallon buffer tank and internal recirculation pump to provide instantaneous hot water to all fixtures within the building. The unit also provides up to three LEED points.

In applications with a big hot water demand, the NPE models make





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multi-unit installation simple. As many as 16 units can operate as a single system, while 8 units can be common vented so that fewer wall or ceiling penetrations are needed. In existing Red Robin restaurants, where the Navien units are used as a retrofit solution, the systems are installed in a large closet at the back of kitchen.

"The water heaters are installed in two rows, one above the other," Fenske explains. "Since height isn't an issue, they're able to save a lot of space this way, with room underneath the bottom row for all piping."

All six units at the Lakewood restaurant act as a single system, firing up only as high as needed to meet current hot water demand. Because the modulating units each provide nearly 200,000 BTU/hr, the system is able to provide anywhere between 20,000 to 1.2 million BTU/hr, or roughly .1 to 30 GPM, depending on incoming water temperature and fixture loads.

Easy Installation & service

At 5,500 feet above sea level, Lakewood's elevation could've been cause for concern. Fortunately,

setting the Navien units up for Denver's thinner air is quick and simple. Some gas-fired, condensing appliances require several extra steps during installation, like changing or modifying orifice plates. With the NPE-240A, DIP switches are used to change the air/fuel mixtures and speed of the fan.

Another installer-friendly feature of the NPE-240A comes courtesy of Navien's low input gas pressure requirements. Compared to many units of the same capacity smaller gas piping can be used, saving time, space and money. But the inherent advantages of the NPE-240A aren't the only thing making life easier for the technicians who install and service the hot water systems at Red Robin locations.

The restaurant chain is proactive, and refuses to cut corners. In restaurants where four units are needed to provide the entire hot water load, five are installed. Where five are needed, a sixth is added. Using an extra water heater not only ensures that pressure drop will never be an issue, but also provides redundancy. Should a unit come

off-line for any reason, whether it be failure or planned service, the hot water system will still be able to cover peak demand.

The right relationships and equipment

"The feedback we've gotten from all the restaurants has been very positive," Fenske says. "As time goes on and more units were installed, my involvement has been less and less crucial. I think that's testament to Navien's ease of use and also to the talent of the engineers involved."

In the earlier stages of the Navien's relationship with Red Robin, Fenske worked closely with the restaurant's MEP engineer, Schnackel Engineers, out of Omaha, Nebraska, providing a hard-spec drawing. From there, the engineer re-draws it and puts it into the blueprints.

Today, word is spreading through the food service industry, and Fenske is receiving calls from other restaurant chains. The capability of the NPE-240A lends itself to the large and fluctuating demands of the food service industry, and it hasn't gone unnoticed. ●

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HYDRONIC PRODUCTS

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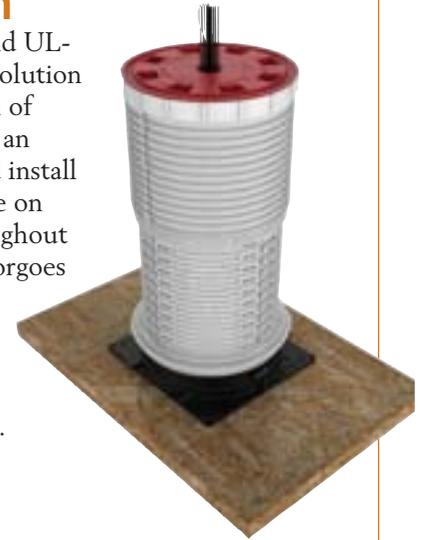


The 0015e3 three-setting, ECM-powered circulator is ideal for hydronic systems zoned with circulators or zone valves. Settings include low, (5 feet), medium (10 feet), or high (18 feet), with a maximum flow of 16 gpm.

Features that make the product reliable and easy to install include the BIO Barrier, which protects the pump from system contaminants; SureStart, which automatically unblocks a locked rotor and purges air from the circulator; and double insulation, which eliminates the need for a ground wire. Due to its energy-saving ECM design, the circulator qualifies for most state, regional and utility efficiency incentive programs. **Taco.**
www.taco-hvac.com

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The evolution of a lab-tested and UL-classified cast-in-place firestop solution continues with the introduction of the HydroFlame Pro Series. It's an easy to specify, stock, order and install firestop solution that is available on trade distributors' shelves throughout North America. This solution forgoes frustration of significant pre-planning requirements, complex purchase orders, tight delivery deadlines and jobsite fabrication challenges. **Holdrite.**
www.holdrite.com



Stacked heat exchangers

The EZ Plate Storage water heater product line now offers dual heat exchanger models on one skid with recoveries from 600 to 15,000 gallons per hour using boiler water temperatures up to 180 F. Perfect for condensing boiler applications, the heat exchangers are stacked to provide the smallest possible footprint while doubling capacity or providing 100 percent redundancy. **PVI.** www.pvi.com



Indirect Water Heaters

Quality Design and Construction

- All stainless tank and coil
- Smooth tube coils; no finned tubing to clog up
- Low heat loss and a thermoplastic jacket

Easy installation

- All connections on top for a neat, clean installation
- Brass drain and T+P valves are factory installed

Residential and Commercial

- Available with heat exchangers 100K to 400K BTU input with large connections

High output and dual coil units for commercial, solar, radiant, and high demand applications.



Hot Water Storage Tank

Quality insulated hot water storage tanks can provide the abundant hot water that today's homes require.

- Adding storage to your high efficiency heat source can satisfy dump loads.
- Same quality design and construction as our indirect water heaters.
- Easy installation: 4 connections on top keep it simple.
- Available with 1½" connections for commercial applications



Hydronic Buffer Tanks

Hydronic buffer tanks will reduce heat pump, chiller, or boiler short cycling. Two connections can be piped to the source, and two connections can be piped to the distribution system. Use it as a hydraulic separator with volume.

- 40, 60, 80, and 115 gallon capacities
- Choice of 1 ¼", 1 ½", or 2" connections.
- Units available with 1 or 2 internal heating coils for solar input, domestic preheat, etc.
- Unlimited applications on residential and commercial application



The Most Energy Efficient, Cost Effective Circulators and Recirculation systems



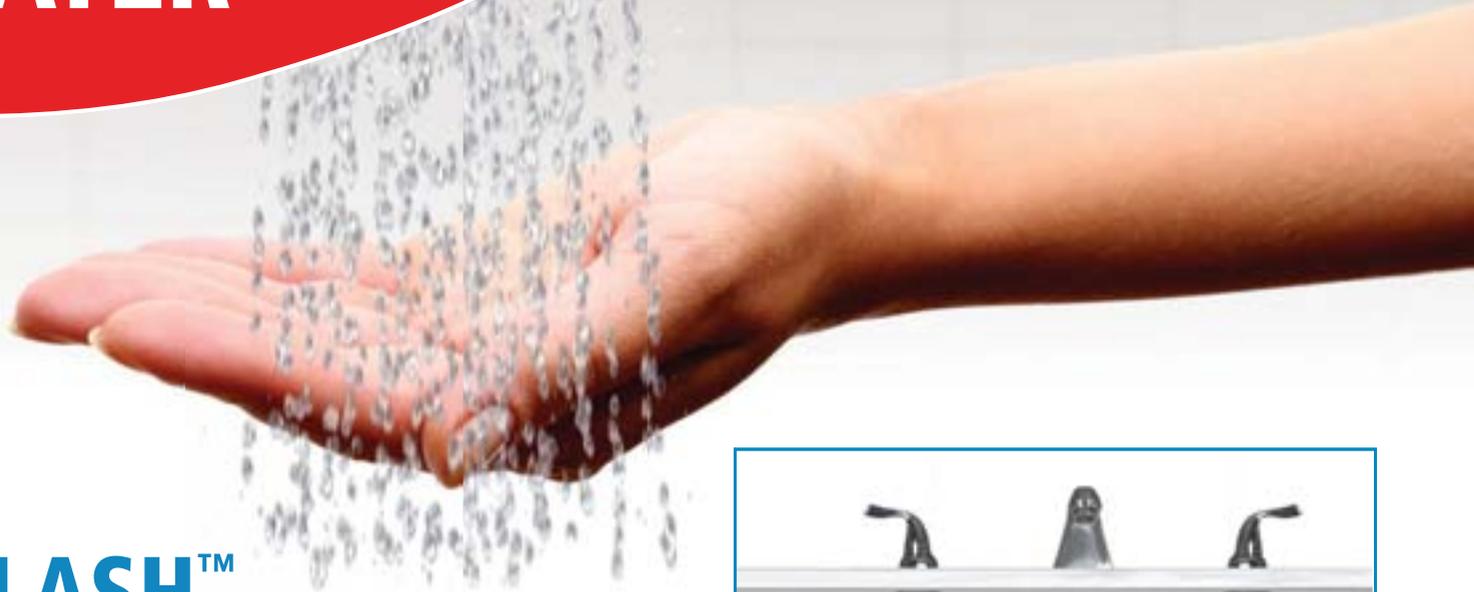
**Aquamotion Circulators are Installed by Leading
Contractors and Stocked by the Best Wholesalers.**

Buy American, Buy AquaMotion Circulators and Recirculation systems.

For quality and innovation we design
and build in Warwick, RI, USA

Longest Industry Warranty

STOP WAITING FOR HOT WATER



AQUA-FLASH™

Instant Hot Water Recirculation System

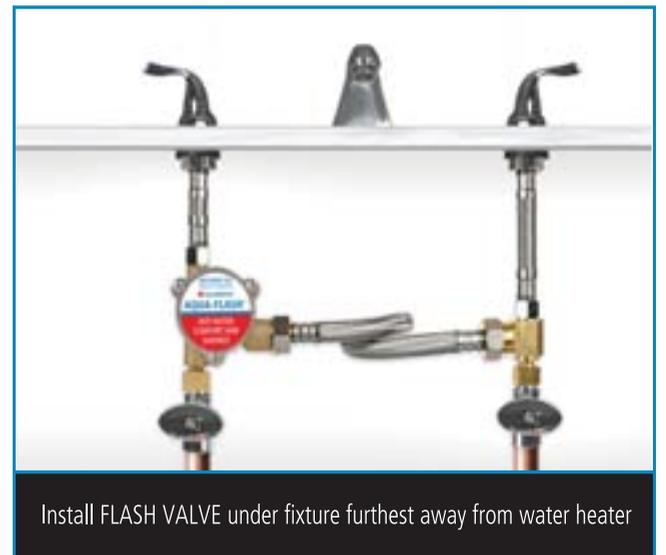
- Enjoy Instant Hot Water at every fixture in your home
- Save up to 15,000 gallons of water per year*
- Save on your Water and Sewer Bills
- Built-in Timer to Save Energy
- Pump operating cost only 2 1/2 cents a day**
- Easy to Install, Bronze/Stainless Construction
- Looks Great with Pedestal Sinks

How it works

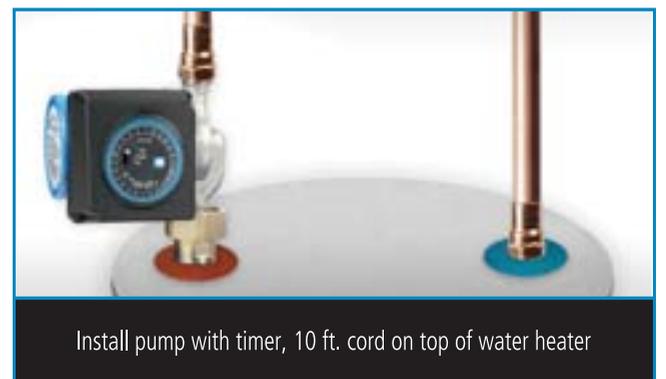
How long do you wait for hot water in the shower or at the sink? Water in the pipe cools when not used. AquaMotion's NEW TECHNOLOGY Flash system provides instant hot water at every faucet by using the cold water line to return cooling water to the hot water tank instead of dumping it down the drain.

MODELS: AMH1K-3UV: Use only with Hot Water Tanks. **AMH1K-RU-VWB:** Meets Title 24 California – for Hot Water Tanks. **AMK-FK:** Replacement Flash valve, Hose, Tee. **AMK-F:** Replacement Flash Valve.

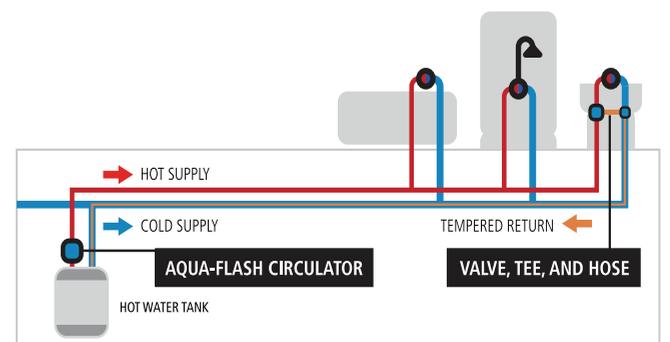
US DESIGN • US ASSEMBLY • US 100% TEST • PATENTED



Install FLASH VALVE under fixture furthest away from water heater



Install pump with timer, 10 ft. cord on top of water heater



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UL, NSF 61 Listed * Family of five. **Based on 4 hour use a day at \$ 0.12 per KWh – AMH1K-3UV



PIPE & COUPLING

Tyler Pipe & Coupling— founded in the heartland of our nation

It took guts and perseverance to start a major manufacturing company in the middle of the Great Depression, but that's just what Tyler did nearly a century ago. While others retreated in the face of tough times, closed their doors and created soup lines, the founders of Tyler Pipe and Coupling saw opportunity and created jobs out of molten iron and built a future for the thousands of team members who would one day call Tyler home.

Tyler Pipe was named after our home base in Tyler, Texas. From their inception in the mid-1930s as the country was coming out of the Great Depression and experiencing economic recovery, Tyler was able to adapt to



industry change. This resilience is the driving force behind the Tyler of today.

The iron foundry is located in Texas and the coupling and gasket manufacturing facility is located in the heartland in Marshfield, Missouri. Tyler has distribution centers in Northern and Southern California and Mid-Atlantic. This wide-reaching footprint allows Tyler to serve a variety of customers that span the entire country.

Cast iron soil piping has been used in storm and sanitary drain, waste, and vent (DWV) plumbing systems for hundreds of years. The reason cast iron has survived is simple, cast iron endures the test of time. It is a highly reliable product with many significant qualities making it ideal for commercial construction.

A cast iron piping system is also a safe building material as it is non-combustible, has excellent crush and deflection resistance, provides superior sound suppression in waste water applications, and it is a green solution as it is manufactured using 95% post-consumer scrap metal which reduces demand on area landfills. And best of all, all Tyler products are manufactured in America by US workers.

Tyler produces a wide variety of high-quality products including cast iron no-hub and service weight pipe and fittings.

Tyler also manufactures standard no-hub couplings and service weight gaskets. Every Tyler pipe and fitting, coupling and gasket is designed to meet industry standards — often exceeding these standards. Hard work, persistence, determination and dedication to quality have made Tyler what it is today — the nation's leading producer of cast iron soil pipe, fittings and couplings.

That's Tyler Tough. Want to see how cast iron soil pipe and fittings are made right here in the USA? Then visit TylerTough.com. ●



Tyler produces a wide variety of high-quality, cast iron no-hub and service weight pipe and fittings, as well as standard no-hub couplings and service weight gaskets. Every Tyler pipe and fitting, coupling and gasket is designed to meet or exceed industry standards.



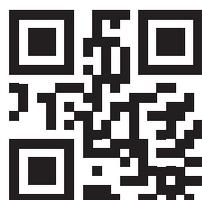
Is cast iron piping the most durable plumbing system with the best sound performance?



Yes!

A cast iron piping system is designed to last the lifetime of a building. It's exceptionally durable and offers superior sound performance. Philadelphia, known for its rich history, was the first American city to use cast iron pipe exclusively due to its longevity. A revolutionary American city that shaped our nation with the signing of the Declaration and Constitution, the Liberty Bell and the nation's first hospital. A city with a tradition of excellence.

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PIPE & COUPLING



BOSCH
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Project Outline – Banff Elementary School Replacement & Heating System Upgrade Banff, Alberta CANADA



Artist rendering of the completed Banff Elementary School (courtesy CRPS and GEC Architecture)

“We have partnered with the Town of Banff to enlarge the gym to a collegiate size as well as adding two Town of Banff Out-of-School program rooms. All sidewalks to the property line are equipped with or will have snow melt systems. In addition to installing the high efficiency Buderus SSB boilers, we also installed a 65 kWh (204 panels) solar array in Phase 1 and plan to add an additional 500 to 600 panels in Phase 2 for a total system of 800 panels or 260 kWh.”

The new school can accommodate up to 550 students, up from the current 400-student mark. Once the project is complete, the existing school will be demolished and converted into the school's new green area, and will double as a community space. CRPS anticipates adding Grades 7 and 8 to the new school, transforming into a Grade K-8 facility. ●



Five Buderus SSB-399 stainless steel gas-fired condensing boilers combine for total input of 1,995 MBH in the school's Phase I heating plant. Additional three Bosch boilers are planned for Phase II (courtesy Lowe Agencies).

Background

The Banff Elementary School (currently K through Grade 6), under the operation of Canadian Rockies Public Schools (CRPS), is being built in two phases. Phase one budgeted at CAD\$8.4 million encompasses construction of 13 classrooms, an office space and a mechanical room. Phase two (CAD\$13.5 million) will consist of another 13 classrooms, a library and a gymnasium.

Installation Summary

Lowe Agencies Sales & Marketing Inc. assisted with design, equipment selection and budget for MCW-Hemisphere Engineering in Calgary for the Banff Elementary School re-development and upgrade project. Based on engineering and customer needs for a modular plant design with high turn-down and high efficiency, Lowe Agencies specified five Buderus SSB-399 gas condensing stainless steel boilers with a combined input of 1,995 MBH. According to Aaron Lowe of Lowe Agencies, “Full Cascade boiler plant design is 92-98% efficiency based on return water temperature variances during operation and set points. Once Phase one is complete, the heating plant will achieve a 25:1 turndown for optimal temperature control and energy savings. As condensing boilers are at their highest level of efficiency at their lowest percentage of fire, the modular condensing boiler design is critical for long term energy saving realization.” Full start up and commissioning of the boilers, control systems and programming of the BACnet module are completed.

Benefits and Conclusion

Lowe Agencies has specified three additional Bosch Buderus SSB-399 boilers for Phase two, planned to be installed by Fall 2017. Once the additional three SSB-399 boilers are installed, the entire system will achieve a 40:1 turndown, which will result in even higher efficiency levels.

According to Ken Riordon, Facilities Manager for CRPS,

Project Summary

Banff Elementary School

Municipality: Banff, Alberta Canada, Canadian Rockies Public Schools (CRPS)

Construction Schedule: 2016 - 2017

Developer: Alberta Infrastructure

General Contractor: Eton-West Construction Alta, Edmonton, Alberta

Architect: GEC Architecture, Calgary, Alberta

Bosch Representative: Lowe Agencies Sales & Marketing Inc., Alberta

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2017 SUPPLIER PROFILES

SANIFLO

Taking Care of Business: Indiana Wholesaler Saves 12 Hours in Labor Installing Above-Floor Plumbing Systems for New Restrooms.

Mid-City Supply Company is a family-owned wholesaler that deals primarily in plumbing, HVAC and refrigeration supplies. When its Elkhart, IN branch outgrew its space, the decision was made to construct new offices and restrooms.

The decision of which plumbing system to install was rendered relatively quickly, according to Dan New, Vice President of Operations. “We really did not want to drill through the concrete floor to install the plumbing,” he says. “As a result, we turned to a solution that we have been stocking at our supply house for the better part of 10 years — the above-floor plumbing option from Saniflo.”

Above-floor plumbing systems eliminate the need to break through a concrete floor to install drainage below. A macerator or a grinder located behind the toilet reduces the waste into slurry and pumps it through small-diameter tubing straight to the drain line. Above-floor plumbing systems, which can also handle drainage from sinks, tubs and showers, can be used to create restroom and bath facilities in garages, basements, attics, warehouses — anywhere conventional plumbing might prove difficult and, therefore, costly to install.

Ryan Hendershott, a licensed plumber with Schreiner & Sons and the installing contractor on the Mid-City job, says the restroom application was well-suited to an above-floor installation. “In this case, above-floor plumbing was the least-complicated solution.”

New ended up choosing the Sanibest Pro heavy-duty grinding system for both the men’s and women’s restrooms. The 1-HP grinder can pump up to 25 feet vertically when it is installed below the sewer line; or nearly 150 feet horizontally to the sewer stack. It is specifically engineered to

handle the accidental flushing of larger sanitary articles, such as feminine products, and can meet the needs of a complete bathroom.

Straightforward Installation

To minimize the level of flushing noise, Hendershott installed the grinder unit behind the wall. He also installed the elbows for the pump’s ejection line at a 45-degree angle and used 3/4-inch pipe. “The smaller the pipe’s diameter, the less noise it will tend to make,” explains Hendershott.

Located on the building’s second floor, the unit pumps the waste slightly upward before gravity takes over and moves it to the drain line. A below-floor installation would have been significantly more labor-intensive and expensive, not to mention messy. According to New, by choosing the above-floor option, Mid-City Supply cut installation time by 12 hours.

Overall, the Elkhart installations went smoothly and without any major complications. It took roughly five hours to complete the job per restroom. “We had a fairly straightforward application and an experienced plumber, so there were no issues,” says New. The bathrooms were finished in October 2015.

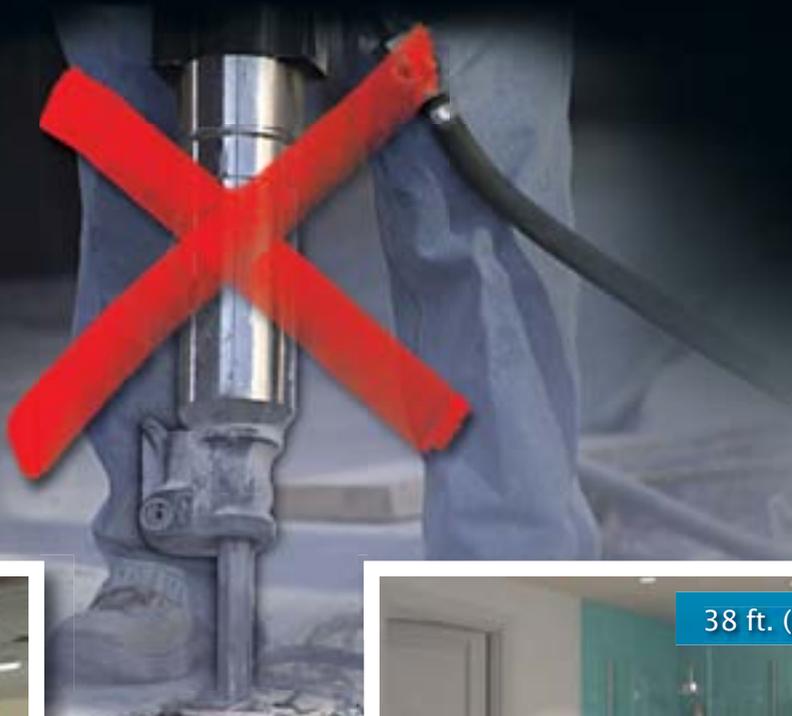
New is pleased with the units’ performance since the installation. “Above-floor plumbing is certainly a niche category, but this brand is the best within that category, and the installation turned out great” he comments. “Above-floor plumbing has certainly proven itself to be a simple, reliable and cost-effective option.” ●

For more information about Saniflo, please visit saniflo.com or call 800-571-8191.



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Before



38 ft. (shut-off head)

After

↑ 25 ft. ↑ and/or ← 150 ft. →



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NightEye® Wireless enabled products by Liberty Pumps

Liberty Pumps; Bergen NY, introduces NightEye® wireless enabled products. The app and cloud-based system designed by Liberty Pumps allows internet connection of a pump via the home's wireless router and provides alarm and other performance information to your mobile device. The NightEye® system sends information via text, email and push notifications, to up to 4 different email addresses or phone numbers - anywhere in the world.

States Randall Waldron, Vice President of Sales and Marketing, "We knew mobile notification through your personal smart device of a pumps' performance or other potential problem was the next logical step in the advancement of our products. With the new NightEye® pump alarm, fluid levels are monitored and customers alerted when levels rise – notifying them of a pump failure or possible power outage before costly repairs, health hazards and property losses can occur."

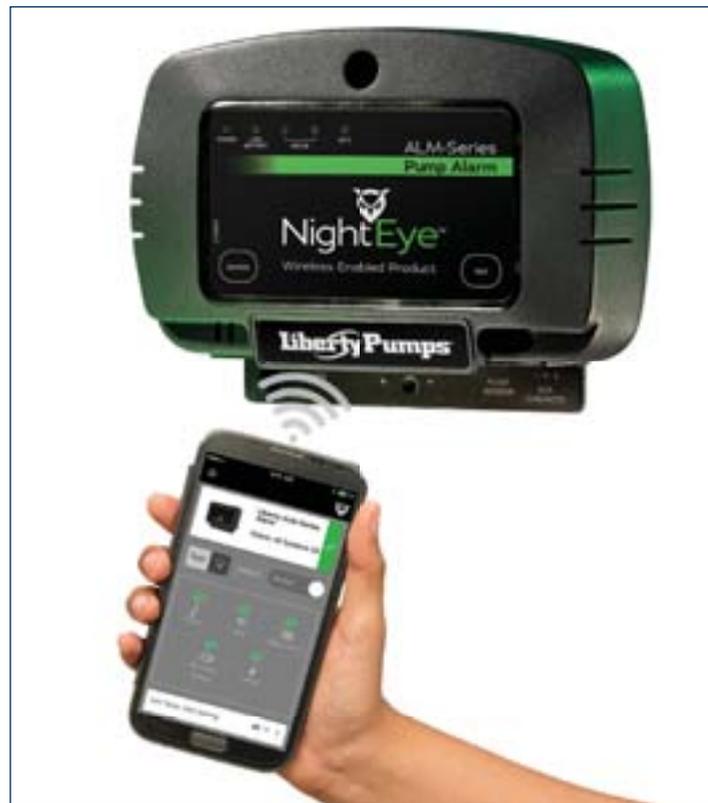
"The system also includes a thermal sensor imbedded in the alarm unit that will notify the homeowner of a low basement temperature. The temperature warning threshold is a user defined setting in the app (user selects the degree setting in Fahrenheit or Celsius) and is highly useful in northern climates where a furnace failure could cause frozen pipes and water damage."

The system is easy to use and setup - all through your portable device – with no need to log into a computer or website. There are no reoccurring subscription fees for use of the NightEye® system.

To connect a smartphone to the installed NightEye® unit, the homeowner downloads the free NightEye® app (available for iOS® and Android® operating systems) and then creates an account using an email address. The cloud-based system receives this data and sends a confirmation email to the homeowner, containing a four-digit PIN. The homeowner keys this number into the app for authentication purposes, and then selects their wireless network and keys in their network password.

To sync the smart device to the alarm module, the system uses a format called BlinkUp™, which is based on the use of light pulses. During setup, the app shows a countdown timer and asks the homeowner to hold their phone's screen

up to the LED screen on the NightEye® unit and to keep it there for 10 seconds. During that time, the app uses rapidly flashing light pulses to transmit the login and password to an optical sensor embedded in the NightEye® unit.

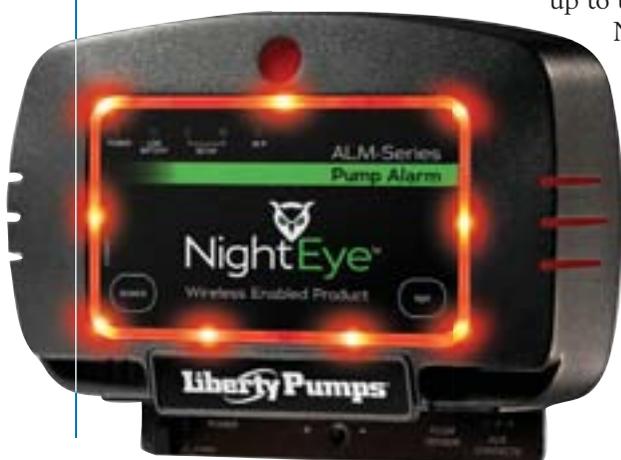


Another key feature of the NightEye® app is that building owners can install and monitor multiple locations where NightEye® alarm units are deployed, all through the same mobile interface.

The ALM-EYE series alarms feature a new super-bright LED alarm ring, 9 volt battery backup and auxiliary contacts for optional connection to other home security systems.

NightEye® connected products include the ALM-EYE series indoor pump alarm, StormCell® 12-volt battery backup pump systems and the SumpJet® water powered backup pump.

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- User-defined low basement temperature alert



Just look for the NightEye® logo on pump alarms, back-up pumps and other new products from Liberty Pumps

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PLUMBESHOP®

Plumbing Products

Professional contractors searching for reliability and a great value can now turn to a new line of plumbing products delivering on that very promise. Plumbshop. Backed by Brasscraft Manufacturing Company and its proven reputation for quality, Plumbshop is value priced to give professional plumbers a reliable new option.

“Plumbshop products offer a unique benefit: ‘Reliable Value’. With Plumbshop, contractors who are seeking a value price-point will also get quality comparable to what they’ve come to expect from Brasscraft Manufacturing Company.” said Rick Mejia, president.

These are reliable, no-nonsense products that install easily and are built to live up to the brand promise of delivering a reliable product at a great value. Supporting contractors with a product line that helps them stay competitive, with support from one of the most respected names in the business, Brasscraft Manufacturing Company.

The new Plumbshop line includes water stops, stainless steel water connectors and push connect fittings. Plumbshop

water stops are available in both angle and straight configurations with a broad selection of connection types, including compression, sweat, CPVC, PEX barb, cold expansion PEX, FIP and push connect. Connectors are made of flexible braided stainless steel and come in multiple configurations and lengths for toilet, faucet, dishwasher, washing machine and ice maker installations. Plumbshop push connect fittings are forged from lead-free brass with an extensive selection of fittings from unions to couplings and small to large diameter, including 2-inch.

Plumbing contractors can be confident in a purchase backed by the industry leader. Brasscraft Manufacturing Company has more than 70 years of plumbing supply experience, with best in class product development, engineering, industry-leading test lab facilities and top-notch customer service.

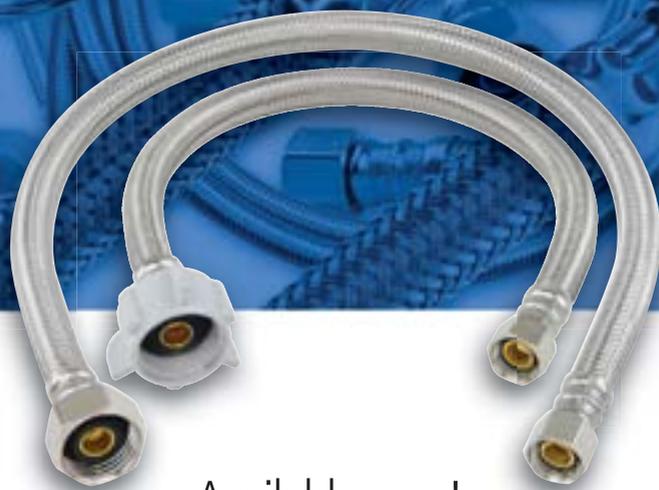
For more information about Plumbshop products, contact Jill Shippy, jshippy@brasscrafthq.com, visit www.plumbshop.com, or contact your Brasscraft sales representative. ●



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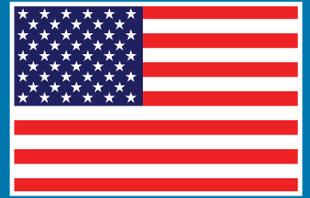
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WITH GLOBAL COMPONENTS



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Worthington Joining has introduced a way to make silver phosphorus copper brazing alloy more ductile and to offer it in 5, 10, & 22-foot coils. The result is QuickCoil® Continuous Phos-Copper Brazing Alloy, a time- and material-saving alternative to stiff, hard-to-bend brazing rods.

“On the job,” says Scott Evans, director of Wholesale Products and Joining Alloys, “you get up to 22 feet of non-stop brazing with no wasted time.” He also points out that the QuickCoil approach also drastically reduces alloy waste. “With rods, you lose up to 20% of your alloy in stubs that you throw away or braze together. QuickCoil brazing cuts waste to near zero.”

“It’s really a new, time-saving way to braze,” he continues. “Just finger-bend it any way you want, and braze away.”

QuickCoil brazing alloy will soon be available at plumbing supply wholesalers in 5%, 6% and 15% silver varieties. All deliver these efficiency-boosting benefits:

- Up to 22 feet of continuous brazing. No more time wasted swapping out 20-inch rods. That’s pure productivity.
- Waste drastically reduced. Rods waste up to 20% of your alloy in discarded stubs. QuickCoil cuts waste to near zero.
- Easy bending with no preheating required. Finger-bend it to whatever angle suits the brazing job at hand.
- Easy staging and storing. Just loop QuickCoil over your tank between jobs — no need for extra storage containers.

Visit worthingtonjoiningtech.com/non-stop-brazing to learn more about QuickCoil products.



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At Worthington, we never stop thinking about what it takes to keep you working at your highest level. That's why we lead with market-changing innovations like our new QuickCoil® Continuous Phos-Copper Brazing. And it's why we engineer our complete OEM line of torches, fuel, solder and brazing products to withstand rigorous quality and safety testing in the factory to make sure that they will stand up to your most demanding applications in the field.

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- 1957** — Martin E. Ismert Jr. starts Sioux Chief on August 16th
- 1960** — Martin's brother Ted becomes Sioux Chief's first full-time employee
- 1965** — Sioux Chief's first fully automatic copper slug spinner is designed and built by Ted Ismert
- 1970** — 3 employees, 10,000 sq/ft
- 1975** — Martin Ismert's two eldest sons Mike and Joe purchase Sioux Chief and take over operations
- 1980** — Sioux Chief purchases its first injection press and begins molding plastic products
- 1985** — Sioux Chief enters the water hammer arrester market with the HydraRester™
- 1990** — 65 employees, 50,200 sq/ft
- 1995** — Sioux Chief enters the light-commercial drainage market, acquiring Schier Drainage Products
- 2000** — 329 employees, 151,096 sq/ft
- 2005** — The OxBox™ and FinishLine™ products are launched
- 2010** — Sioux Chief enters the PEX tube market with a state-of-the-art extrusion line
- 2015** — 480 employees, 370,000 sq/ft
- 2020** — Sioux Chief expands its manufacturing, warehouse and distribution capabilities, moving into a new, 600,000 sq/ft headquarters in Kansas City, Missouri
- 2025** — 675 employees, 800,000 sq/ft

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»» We're Making it in America

Sioux Chief is proud to deliver value to our customers by creating innovations in plumbing products.

Thank you for giving us the opportunity to serve you.





Sioux Chief Celebrates 60 Years Serving Plumbing Industry

Sioux Chief, a family-owned manufacturer of plumbing products, is celebrating its 60th anniversary. The company was founded in August 1957, by the late Martin E. Ismert Jr., and got its start packaging specialty fasteners and other items geared toward residential plumbing jobs.

Today, Sioux Chief continues with the third generation of Ismerts, who carry on their grandfather's mission of focusing on high quality, innovative product and superior customer service.

"Our primary purpose has always been to provide quality to our customers in every way," says CEO Joe Ismert, "By listening to their needs and developing products to meet those needs, we allow them to be more effective and more efficient."

To that end, the company is known for designing and building their own machines, tools and dies, and equipment in order to ensure the highest quality, and maintain consistent product tolerances.

"For the last 60 years, we have worked hard to provide plumbing contractors with a better way to plumb" says Rex Baer, Executive Vice President. "We strive to make products that are easier to use, faster, and more consistent - so our contractors can take on more jobs, with less risk and be more profitable."

Though the company has expanded its buildings several times over the years, Sioux Chief's continued growth has once again called for expansion - this time into a new

location. Construction of the company's new 600,000 sq.-ft. headquarters in Kansas City, MO, is nearly complete. The new facility, which will include both production and office space, will feature multiple banks of roof-top solar energy panels and incorporate enhanced material-recycling capabilities.

"With that much roof space, utilizing solar panels to offset our energy needs was an easy decision" said Joe Ismert Jr., President. "With the newly installed panels, we'll be generating nearly half a megawatt of electricity."

In addition, Sioux Chief recently purchased a recycling plant that will enable the recovery of 100% of the braided PVC tubing it extrudes during the startup and shutdown process, further evidence of their commitment to sustainable manufacturing.

The company is also committed to manufacturing American products with American materials - making more than 90 percent of the products it sells, and employing over 650 people. In 2016, Sioux Chief acquired a plant in Nogales, Mexico, and relocated it back to the United States, giving them the opportunity to add 30 hardworking Americans to the company family.

"We were very pleased to be able to employ even more Americans by bringing that plant home," adds Joe Ismert Jr. "The movers that helped with the relocation told us it's the first time in 30 years that they've moved an operation from Mexico to America. That makes us proud." ●



Comfort at Heart

Raypak donates ultra-high efficiency boilers to Boy Scout camp

THE HEART OF COMFORT HEARS A VOICE IN NEED

It all started with a simple phone call from Boy Scout Camp Ranger Mike Daniher to Raypak. Daniher needed a huge favor – his camp, Camp Guyasuta in the Laurel Highlands Council, needed to replace their 13-year-old boiler with a new one – and they needed it done at little or no cost. The timing couldn't have been more perfect when that phone call came in. Raypak, part of the Rheem family of brands, was able to tap into the Heart of Comfort philanthropic program, donating two wall hung XPakFT boilers to Camp Guyasuta to better fit the space and save the Boy Scout camp money on energy bills.

The boilers' primary job is to heat the McGinnis Education Center, a two-story conference center that includes a dining area and sleeps up to 156 people. The camp added square footage to the facility, making their old boiler practically useless. The non-profit organization required a solution that could not only handle heating the additional space where campers play, eat and sleep, but it had to withstand the harsh Sharpsburg, Pennsylvania winter.

Raypak and their local representative, Herrmann Associates, engineered a solution using two ultra-high efficiency condensing boilers for light commercial applications – the enhanced XPakFT®. The XPakFT is more efficient than the older boiler and features a stainless steel fire-tube heat exchanger design which allows for a broader

range of flow rates, requiring reduced pump energy for maximum system operating efficiency.

"It made sense to use XPakFT boilers. It was a perfect solution for Raypak and for Camp Guyasuta," said Steve Thurlkill, national sales manager, Commercial Products Division, Raypak. "Raypak was given the chance to showcase a product for a good cause while the Boy Scout camp got a sizable donation to ease their budget concerns."

The XPakFT heat exchanger is ASME-certified and National Board registered. The units donated to the camp are certified at 96% thermal efficiency, 10:1 turndown and extremely low NOx emissions. These XPakFT features suited the McGinnis Education Center because it's a "LEED" certified Green Building.

"Our facility is used year-round,



so we needed a more powerful boiler," said Daniher. "What we got were two small wall mount units that are more efficient than the single older boiler, have better technology, do a better job at heating and take up less space. It's a win-win situation for us."

AN ARMY OF HELPERS

Thurlkill admits donating the boilers was the easy part. It took a team of engineers and contractors to get the job done properly. In fact, M&G DuraVent donated stainless steel venting and Jack Getkin of Herrmann Associates pitched in a lot of his time – for free.

"I joined Boy Scouts in 1963 and earned the rank of Eagle Scout in 1970," said Getkin. "I have a life-long connection with Scouting and really wanted to make this work." What's more, you don't have to be a Boy Scout to go to Camp Guyasuta – the 175-acre camp is also used by the surrounding community, often serving "at risk" youth to teach them teamwork, conflict resolution and self-esteem.

"Camp Guyasuta deserved our help," Thurlkill added. "What better way to give back to such big-hearted organization, by pooling resources to make the XPakFT donation and installation happen. These boilers will make their camp warm and inviting."

A TRUE RELIEF

The XPakFT boilers were installed in April and have already been tested for three weeks. The real trial will come soon when outside temperatures drop.

"So far, so good. The system is meeting and exceeding our needs." Added Daniher. "With these two new reliable boilers, we no longer have to add bandages to the old system which means less money coming out of our maintenance budget – and less headaches."

Raypak has also arranged to have the system monitored remotely to make sure the boilers run properly this winter. As for the cost of the project, Camp Guyasuta saved approximately \$35,000.

"That's pretty substantial. If it weren't for Raypak's generosity, we would have had to really scale back our projects," Daniher said. "Instead, we were able to add to the McGinnis Education Center by putting in a larger kitchen in order to feed 500 people and additional space to seat 300 people. We also added two restrooms and sinks in the hallway."

During the XPakFT's lifetime, thousands of campers will come and go each year at Camp Guyasuta – earning badges and building friendships that will last a lifetime – all while staying warm thanks to Raypak's "Badge of Generosity".

For more information about the XPakFT, go to www.raypak.com. For more information about the Heart of Comfort program, go to <http://www.rheem.com/heartofcomfort/home>. ●



XTherm[®]

Ultra high efficiency up to 4,000MBTUH



Ultra-high efficiency
XTherm Commercial Boiler.

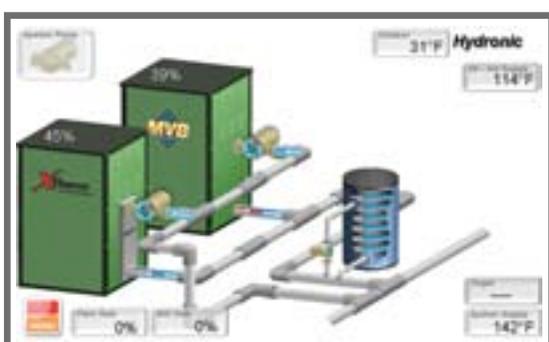
Our hybrid design allows condensation to form only in the pre-plumbed and piped stainless steel secondary heat exchanger. Take advantage of our built-in freeze protection that can save you thousands on venting material by allowing you to install the boiler outdoors. In addition to our installation flexibility, XTherm offers class-leading vent lengths.

For your heating needs from 42,000BTU thru 4,000,000BTU - Raypak has you covered. Learn more at www.Raypak.com

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TracPipe® CounterStrike® Flexible Gas Piping by OmegaFlex®

CounterStrike® CSST Solves All Problems

BY BOB TORBIN
DIRECTOR OF CODES AND STANDARDS

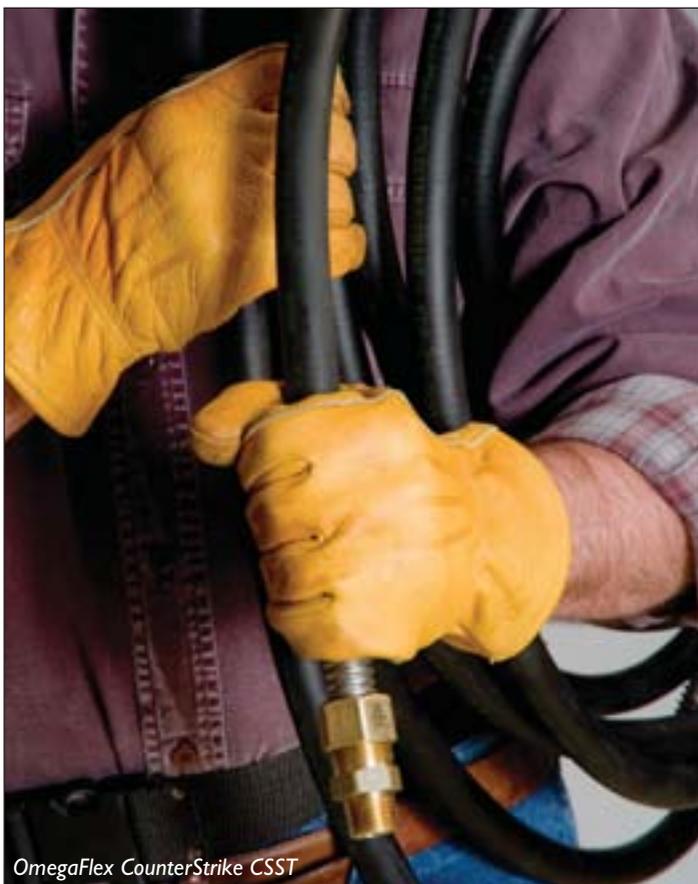
The installation of gas piping has always been a challenge for both builders and plumbers when using schedule 40 steel pipe which is rigid, difficult to handle and assemble, and subject to many threats. The introduction of corrugated stainless steel tubing (CSST) gas piping technology in 1990 was a major step in overcoming the shortcomings of steel pipe. With the development of the latest generation of arc-resistant CSST, most of the problems associated with gas piping have become history.

The OmegaFlex CounterStrike® CSST system is designed to resist the many forces of Nature that challenge rigid piping systems including structural movement associated with earthquakes, hurricanes and floods and electrical insult from lightning. OmegaFlex re-invented its benchmark CSST TracPipe® product with the development of a conductive outer jacket which can resist arcing damage caused by lightning energy within any structure. Since its introduction in 2004, over 150 million feet of CounterStrike have been installed in the United States with essentially problem-free performance and zero loss of life.

In the residential construction world, nothing is designed to be lightning-proof. Not the materials of construction, not the electric or gas distribution systems, or any of the many household appliances. Despite all of these limitations, the manufacturers of corrugated stainless steel tubing gas piping have taken the lead in demonstrating that resistance to arcing damage caused by lightning strikes can be achieved using advanced materials technology. The CounterStrike arc-resistant (or "black") CSST represents the most advanced gas piping product available in the market built to resist damage

from lightning without compromising its unique installation characteristics. CSST is design certified by CSA in accordance with the national consensus standard (ANSI LC-1) which includes performance requirements for arc-resistant jackets, and represents the only standard accepted by all model and state codes.

For builders this means a predictable and affordable installation for the gas piping system. CSST offers greater flexibility in construction scheduling and the fastest installation time of any gas piping material. The use of CSST also addresses the shortage of licensed plumbers allowing the installation of more gas appliances with fewer plumbers, but without compromising installation time or raising cost. In 2013, OmegaFlex again leap-frogged the industry with the introduction of its AutoSnap® fitting technology. This fitting design allows the installer to simply push the fitting onto the prepared end of the tubing without any disassembly or assembly of the fitting itself. This streamlines the installation of the fittings and makes the assembly of the piping system more manageable when working in tight and cramped quarters such as crawl spaces. The shape and design of the CSST products makes it ideal for complicated residential construction and eliminates problems associated with complex structural geometries based on its long uninterrupted length and extreme flexibility. For plumbers, builders and home owners, CounterStrike CSST represents the most technologically advanced gas piping product that is specifically designed to address all the forces of Nature resulting in the safest gas piping system available in the marketplace. ●



OmegaFlex CounterStrike CSST



OmegaFlex AutoSnap Fittings

The Lightning Problem is Solved!

After ten years, over **125 million feet**
have been installed in homes across
America, making CounterStrike® CSST the
only field-proven product in its class!



TracPipe®  **CounterStrike®**
Flexible Gas Piping by OmegaFlex®

For more information on gas piping safety, visit www.CSSTFACTS.org
Visit our website at www.tracpipe.com

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Exton, PA 19341
1-800-671-8622
ISO 9001 Registered Company
FGP 682 04/16



Trade Life: Paying It Forward

"I had a tragedy in my life and my daughter was hurt bad and people helped me. So why not help people help each other?" – Joe Jester

Back in November the SupplyHouse.com team joined Joe Jester on a jobsite to learn more about him and his story. In the basic sense, this job was just like any other for Jester's Waterworks. The five man crew from Malaga, New Jersey was drilling a well in a wooded landscape, something that they had done many times before. Watching the towering mobile drilling rig pull mud



from deep within the earth was impressive in itself, but the reason we were there on that day was the circumstances surrounding this particular job. Joe was not receiving any payment for his efforts and if we did not discover it ourselves, only a few people would have even known that

this had occurred. Joe simply saw an opportunity to give back to the community that had supported him in his time of need and took action.

The catalyst to this day took place over ten years ago, November 19th, 2005, the day which Joe's youngest daughter was involved in a serious car accident. She was left with lasting injuries and had a lengthy hospital stay before she was able to come home. Joe and his wife had a lot on their plate between this, their lives and jobs, and their other daughters, but thankfully their community rallied behind them. Food and chores were taken care of, no questions asked, helping the Jester family recover. Ever since, Joe has sought out opportunities to pay it forward.

Enter Donnie Davis: a veteran and retired police officer looking to help fellow veterans dealing with PTSD. His "Operation Safe Haven" is a charity he is building with a goal to provide micro homes in a secluded and quiet area so these veterans can get squared away and transition from military life to civilian life. All needs would be provided; all they would have to focus on is getting themselves in a better place. One of those needs happened to be a well to provide clean water. Donnie had originally called Joe to get an estimate on how much the well would cost, but once Joe saw what Donnie was doing, he offered his services free of charge.

Joe's life hasn't always been easy, and through these hardships he has seen firsthand how a community working together can improve lives. Taking this lesson to heart, Joe uses the gifts he was given and the skills he has developed to help those around him. We are all going to need help at one point or another, so why not help people when we can?

Watch the video at www.supplyhouse.com/tradelife ●

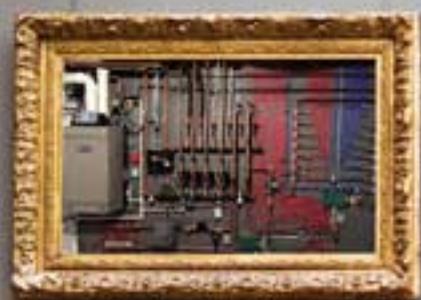


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Installation by
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Eemax AutoBooster delivers long-lasting hot water performance

Eemax AutoBooster delivers more hot water from any new or existing tank water heater. By installing AutoBooster, homeowners can get up to 63% more hot water and nearly double their shower time. AutoBooster can be installed directly on the tank outlet and the unit works by activating when the tank's outlet temperature drops below the user-set activation temperature. AutoBooster increases the hot water delivered by a 50-gal. tank to that of an 80-gal. tank, without taking up more space while costing less to operate than a traditional 80-gal. water heater. The vacation mode feature allows homeowners to switch off power to their tank when they're away, saving money on hot water heating when it isn't needed. AutoBooster only heats water when the tank alone can't keep up with demand, so there is no wasted energy. Installation is a simple, one trade process and the unit has a compact design so that it can install on a tank or be wall mounted nearby. Homeowners can now enjoy hot showers, longer with the new Eemax AutoBooster.

For more information, visit eemaxautobooster.com ●



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2X
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HOT
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MORE
HOT WATER



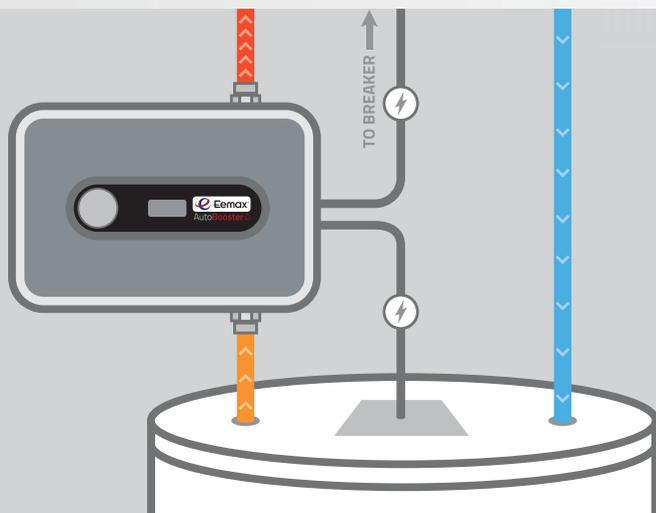
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* Results are based on a 1.5 Gallons Per Minute shower head at 105° for a 40 gallon tank



Custom Heat Exchangers for your Heat Transfer Needs

Diversified Heat Transfer (DHT) is an industry leader in thermal design and manufacture of custom heat exchangers and ASME pressure vessels for a broad variety of markets and applications. With over 70 years of experience, DHT has established a reputation for exceptional quality and dependability with customers around the world.

Advantages of using DHT for custom heat exchanger fabrication:

- Exceptional communication throughout the process: a direct line of communication with our sales and engineering team.
- Quality: Full conformance to specifications, industry standard applicable codes, and NDE
- Engineering capability: diverse wide range market sectors; experienced with ASME Section VIII and TEMA standards.
- Competitive Pricing: Our lean manufacturing capabilities and operations allow us to provide our clients industry leading technology and products at an excellent value.
- Materials capability: Extensive fabrication experience with materials such as Carbon Steel, Stainless Steel, Duplex Stainless, Copper, Cupro-Nickel, Brass, T Titanium, Hastelloy and other alloys.
- Range in vessel capability: We can fabricate up to 40" in diameter 20' long 15 tons max weight
- Delivery commitment: DHT reviews production twice a week to minimize hold up issues. This ongoing project tracking assures timely delivery.

Advanced Engineering:

DHT offers heat exchangers that are custom-built in accordance with our customer's specifications. By combining our extensive knowledge of thermal systems and industry leading experience, DHT's highly skilled engineering team will analyze your specific requirements and utilize advanced computer technology (CAD and SolidWorks 3D design programs, and ASPEN) to design solutions to meet your heat exchanger needs. Our experienced team will work with your staff to make sure specific needs and design requirements are met at the most cost-effective choice for your application.

Manufactured in America:

All fabrication takes place at DHT's main headquarters (65,000 square feet) located in Towaco, NJ. We are an ASME code fabrication facility and holds a Section VIII "U" stamp as well as National Board "NB" and "R" stamp and is experienced in all TEMA types, fabricating to B, C, and R TEMA classes. All of our welders are qualified to perform ASME fabrication work, and our quality control program applies a stringent set of fabrication standards to every job. Customers and their quality personnel are welcomed to visit

and inspect progress on their units throughout the custom fabrication process.

A Wide Range of Applications and Industries:

DHT specializes in providing heat transfer solutions for a variety of markets:

- Commercial
- Institutional
- Refining Petrochemical
- Utilities & Power
- Marine, Food Service
- Oil & Gas Processing

By developing our portfolio, we aim to offer our clients a broad range of innovative products and services including:

- Shell & Tube Heat Exchangers
- Tube Bundles
- Pressure Vessels
- HVAC Coils- Chilled & Hot Water, Steam & Refrigerant Coils
- Generator Coolers
- Intercoolers & Aftercoolers
- Tankless Coils
- Oil Pre-Heaters
- Steam Generators
- Plate & Frame Heat Exchangers
- Water Heaters

Delivering the right solutions

DHT differentiates itself through leveraging decades of engineering experience and industry expertise to understand each customer's requirements. We believe that businesses are unique and may require individually tailored solutions. By partnering directly with each client to understand their project-related specifications, we will be able to provide cost-effective solutions to meet their needs and operating environments. ●



All Stainless Steel Polymer Shell and Tube Heat Exchanger



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DHT SUPERPLATE
Indirect-fired Water Heater



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Indirect-fired Water Heater



DHT SUPERSTEAM
Unifired Steam Generator

DESIGNING SYSTEMS FOR OVER 75 YEARS.

Diversified Heat Transfer (DHT), is a leading engineering and manufacturing company of heat exchange equipment and systems for the residential, commercial, and industrial markets. With more than 75 years of experience, DHT can customize, design, build, and manufacture innovative, technology-driven products that provide flexible, high-quality, and cost-effective solutions for a wide variety of applications.

DHT's Super Series offers a broad portfolio of indirect-fired water-to-water and steam-to-water water heaters and unifired steam generators that provide you with a high-efficiency system a variety of commercial and industrial applications.

DHT SUPERSERIES:

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See how it works with installation videos on www.holdrite.com/videos ●





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- **LOCATOR WHISKERS, YES!**
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- **FASTER INSTALL, YES!**
 6 times faster to install than makeshift methods
- **EASY TO STOCK, YES!**
 Available at a distributor near you!
- **UL LISTED FIRESTOP DEVICE, YES!**
 Meets and exceeds building code requirements

EASY INSTALLATION



1 Lock outer sleeve in place



2 Nail to form deck



3 Remove cap with
 Safety Cap Tool



Buy American Act



2017 SUPPLIER PROFILES



RoofGuard will replace any roof drain dome up to 15" wide and scupper drains 6-12" wide. Installation is fast and simple!

It's very exciting when we experience innovation in our industry with revolutionary products that defy existing paradigms and challenge the status quo. It's that time when we ask ourselves "why didn't anyone think of that before?"

RoofGuard has come to change the roof drain industry. In both a polyethylene and new cast iron version, Mifab, a unique company focused on design and innovation has unveiled a new uncloggable Roof Drain Dome and Scupper Grate available now through your local Roofing or Plumbing Supply store.



We've all seen them before, clogged roof and scupper drains. The standing roof water they create is the leading cause of costly leaks and your roof's arch nemesis.

The fact is, traditional roof and scupper drains can quickly become clogged by leaves, needles and other debris creating standing roof water. The roof's only protection is constant preventative maintenance. Labor intensive and costly until now. RoofGuard makes roof and scupper drains virtually uncloggable. With RoofGuard on duty, there's no need for costly ongoing maintenance. Install it and forget it until next year!

With traditional drains, debris is pressed and compacted around the sides of the drain dome creating a dam effect. With an outer diameter 5 to 6 times



Cast Iron RoofGuard Dome
Also available as a complete drain

that of traditional drain domes, RoofGuard's increased surface area makes it virtually impossible to clog. Its patented design is engineered with horizontal passage ways to allow debris to float on top while water flows below.

Installation is a breeze. The polyethylene RoofGuard

body is attached to the roof with an exterior rated sealant. It also features a removable top for access to the drain and drain pipe without detaching the RoofGuard body. The cast iron version is attached to the existing drain body using three bolts and a universal membrane clamp ring that ensures it will line up with the existing body, no matter who the manufacturer.

A RoofGuard protected drain should only require an annual inspection and cleaning to remove any accumulated debris. Inspect it and forget it!

Now you can cut costs and increase the life of your roof. Protect your investment 24/7. Put RoofGuard on duty.

MIFAB is a family-owned, Chicago-based manufacturer, specializing in commercial plumbing products. Their product line includes: Backwater valves, BEECO pressure reducing valves, C-Port recycled rubber pipe supports; fixture carriers; floor, roof and area drains; floor sinks; grease interceptors; trench drains; hydrants; and water hammer arrestors.

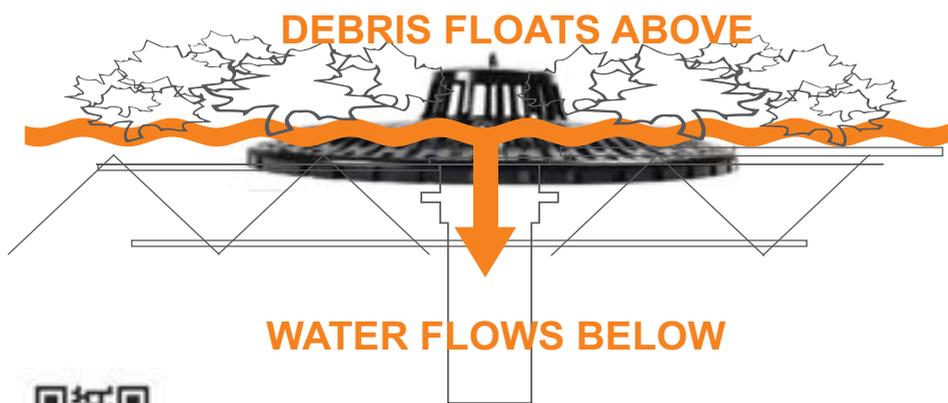
For more information on this product and where to buy RoofGuard, call toll free in US 1-800-465-2736, in Canada 1-800-387-3880, visit our website at www.mifab.com or view a RoofGuard video at www.roof-guard.net.



Plastic MRO RoofGuard Dome



Clogged Drain with Typical Installation



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- Eliminates water
- Saves money
- Easy to install
- For roof drains & scuppers
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INSTALL IT & FORGET IT!



Polyethylene RoofGuard Scupper & Roof Drain Domes

Cast Iron RoofGuard Dome



Part No. RG2016DG



Part No. RG2016DD

NEW



Part No. RG2016DDC

Fits over most anybody's drain!

MOMENTUM BUILDING MARKETING

Reviews and Stars Count

Your online reputation is essential to your plumbing company's success.



BY HEATHER RIPLEY

When was the last time you searched online for a restaurant, movie or business before making a purchase or a visit? You probably do it more often than you realize. Think about it. When you are at a doctor's office or in a long line to check out, what do you and the other patients or customers do? You are probably on your smartphones.

So, let's say you want to buy a new refrigerator. If you are like most people these days, you'll take to the Internet and Google "best refrigerators," "most efficient refrigerators" or "most reliable refrigerators." And you'll get results. Then you'll probably look for reviews from consumers, right? I know I do. And whether you are looking for reviews on the refrigerator brand, or the retailer nearest you that carries the specific model you decide on, the reviews are everywhere. Sometimes the review stars show up in the organic results, and sometimes they'll show up on a map or Google Plus listing. But you can't avoid them. And the other thing you can't miss are the search results with no reviews, or even worse, bad reviews.

If you are the owner or manager of a residential plumbing company, the reviews your business receives online can help or hinder your company's growth. It's in your best interest to be aware of and monitor your reputation online. The thing that business owners, and especially in-home or commercial service business owners, dread is a terrible review. This happens to many good businesses as well as not-so-good businesses, but how do your customers know the difference if your good business gets a bad review?

Honesty is always the best policy, especially in light of today's transparency in business practices and the proliferation of social media platforms. If you encourage your customers to review your business on Google or Yelp (and you should), you can expect that not every

single review will be glowing. Here are some tips on how to handle reviews:

1. Monitor what's being said: Search reviews of your business every week. Make sure you get to know who reviewed your business. Thank them for a good review quickly after one is posted.

2. Do not ignore bad reviews: Answer promptly and professionally. Never get into an argument. You cannot remove a bad review, in general, unless you can prove there was intent to harm a person or the review is untrue. Each review site has its own rules as to how to deal with bad reviews, but always answer, and if possible, ask the reviewer to contact you personally, offline.

3. Ask for a retraction or correction: Once you have resolved the complaint or bad review, ask for a new or a revised review. It can and does make a big difference when potential customers see that your business worked hard to regain the customer's trust when there was a problem.

4. Monitor what's being said: This was the number one tip, and it bears repeating. Reviews happen on many different platforms. Google Local or Google Business (pretty much the same thing) is one option where reviewers can "rate" your business through a star system. There are others that use similar rating systems. Watch your star ratings every week and encourage customers to leave star reviews with links and instructions on your bills, website, social platforms and emails.

You may wonder if potential customers really pay that much attention to online business reviews. Well, according to Constant Contact, an online email marketing company, 90 percent of consumers' online reviews do have an influence on buying decisions. And, as mobile devices take over laptops or desktop computers when it comes to search, reviews will be easier than ever to write and see. If you haven't checked your website analytics lately, check out how many visitors come to your website from mobile devices and how many come from computers. I'll bet your visitor balance is changing, and more of them will come from mobile devices every year.

Knowing this is important as you work to grow your home service business. It's also important to know how to get Google or Yelp reviews and why these reviews (and the number of stars people see when searching for your business) are essential to help your business grow.

You probably have a Google Business listing. Google may have created one for you, or you may have created one for your business years ago. In any case, here are some steps to take to ensure you take advantage of your Google online presence and make the most of its marketing potential:

Google stated that: "Once your business has obtained five reviews, your business can show up in SERPs (Search Engine Results Pages). This is a highly desired accomplishment as once having attained this threshold, these reviews have been shown to increase click-through rates (CTRs) by as much as 20 percent."

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| MARKETING |

1. **Claim your Google My Business Account or create one.** To create one, go to business.google.com/create and follow the instructions. If you Google your company's name and see there is already a listing for your business, then search Google for "claim my Google my business

Ninety percent of consumers' online reviews do have an influence on buying decisions.

account," and follow the instructions.

2. **Check for existing reviews of your business.** You may find there are already reviews on your Google business page. If there are, try to verify the reviewers are actual customers. If they are, and the reviews are old, you may just want to start responding to new or recent reviews. If there are bad reviews, take the time to find out who the reviewer is and see if you can resolve the bad comment(s). If you can, get a new review or comment if you have resolved the issue.

3. **Add all the pertinent information to your Google My Business Account.** A complete Google My Business Account gets more results. List your location, hours, link to your website and more. As your business gets more and more high-star ratings, your star ratings will appear next to your business name in search results.

Why is this important? Google stated that: "Once your business has obtained five reviews, your business can show up in SERPs (Search Engine Results Pages). This is a highly desired accomplishment as once having attained this threshold, these reviews have been shown to increase click-through rates (CTRs) by as much as 20 percent."

What this means is that with time and concerted effort, a business can help get more customers to visit its website and take action by having 5-star reviews show up in search results next to the business name. This is no small feat, as noted in Google's own explanation of the importance of Google reviews above. Click-throughs are metrics that show how effective your call to action on your business page or advertisements has been.

While some of these steps can be accomplished with due diligence and study of Google's process, sometimes hiring a professional PR and marketing agency specializing in your industry, with solid and proven results in improving Google rankings through expanding reviews and by increasing the brand's online awareness and clout, is the most effective plan. Whatever your business decides to do, keep this in mind: doing nothing could hurt your company's reputation. ●

Heather Ripley is CEO of Ripley PR, a global B2B public relations agency specializing in home service and building trades. For additional information, visit www.ripleypr.com.

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Step 1: Cut Step 2: Push Step 3: Tighten

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All metal parts • Click & Tighten • Save time / money

CSST GAS LINE SYSTEM

EASYFLEX HAS IT ALL

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- Same fitting for both tubing ✓
- Click & tighten, Ready to use fitting ✓
- Complete CSST gas piping system ✓

The image shows a complex installation of three Rinnai tankless water heaters. The units are white and mounted on a metal frame. They are connected to a network of white PVC pipes and black flexible hoses. The background is a light blue wall. The Rinnai logo is in the top right corner.

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BARE BONES BIZ

Leave Room for the Wormhole

Thinking outside the box when chasing your dreams can get you far in this industry.

BY ELLEN ROHR

I enjoy meeting business owners and learning what makes them tick. I like to ask about their business planning process. Most folks spend more time planning a party than they spend planning their business. I'm always enthusiastic when I visit with someone who has a plan and uses it to gain clarity, take action and get their team in on the game.

Occasionally, an ambitious owner will share a nothing-left-to-chance plan, describing what and how they intend to grow their company, month-by-month, almost day-by-day, for the next five years.

No plan is planning to fail. Too much plan? You are in danger of missing a wormhole.

"A wormhole is a theoretical passage through space-time that could create shortcuts for long journeys across the universe," according to www.space.com.

Once upon a time, my husband Hotrod and I had a plumbing-heating-solar company. My dream was to become a big company, to see if we could do it, if I had the "chops" to manage real growth. Hotrod had no interest in that dream; he loves to work, especially all by himself or maybe with one like-minded craftsman by his side. Imagine how dysfunctional it was for me to push my dream on him. So, we sold our company to our employees (a move that still fills me with pride) and decided to pursue separate career paths (a move that probably saved our marriage).

With a blank slate in front of me, I could create the business of my dreams. I considered that I knew something about financials and business planning, and maybe I could help other mom/pop shop owners fix and grow their businesses. I started writing for trade journals, and stitched together my articles into business basics books. I began consulting with contractors, and sharing what had worked for our business, and what I was learning from other sharp operators. I scored speaking gigs with contractor groups. I was successful

and profitable, however, I wasn't achieving my dream to get big. I just didn't know how.

It was time to ramp up. I gathered a few business experts together and formed a board of advisors. I engaged a marketing company. We met for a strategy session and built an ambitious business plan. We moved the vision to decisive action, with monthly targets, financial goals and specific, assigned tasks. We laid out exactly how we were going to make it happen.

Two days after the retreat, I presented a seminar to a large contractor association. Right after the event, a venture capitalist approached me and said, "We are growing the country's largest home service plumbing company. Would you like to be the president?"

Woah.

"Life is what happens to us while we are making other plans." – Allen Saunders

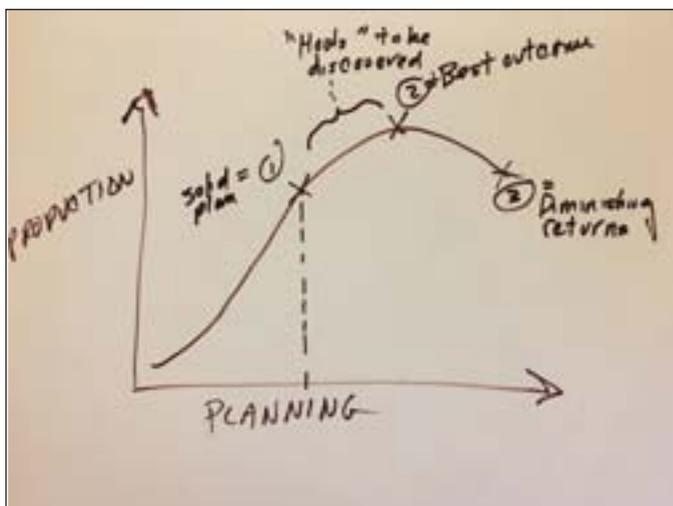
I didn't see that coming, but I did know that I wanted the job. I called my newly formed team, one member at a time. I explained that I received an opportunity that totally aligned with my dream, and I wanted to take it. I apologized, and expected to get some criticism (which I felt I deserved) and disappointment. My mentors and team members encouraged me to follow my instincts, for which I am so grateful.

The next three years were like getting a PhD in business and franchising. We grew to 47 locations and more than \$40 million in franchisee sales. It was at times a brutal experience, but so worth it. I'm proud of myself for saying, "Yes." It wasn't in my plan, and yet it was a wormhole to what I wanted. The experience set the stage to create ZOOM DRAIN, with my awesome partners and dynamic franchisees. We have a crystal-clear vision, a solid plan and a light touch on the reins. So good.

That's the thing about honoring what you really want, you may get what you ask for. It helps to put a plan together and take some aligned action. You don't need to have all the hows figured out; you don't even want to! You may discover a wormhole (maybe divine intervention?) that can get you where you want to go, faster and easier.

"The law of diminishing returns is a concept in economics that if one factor of production is increased while other factors are held constant, the output per unit of the variable factor will eventually diminish," according to www.businessdictionary.com.

Let's consider this economic law as it may pertain to planning. This law can be reflected as a bell curve; as you increase your planning, you'll increase your success. At least for a while. The "sweet spot" for planning is





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just on the upward shoulder of the bell curve. Lighten up on the “hows” when you have 70-80 percent of the details fleshed out. Leave the plan loose enough for to-be-discovered opportunities that will inevitably pop up. The apex of the curve, and your success, is reached by the delicious combination of careful planning and openness to “even better” presenting itself.

Recently, a friend sent me an email. Here's the essence of what he shared with me:

I've always considered myself a good hydronics sales person. But I had typecast myself so that I was missing opportunities literally right under my feet.

I felt stuck in a position that kept me out on the road way too much. And with two young kids, my wife and I had finally had it with the on-the-road life. I knew it was time to leave my job, but where else could I go? To the competition? I really liked my boss and the company, and I didn't want to do anything to harm them. I thought if I tried to sell something other than hydronics, my tongue would swell up, and I would be reduced to wordless blabbergocky. I knew I needed a change. I didn't know how to go about it.

I started to think outside the box, or industry, I guess, in this case. It dawned on me that I am good at hydronic sales because I am good at sales. Wait, what was that? It's called a breakthrough. (Or a wormhole?) I got a job

selling trucks, and I didn't know much about vehicles, so I studied up, and learned everything I could about our lines. However, good sales skills make for good sales, no matter the product. Ask good questions and listen intently to the answers. Offer advice and upsells without pressure. I love my new job, the hours, the people and I am crushing it.

So, what I wanted to share with you and feel would be an interesting topic for your column is this: If you are a business owner or sales manager, don't just look for industry sales people. A good salesperson could be right under your nose. Maybe they currently serve you coffee from your favorite kiosk, or are working the counter at the auto parts store, or driving a taxi downtown. And, if you have developed a skill set, those skills can apply to many different jobs and opportunities. Don't typecast yourself and limit your options for success.

Good advice, right? In other words, put your plan together. Just don't let your plan get in the way of your dreams. Allow for a wormhole. ●

Ellen Rohr is president of the franchise company, ZOOM DRAIN, www.zoomdrain.com and offers “in the trenches” insights to contractors and family business owners. Reach her at 417-753-1111 or ellen@ellenrohr.com. For free business tips, problem-solving webinars, money-making tools and lots of love, visit www.ellenrohr.com.

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The Perfect Plumber

Accurate H₂O Plumbing's search for a "perfect plumber" led to the creation of its Lexington Institute.

BY KYLE MILNAMOW

Full service plumbing operation Accurate H₂O Plumbing had a problem that began around five or six years ago, according to owners Joe and Heather Miller.

The Millers were looking to hire technicians that had a breadth of experience in the plumbing field. While they found technicians who had some experience, finding someone well-rounded with a wide range of repair experience was not in the cards.

"Being from up north, I was raised on gas. If somebody said 'I got a boiler down,' or a commercial or residential gas water heater or a set of gas logs, I was the first to go," Miller says. "I don't know if it was complacency among the plumbers, they just didn't feel like they wanted to learn it, or there was that lack of ability to teach it."

According to Miller and his wife Heather, there were companies throwing employees into the field after being in the plumbing industry for just three months; time they considered to be too short.

"It was kind of a scary thought," says Heather Miller, who is also the office manager for Accurate H₂O Plumbing, "that someone who doesn't know anything about plumbing goes into a training program for three months, and then they are put into a truck. That's a liability and just a giant question mark on that company."

It wasn't just inexperience that the Millers had trouble with when finding technicians. They also noticed a lack of youth in the industry.

The family had a history of trying to recruit the younger demographic by using resources right in their own town.

"We started talking to the high schools because that's where it starts," Heather Miller says. "There is a local high school in Lexington that has a technology center. They've got a building that [the students] work on. They have HVAC, electrical and masonry — everything except plumbing in this house. We talked to the principal, and it was kind of a shock that he said there used to be a plumbing class years ago, but they weren't getting enough interest in it."



With help from the Plumbing-Heating-Cooling Contractors Association (PHCC) and the motivation to grow interest in the industry, the Millers started their "Ride To Decide Program," and began to recruit students. The program allowed students to get hands-on experience with a selected technician for a day and learn a different side of the plumbing industry.

"People think about toilets when it comes to plumbing. It's much more than that. It's going to open up a lot of doors, and they are going to see a lot of things when they are on that truck," Heather Miller says.

Even with this program and other efforts to recruit local students around the area, the Millers ran into the same problems. So, they had to come up with a different idea.

As the old adage goes: If you can't find the perfect technicians, build your own.

On Jan. 6, Accurate H₂O Plumbing opened the doors to the Lexington Plumbing Institute to teach young plumbers their way around the industry. The institute holds classes at the company's facilities in South Carolina before students go out and get hands-on experience in the plumbing field.

"We were getting dismayed; we realized there is a labor problem, and that people aren't going into the trades," Heather Miller says. "We are trying to stop here and do our part."

Everything from Plumbing 101 to codes, installation and customer service will be covered, according to Joe Miller. "Building the perfect

plumber" is something the school aims for, he says, but they are also focusing on soft skills that can make a plumber stand out.

"We're making them customer-oriented. This includes their soft skills, communication skills and appearance," Joe Miller says. "You want to feel safe when this gentleman or this young lady walks into your home to fix your plumbing, and that's what we are trying to achieve."

"When we get these folks through this program, they will actually — as long as they are certified in each particular area — qualify to take their journeyman's exam, which will support them. They can come out of this program after 24 months as a licensed technician," Joe Miller adds.

The journeyman's plumber exam is required for plumbers to attain a master license in many states. A plumber can take this exam in South Carolina after working under a master plumber for two years, which is also the duration of this program. According to Heather Miller, "[The exam] is a stepping stone, although it's not required to work as a plumber, as long as you are working under the guidance of a master plumber."

The school was approved by the South Carolina Apprenticeship program; Heather Miller was pleased with the approval process.

"These people are fantastic," she explains. "They come out to your office, spend time with you and find out what you want to do. They find out what you want as far as OTJ or classroom training and how many

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hours you need to apply. They come up with a two-year program.”

After the approval, the Millers looked to find teachers, particularly one that could teach math, as it was the hardest position to fill. Heather Miller had a random encounter with a gentleman named Akeem Evans who she hired on the spot.

“I walked into the local AT&T store, and the person that was helping me was a math teacher for middle school and high school,” Heather Miller says. “I asked, ‘Would you be interested in teaching the math for our school?’ and he said, ‘Yes.’”

For course material, the Millers, who are proud members of PHCC, have used the Association's materials such as books and forms to help track student progress.

With the institute being approved, staffed and stocked with materials, the Millers prepared for opening day. Even with all his years of experience, Joe Miller admitted he was nervous.

“It was like going to a Motley Crew concert when you were 21. You’re pumped,” Joe Miller says.

The program will still allow the

apprentices to ride with a technician, as the “Ride to Decide” program did, but the institute also incorporates a classroom session to further explain situations plumbers will face in the field.

The Millers currently have two students enrolled as apprentices. Both are “pretty excited” according to Heather Miller. If more students enroll in the program, the Millers may have to rethink how the program is set up.

According to the South Carolina Apprenticeship Program, the school can have as many students as they have trucks. If interest grows, there is a way for the school to add more students than trucks. Apprenticeship programs can switch to half days, which can then double the number of students. So, full-day programs with three trucks can have three students, but a half-day program with three trucks can have six students. The institute currently is set up up as a full-day program.

Since it has begun, the school has been contacted by Bavco Supply and A.O. Smith to teach backflow classes and water heater repair classes,

respectively. The more companies that help with the school, as Heather Miller points out, the more vendors students can be exposed to.

“Plumbing is one of those trades. Even though the industry is changing, you can’t put a computer in this position and say ‘go plumb a house,’” Joe Miller says. “And you can make a pretty good living as a licensed plumber.”

Since getting over the initial hurdles, the Millers have focused a little more on the transition the company is taking with re-branding and finishing up the institute’s website.

It will take the institute’s first two students up to two years to complete the courses. In that time they will have completed 4,000 hours on the jobsite and more than 500 hours in the classroom. This may quite possibly make them the so-called perfect plumbers the Millers were originally looking for.

You can learn more about the Millers, the Lexington Institute and how to participate in the program at lexingtonplumbinginstitutesc.com. ●

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Inside Milwaukee Tool's Sawzall Factory



A number of employees were on hand at the Greenwood, Mississippi plant to greet members of the media for a tour of the facility.

From uncoiling rolls of raw material to packaging the blades, we got a behind-the-scenes look at the company's first-ever media tour of its Mississippi facility.

BY STEVE SMITH

Milwaukee Tool invited 23 media professionals to take a tour of its Sawzall blade facility in Greenwood, Mississippi last March.

Although the plant also makes the Hole Dozer hole saw, the big draw was viewing Greenwood's Sawzall production since it is the only place in the world that makes the blades for the reciprocating saw Milwaukee Tool invented in 1951.

next few hours.

"Everything you will see starts with the user, comes back through the organization and ends up all the way to the shop floor," he added.

And while the product churned out by the site's 670 workers were the blades and hole saws — more than enough of the products made every year to place end-to-end upon the Earth's equator — Griswold said that wasn't really the business

Carbide teeth

That marketing philosophy was on display, in particular, with recent improvements made to the company's latest addition to the Sawzall blade line — the Ax with Carbide Teeth. According to the company, the blade promises to deliver 30 times longer life over regular bi-metal blades and two times faster cutting than other carbide blades.

Product Manager Brad Urban shared a brief history of the Ax blade, originally marketed in 1999 specifically for demolition. Milwaukee Tool improved the line with Variable TPI (teeth per inch) on the blade in 2002, plus added the Fang Tip and Nail Guard technology in 2012.

The Ax with Carbide Teeth blade came to market last year after the company made more than 1,500 different prototypes in order to develop this new line.

Over the years, Milwaukee Tool has invested \$15 million into the facility as part of a \$47 million overall investment into its U.S. plants over the past five years.

"We have an outside-in focus," said Scott Griswold, president of the company's power tool accessories group in his opening remarks, explaining the overall concept of what would be on view over the

Milwaukee Tool's ultimately in.

"It's the cost per hole or cost per cut and not the cost per blade that's critical," Griswold said, "since the cost of labor is our customers' biggest expense."



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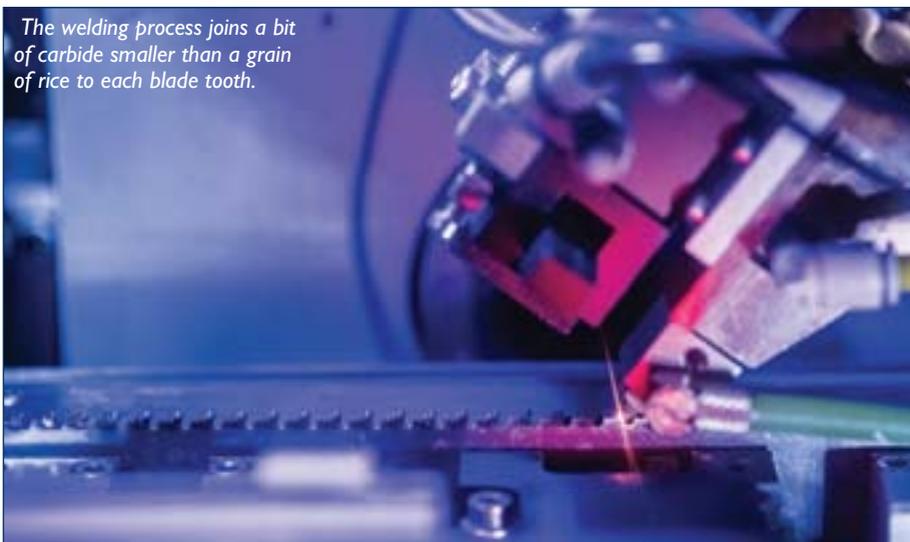
It all starts here for the Sawzall blades as spools of raw material are straightened and fed into a press.

The company conducted blind testing with contractors, putting prototypes up against unmarked competitors' recip blades. As a result of the tests, the company discovered that its contractor customers weren't switching out the Milwaukee Tool blades no matter what material needed to be cut. The professionals were using the prototype, essentially a "wood" blade meant to cut through nail-embedded lumber, to also cut through just about anything else they

might find on a jobsite, such as rebar and black pipe.

Product managers put the blade prototype through further torture tests and found the blade could handle the following punishment:

- 300 cuts in hardened fasteners.
- 200 cuts in roofing material.
- 35 cuts and ½-inch rebar.
- 25 cuts into 1-inch schedule 40 black pipe.
- 20 cuts and ½-inch stainless steel.



The welding process joins a bit of carbide smaller than a grain of rice to each blade tooth.

The secret, of course, was in the carbide teeth. And the challenge, of course, was going from making a handful of custom-built prototypes to mass-manufacturing the blades.

"Our users are looking for a blade that is fast and durable," Heath A. Nunnemacher, program manager told us after walking us through the manufacturing process.

That sounded simple enough to us. However, Nunnemacher said there's often a trade-off between those two benefits.

A lower TPI, for example, allows the blade to cut faster through wood. But the extra space between the teeth gives any nails embedded in the wood the chance to break the teeth. More teeth per inch? That will make the blade more durable, but slow it way down.

Milwaukee Tool had already engineered some of these compromises into its BiMetal Ax blades. The Fang Tip design, for example, helps to bite and hang on to that first contact, whereas other brands might just skate across the surface.

The carbide teeth took the Ax family to the next level.

The process

The easiest part of the process was the choice of carbide, in this case, a compound of equal parts tungsten and carbon.

"Tungsten is Swedish for 'heavy stone,'" Nunnemacher explained. "It is twice as stiff and double the density of steel."

The addition of carbide is old news for circular saw blades, but a difficult proposition for manufacturing reliable recip blades.

"The cutting dynamics for a circular saw are very smooth," Nunnemacher said. "But compare that with a recip saw in which the blade is likely to encounter interrupted cutting along with high shock patterns as it does its job."

Nunnemacher aptly described the difference as a NASCAR driver racing around a concrete oval track versus a Rally car driver bouncing over hills and making quick turns on a natural, dirt track.

Also, carbide is typically brazed onto circular saw blades using some type of intermediary in much the same way that flux is used to braze a copper fitting. That approach wouldn't work as far as Milwaukee Tool was concerned with recip blades. Other brands may use brazing for their recip blades, but



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A robot grabs stacks of blades and distributes them among four teeth-setting machines.



Milwaukee Tool thinks those brands are inconsistent. One blade out of the pack might work like a charm, but the next blade could break upon first use.

The company's engineering team went to work and after countless hours of R&D, found the best way to place the carbide was to weld — or this case fusion weld — each tiny bit of carbide to the blade's individual teeth.

If we didn't see the process itself we'd have a hard time believing it. Even after seeing the process, we still have a hard time understanding how the company engineered this feat. Keep in mind, the company wants to keep this a trade secret and walls off this portion of the factory behind towering partitions.

While we were allowed to take pictures, we weren't allowed to film video or take pictures of the monitors above the welding stations that show the action close-up.

The best we can say is imagine a bit of carbide smaller than a grain of rice individually welded onto the teeth



of the blade. Unlike the company's other recip blades, these particular blades are ground into a partial tooth form. Basically, the carbide provides the tip.

All Nunenacher would say to describe the process was that the variables of "time, temperature and pressure" were the keys to forming a strong electro-mechanical bond between the two dissimilar metals.

Best of the rest

Once the carbide tip is welded on, these blades go through the same, washing, setting and powder-coating processes as standard Ax recip blades.

Our tour went from the start — where thousands of feet of raw material is unrolled and straightened before a press stamps out the blanks — to the finish — where the final products are packaged and ready to ship. In between the blades are ground, washed, set, heat-treated, powder-coated and logo-printed with a UV process that sets the ink in a second.

It's easy to see how the processes are synched and employees stationed for maximum efficiency of the manufacturing process. While we saw plenty of automation, we also saw plenty of instances that require the human touch. And like the employees, the robots are clad in Milwaukee red.

In general, here are a couple of manufacturing highlights that Milwaukee Tool believes set its recip blades apart from competitors.

Grinding not milling the teeth: The company places the teeth on the blades only after the blade stock is stamped out. Other companies start with the teeth already in the stock.

Milwaukee Tool says making

the teeth after stamping ensures a consistent pattern to the blade's teeth.

Also, grinding the teeth into the blade rather than milling, provides further consistency. With milling, makers have a cutting tool that's bound to degrade each and every time, making a cut a little worse than the last.

Milwaukee Tool also pointed out that its diamond-grinding wheel is redressed after each 3-inch stack of blades has run through.

Setting the teeth: Here's a prime example of automation. After the grinding process, the blades go through a washer. Then, a robot grabs a 3-inch stack of blades and places them into one of four teeth-setting machines. Those machines offset each blade's tooth left and then right so that the kerf of the cut exceeds the blade width. Without this process, material would quickly gum up the blade. The robots can keep within a quality control limit of 1/20,000 of an inch.

Small bath heat treatment: After the teeth have been set, the blades are heat treated in small batches. The company says that treating blades in large batches can produce temperature swings as much as 50 degrees. In this case, the small electric ovens that hold three trays of blades in a single layer can greatly minimize temperature differences. ●

Facts and Figures on the Greenwood Plant

The Greenwood, Mississippi plant started in 2001 with 120,000 square feet of space and 87 employees.

Over the years, Milwaukee Tool has invested \$15 million into the facility as part of a \$47 million overall investment into its U.S. plants over the past five years.

Today, the plant employs 670 employees working three shifts five days a week and takes up more than 200,000 square feet.

The site features two buildings — the factory we toured and another facility that we gathered in for speaker presentations, including an end-of-the day speech by Mississippi Gov. Phil Bryant. The company, however, kept much of this building off limits to us since they conduct extensive R&D.

In addition, the company owns 20 acres outside the plant, giving it room to grow more.

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GEO THERMAL

Nashville Airport's Geothermal Legacy

The time is now to make the switch to a geothermal HVAC system.

BY JAY EGG

You've likely heard that Nashville Airport has gone geothermal. Of course, that means the energy efficiency has improved quite a bit. But the real benefits are far greater than most folks even know. Let's review it by the numbers.

Nashville airports used to have three 1,100-ton cooling towers. These have been eliminated. With the elimination of the cooling towers, they have eliminated:

- Thousands of man-hours of maintenance spent on cooling towers
- Thousands of gallons of chemicals used for cooling tower water management
- Millions of gallons of fresh water consumption through evaporation and blowdown
- Periodic cooling tower overhaul and replacement costs
- Cooling tower noise pollution
- Cooling tower footprint (area on the ground)
- Threats of Legionella from cooling towers

Oh, and they now save millions of kWh of electricity per year; 40 percent better than with cooling towers according to Metro Nashville Airport Authority (MNA).

This is an all "up-side" upgrade. The only question is, "Why wouldn't a building go geothermal?"

Governments and corporations are making the switch to geothermal in record numbers, because it makes good sense, never mind the impressive return on investment (ROI).

Geothermal systems can work with any building HVAC system, like it did for the Nashville Airport. I caught up to Alan Watts, president of AWEB Supply, manufacturer of the lake plate exchangers used at the Nashville Airport. I've known Alan and his wife, Barbara for years. In fact, I had to get their permission to place a photo of their lake plate exchanger in my first book, "Geothermal HVAC, Green Heating and Cooling," published by McGraw-Hill Education in 2009.



Life has been busy these last few years, since writing that book with co-writer Brian Clark Howard (senior editor at National Geographic Society). I realized that of the hundreds of articles I've written about geothermal systems, I don't think I've written one about a lake plate system.

Energy Systems Group contacted Watts around 2013, asking for some advice on the application of the lake plate exchangers for the Nashville Airport. They had identified the former Hoover Quarry [S1], which is a 43-acre lake located next to the Nashville International Airport that holds storm water runoff. Because water from the lake is naturally at about 50, it does not require as much energy as to run the mechanical plant. Actually, the geothermal system saves the city 30 million gallons of potable water a year and cuts 1.3 million kWh in electricity consumption. With the cooling towers shut down [S2], life is simplified for maintenance personnel, and PM costs are reduced significantly.

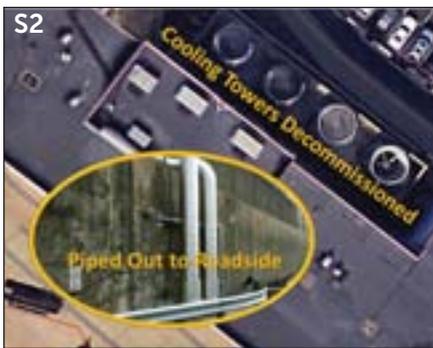
To complete the Nashville airport geothermal project, 11 large lake-plate assemblies [S3], each with 26 plate exchangers were connected to the mechanical plant. Each plate has the capability to dump 10+ tons of chiller plant heat rejection into the cool body of water. Watts uses pond exchange software to determine the thermal effects on a given body of water over time.

To get from the airport's mechanical plant to the lake, contractors had to trench [S4], tunnel and drill through more than a mile and a half of rocky terrain. In the photos, the 20-inch HDPE is laid carefully in trenches and eventually connected to six valve vaults [S5] at the lake-side piping junction. This header assembly is a work of art in itself [S6]. The valve boxes [S7] are tied to the 11 lake plate assemblies [S8] that were craned out into the water [S9], floated to their final resting spots [S10], and then sunk 50 feet below the surface of the water.

The \$10.4 million project is saving the Nashville Airport about close to \$430,000 a year in cooling costs, which it will continue to do for at least the next 50 years. That's enough to last more than three cooling tower lives. All told, about 1.6 miles of 20-inch HDPE pipe complete the heat transfer circuit from



S1



S2



S3



S4

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Photos courtesy of AWEB Supply.



the quarry to the airport and back, traveling under a major runway, and also under Donelson Pike.

Energy Systems Group contacted Watts around 2013, asking for some advice on the application of the lake plate exchangers for the Nashville Airport. He helped them out, providing real data that they could build on, and paving the path that “flipped the switch” for full geothermal operation in February 2016. Watts and his wife Barbara help folks all over the world with pond-loop applications. Though we often use the term “pond-loop,” the technology applies to any body of water, whether it be the Atlantic Ocean, or the Seine River in the United Kingdom. By the way, they’ve had a 2,500-ton lake plate exchanger at King’s Mill Hospital in Mansfield, England since 2008, providing all the heating and cooling exchange needs for the impressive campus.

On March 6 2017, the Nashville International Airport received the Envision Silver Award from the Institute for Sustainable Infrastructure. In 2010, the MNAA was selected as one of only 10 airports in the U.S. to take part in the Federal Aviation Administration’s (FAA) Sustainable Master Plan Pilot Program. The MNAA was selected for this program for its demonstrated leadership in implementing sustainability initiatives, and promotion of water conservation, energy efficiency, social well-being and community involvement.

Watts and his wife Barbara started Alan Watts Service Inc. in 1974. Then after discovering geothermal heating and cooling seven years later, they began to focus on ground-source systems in 1981. AWEB Supply was opened in 1984, and they started marketing the Slim Jim Geo Lake Plate Exchanger in 1998. Next year, it will be 20 years for the remarkable plate exchanger that has found its way into HVAC systems all over the world. The Watts have sold off their service businesses now, and they are focusing their professional efforts entirely on implementation of Lake Plate Exchanger systems.

If you have an application that you think might work, give them a call. Even if you only have a small body of water, they can help with hybrid applications, whether it’s with a vertical closed loop system, or a cooling tower that operates only during peak demand. You might even find that a fountain placed in the pond will create the

additional heat exchange needed, and add to the ambience of the system.

Now is the time to get involved with geothermal projects whether you’re a contractor, architect or engineer. Geothermal HVAC systems are going into larger projects in record numbers, and the earlier you’re involved, the better.

One great way to get an introduction to geothermal is to attend a course offering CEUs. These courses are being offered more and more often. New York State Renewable Energy Development Authority (NYSERDA) is spearheading efforts to bolster installation of geothermal systems throughout New York, and the efforts are being mirrored throughout North America.

Now is the time to get involved. Become informed, then get trained as a designer or installer of geothermal systems. To find out more, visit IGSHPA and GEO, the geothermal HVAC industry organizations.

Don’t wait; go to the geothermal industry websites: igshpa.org and geoexchange.org. ●

Jay Egg is a geothermal consultant, writer and the owner of EggGeothermal. He has co-authored two textbooks on geothermal HVAC systems published by McGraw-Hill Professional. Email: jayegg.geo@gmail.com.

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The Big Storage Room

Shop class should be a priority for future students.

BY MAX ROHR

When I was in eighth grade, there was a day that I had to select the classes I would take in the first year of high school. There was a science class fork in the road. Option one was to take Chemistry 1, which would prepare me for the other harder science classes, and eventually college. Option two was to take Biology 1, which covered one of the science requirements that I would need for bare minimum graduation, and leave more room in my schedule for agricultural studies classes and shop.

It was also explained to me that college graduates would make \$1,000,000 more in the course of their careers than non-graduates. The choice seemed simple to me because I would enjoy an extra million dollars. At no point was the shop class route sold as a completely viable way to be rich and happy.

After taking Chemistry 1, I continued down the academic path and went to college, with the intent to get a cool medical field job where I would wear a tie and drive a nice car. For various reasons, including the fact that I wasn't actually that good at chemistry equations, I graduated college without a clear path to the nice car and million dollars. At that point, I realized that I actually enjoyed being in the trades more than the career I had been working toward. I always loved building things in our shop growing up, and it may have just taken the time away from that lifestyle to appreciate it more.

At this point, for many of students, shop classes may not even be an option. Schools with budget or space limitations may not prioritize shop class. For some students, that may mean one of few classes they could have excelled in is no more.

I don't want to discount the value of going to college. The experience of living away from home with a group of people from all different backgrounds shaped my outlook on life in a way that may have not been possible if I went right to work in the same city I grew up in with people who look like me. Half the value of college is having people challenge the things you deeply believe to be true to see if you actually understand those issues. If college isn't in your future, find a mentor who will bust your chops in the hopes of making you better at what you do. There are a lot of them around the plumbing industry.

At this point, for many of students, shop classes may

not even be an option. Schools with budget or space limitations may not prioritize shop class. For some students, that may mean one of few classes they could have excelled in is no more.

Time Magazine writes of a shop program at Analy High School in Sebastopol, California: "... [the program] had become largely irrelevant. The main shop room had become little more than a glorified storage room. The school's priorities were firmly focused on college readiness and success at standardized tests, and vocational programs had taken a backseat." The motivation to score well on standardized tests has outweighed the benefits of working with tools.

The article continues: "Sebastopol is also the home of *Make* magazine, one of the leading voices of the maker movement, a community of inventors and do-it-yourselfers that has blossomed on YouTube and shows up in the tens, and sometimes hundreds of thousands, at maker fairs all over the world. *Make* proposed that a group of students from Analy come to its offices to explore the possibilities involved in creating things with 3D printers, computer-aided design and more. The program was so popular that soon *Make* could no longer accommodate it in its offices, so it agreed to donate equipment to Analy if the school would ramp up its vocational program." It found that the kids on either end of the standardized testing bell curve were interested in the cool projects they could make in shop.

A 2006 TED Talk by Sir Ken Robinson entitled "Do Schools Kill Creativity?" explains that our education system values right answers more than creativity. Sir Robinson stated: "What we do know is, if you're not prepared to be wrong, you'll never come up with anything original. And by the time they get to be adults, most kids have lost that capacity. They have become frightened of being wrong. And we run our companies like this. We stigmatize mistakes. And we're now running national education systems where mistakes are the worst thing you can make. And the result is that we are educating people out of their creative capacities."

Robinson concluded: "Our education system has mined our minds in the way that we strip-mine the earth: for a particular commodity. And for the future, it won't serve us. We have to rethink the fundamental principles on which we're educating our children."

There is an approach that eliminates the academic fork in the road, according to a 2014 *Atlantic* article. A few schools in Georgia have been working with this model. They call it the career and technical education (CTE) approach. "The lines between electives, college-



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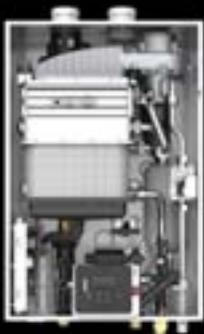
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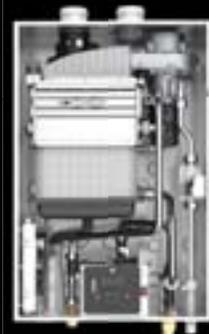


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preparatory work and career exploration are blurring. Schools that take this seriously can use career courses to elevate every student's education, rather than to warehouse the students lagging behind."

If you have a kid in school now and shop isn't a choice they have, look for a makers space near you and take a trip to check it out. A good maker space will combine the shop class atmosphere mixed with the Internet of things. Makersmiths is a group near my office in Virginia that offers basic woodworking classes to Arduino microprocessor programming classes.

What does this mean for the plumbing and heating industry? The National Association of Home Builders published a single-family builder survey with a sample size of 298 respondents. In its summary, it found younger workers with less experience may need more monitoring and training, which could reduce efficiency and drive up costs. Training a new employee at any time probably works like that, to some extent. The problem is that when you multiply that by the 700,000 new construction industry jobs since 2011, the effect is noticeable.

Investing in training is money well spent, but it would be nice if the new person you hire at least knows how to turn a wrench. This is part of the missing shop class component. New employee training and monitoring will always be part of the process, but each cohort of students that doesn't have the option to learn how to use basic

tools before entering the workforce will need more help.

The bottom line is that no decision that you make in middle school determines your success ceiling. Ambitious people create opportunities. Additionally, people will give up a lot of things before indoor plumbing, so you are pretty safe with a blue collar, white collar, green collar or any other type of shirt in the field of plumbing. ●

Max Rohr is a graduate of the University of Utah. He is the REHAU Construction Academy Manager in Leesburg, Virginia. He has worked in the hydronics and solar industry for 16 years in the installation, sales and marketing sectors. Rohr is the Radiant Professional Alliance (RPA) Education Committee chairman. He can be reached by email at max.rohr@mac.com and on Twitter at @maxjrohr.

For more information:

- <http://time.com/3849501/why-schools-need-to-bring-back-shop-class/>
- https://www.ted.com/talks/ken_robinson_says_schools_kill_creativity
- <https://www.theatlantic.com/education/archive/2013/12/the-future-of-shop-class/282389/>
- <http://eyeonhousing.org/2017/03/young-construction-workers-mean-more-monitoring-longer-projects/>

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SOLAR SOLUTIONS

Propylene Glycol: Solar Heat Transfer Fluid

PG has a long track record of being used in solar heating systems.

BY BRISTOL STICKNEY

In any hydronic closed-loop solar heat collector system, the heat transfer fluid is the lifeblood. It must be sealed and pressurized in the solar heat piping, much like the Freon fluid in a refrigeration system. To ensure that the solar heating system is reliable over a very long time, the heat transfer fluid in the system must not leak out, freeze or boil, and it must tolerate high temperatures inside the solar collector without “cooking.”

Propylene glycol (PG) has become the most common heat transfer fluid used in closed-loop solar heating systems that contain antifreeze. It has a long track record over many decades in this application and is widely available from a number of sources. This is not automotive antifreeze, which is a different substance (ethylene glycol), and is much more toxic and should never be used in domestic solar heating equipment. When working with PG, it is good to get to know its properties, capabilities and limitations that have a direct bearing on the pumping, piping components and temperature controls required by these systems.

Non-toxic

Solar home heating systems are most often used to heat potable domestic hot water, and in-tank heat exchanger coils have become very popular for this purpose. When a single wall heat exchanger fails, it is possible for the

heat transfer fluid in the coil to leak into the potable water. Because this (and other environmental leakage) is a real possibility, the ideal solar heat transfer fluid would be biodegradable when released into the environment, and non-toxic if consumed by people or animals.

Pure PG has a very high score in this regard, as evidenced by its use as a food and drug additive. Millions of people consume pure PG as part of their diet every day mixed into their food, cosmetics, medications and, more recently, inhaled when vaping. So, how pure is the PG used in solar heating systems? The answer is typically 95 percent pure before it is mixed with water. Typical PG heat transfer fluid contains additives to prevent corrosion and boost the resistance to high temperature degradation. The additives make up about 5 percent, by weight, of the concentrated PG fluid. The concentrated fluid is mixed with de-mineralized water before final usage, so for example, if mixed half and half with water, the final concentration of additives would be about 2.5 percent.

These small concentrations of additives are apparently nowhere near toxic levels. The makers of the PG heat transfer fluid provide Material Safety Data Sheets (MSDS) for the concentrated and the pre-mixed products. The MSDS language is very reassuring. For example, “first-aid measures” listed on one of these sheets include the following entries:

- Skin contact: Wash skin with plenty of water.
- Inhalation: Move person to fresh air; if effects occur, consult a physician.
- Ingestion: No emergency medical treatment necessary.

The MSDS listing under “Ecological Information” seems equally benign:

- Persistence and degradability — For the major component(s): Material is readily biodegradable.
- Ecotoxicity — For the major component(s): Material is practically non-toxic to aquatic organisms on an acute basis.

Heat tolerance for some common brands

Look for PG manufacturers that specifically formulate their glycol products for compatibility with solar heating systems. Those that do will say so very clearly in their product labels and literature along with a high temperature



FIGURE 100-1: PROPYLENE GLYCOL COMMONLY USED FOR SOLAR HEATING



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*Gallons per minute

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rating that indicates compatibility with the normal operating temperatures of hot solar collectors. Pure PG will “cook” at high temperatures, and long exposure will cause it to change from a clean, transparent liquid to a brown substance resembling molasses with a burnt chemical smell.

Figure 100-1 shows some common brands that typically come premixed with water, such as 60/40 or 50/50 (water to glycol ratios). One hundred percent PG is also available, but is very thick and cannot be pumped with a common hydronic circulator until it is mixed with water.

The MSDS listing for DowFrost, for example, acknowledges this in the section under “Thermal Decomposition,” which states: “Decomposition depends upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to aldehydes, alcohols and ethers.”

In other words, the heat transfer fluid will remain thermally stable in a closed system at recommended temperatures and pressures for a long time. If the high-limit temperatures are exceeded and/or oxygen is introduced into the closed system, the fluid will degrade. During decomposition, gases are generated that can cause extra pressure in closed systems as well.

So, you can see that preventing the glycol from overheating is a design consideration of primary importance. That is why solar heating design discussions

(even in this column) so often focus on controlled overheat dissipation (heat dumping) to keep the solar collectors below the high-limit temperature of the glycol in question. When overheat controls are provided, they are often set to keep the collectors below 220 F to extend the life of the glycol. Here is a short list of some common glycol brands, and their temperature ratings as listed by the manufacturers.

DowFrost and DowFrost HD: DowFrost inhibited glycol-based fluid has an effective operating temperature range of -50 F to 250 F. DowFrost HD inhibited glycol-based fluid is effective from -50 F to 325 F.

Use any Cryo-Tek antifreeze in hydronic closed loop solar heating systems that require freeze protection. Operating temperature range for closed system: Up to 250 F.

Tyfocon L and Tyfocon LS Pre-mixed: Premature aging will occur above 338 F, slow thermal decomposition above 392 F.

Dynalene Solar Glycol-XT: (BioGlycol made from corn.) Recommended temperature range closed system: -17 F to 350 F.

DowFrost in depth

There is a wealth of information available for PG heat transfer fluids, and one of the most prolific sources is Dow, and can be found at www.dow.com/heattrans.

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There are many useful publications in PDF format on this site available for free. One of the most comprehensive is the DowFrost “Engineering and Operating Guide,” which is a gold mine of technical information about the properties of PG with advice about how to use it properly. If you want to know freezing point, boiling point, conductivity, specific gravity, density, viscosity, temperature limits and lots of other details, this is the reference to get.

Testing methods

As the PG ages and degrades over time, the freeze protection concentration can change, the acidity can change, and the additives can lose their effectiveness. You can quickly determine the condition of your fluid by examining its appearance and odor. Any drastic variation from the initial fluid specifications, such as a black or dark-gray color, presence of an oily layer, burnt odor or any heavy sludge in the fluid may indicate the need for fluid replacement.

Test equipment is also available to measure the quality of the fluid. This can be done with test strips, supplied as a kit by the manufacturer, that resemble litmus paper. Test strips will tell you the pH, the freeze protection level (indicated by the percent concentration) and the state of the inhibitors. We often use a refractometer gauge that resembles a small telescope to quickly check the freeze point/concentration. A hand-held digital refractometer gauge (e.g. by MISCO), that reads out concentration

Solar home heating systems are most often used to heat potable domestic hot water, and in-tank heat exchanger coils have become very popular for this purpose.

and freeze point directly on an LCD display, has also proven to be very useful. Digital pH meters are available as well.

The following advice is taken from the DowFrost “Engineering and Operating Guide”:

Control of pH between 8 and 10 is important to minimize corrosion and glycol degradation. Using narrow range pH paper, such as pHydriion Control paper with a 7.2 to 8.8 pH range is an easy and reliable way to read your pH level.

A pH tester can also measure alkalinity or acidity of the fluid. The desirable pH range should fall between 8 and 10. Adjustments can be made by using a 50 percent solution of sodium hydroxide or potassium hydroxide, if the pH is between 7 and 8. Any fluid with an acidic pH below 7 should be replaced.

Final notes

This article is targeted toward residential and small commercial buildings smaller than 10,000 square feet. The focus is on closed-loop pressurized glycol/hydronic systems since these systems can be applied in a wide variety of building geometries and orientations with few limitations. Brand names, organizations, suppliers and manufacturers are mentioned in these articles only to provide examples for illustration and discussion and do not constitute any recommendation or endorsement. ●

Bristol Stickney has been designing, manufacturing, repairing and installing solar hydronic heating systems for more than 30 years. He holds a Bachelor of Science in Mechanical Engineering and is a licensed Mechanical Contractor in New Mexico. He is the chief technical officer for AMENERGY-SolarLogic LLC in Santa Fe, New Mexico, where he is involved in solar hydronic installations, development of solar heating control systems and design tools for solar heating professionals. Visit www.solarlogicllc.com for more information.

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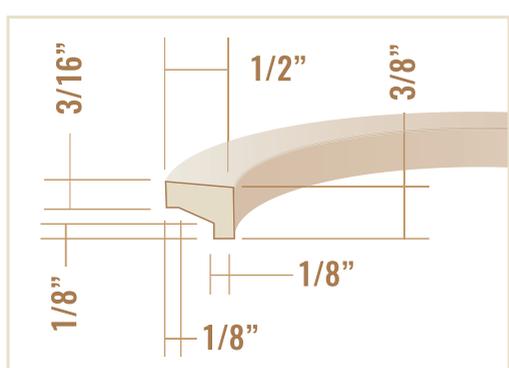
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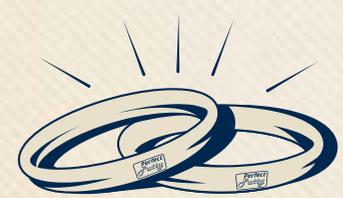
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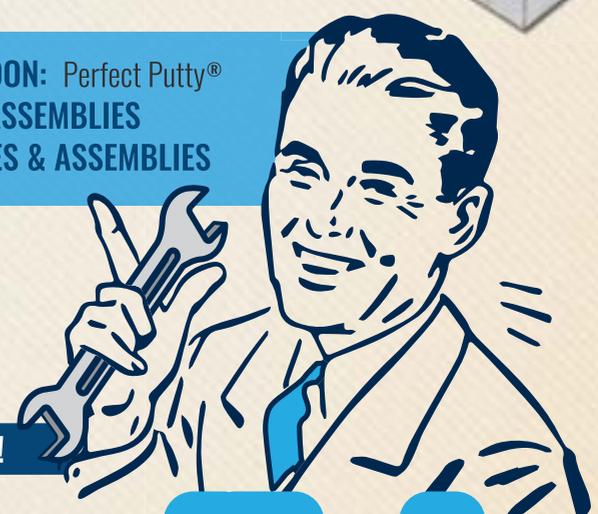


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NFPA Braces for 2017 Conference

With the help of surveys from last year's conference, the NFPA adds themes and seminars for a "renewed sense of excitement, energy and empowerment."

BY KYLE MILNAMOW

It's been more than 300 days since the 2016 National Fire Protection Association (NFPA) Conference & Expo wrapped up in Las Vegas. Attendees learned from peers about the latest products and services, and how they can help meet and maintain codes and standards in designs, construction and operation of buildings and facilities. In the meantime, organizers of the event were already preparing to ship out to Boston for the 2017 event.

Last July, the NFPA staff read through survey responses, comments and reactions that thousands of attendees submitted during the conference. More than 90 percent rated the conference between "good" and "excellent," but there were still changes to be made.

"Several themes emerged in the responses that attendees and conference organizers agreed would enhance the experience and strengthen the learning opportunities for the professionals in attendance," says Susan McKelvey, communication manager for NFPA. "Consequently, many meaningful tweaks have been made in 2017 that will add value to attendees' experience both during and after the conference, including educational sessions that are more tailored to specific audiences and professions,



along with more concrete takeaways and hands-on learning provided across the scale."

According to McKelvey, the NFPA Conference & Expo helps professionals connect with peers to help "promote and foster a host of opportunities for face-to-face meetings, conversations and interactive learning that enable attendees to talk, network and connect with as many people as possible." Connecting is the focus of this year's event that will have more than 330 exhibitors, 15 sponsors and about 5,000 visitors coming to Boston from June 4-7.

"Learning and making connections with peers are hallmarks of NFPA's annual conference," McKelvey says. "We've incorporated half-hour breaks between sessions and comfortable lounge areas where people can meet and talk after presentations."

Though the annual event will see its share of veterans that have been attending for many years, first-time visitors also will be stocking the convention center in Boston. NFPA organizers instruct first-timers to meet staff liaisons at booths, and to "take full advantage of all the networking opportunities" that the NFPA will offer.

There will be events focusing on many different veterans in the industry; this will also be the third year the NFPA hosts the Women in Engineering event. The panel, that had engineers from Tyco, Procter & Gamble, FM Global and the NFPA last year, highlights the invaluable roles female engineers play across multiple industries. Sponsored by Jensen Hughes, the panel is followed by an evening reception on June 4 for people to connect further on information shared in that session.

Unique sessions are scattered throughout the Conference & Expo this year, including:

The Marijuana Industry: This presentation focuses on marijuana grow facilities and uses case studies



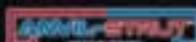
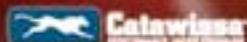
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to look at common issues faced during the plan, review and approval process.

Firefighter Health: Discover how toxic and carcinogen-contaminated materials are transported with the crew back to the firehouse, and how departmental culture may be the single greatest obstacle to reducing the escalating occurrences of cancer within the fire service. Also learn how fire station design can be improved to limit exposures.

Drones: Learn about unmanned aerial systems (UAS) and their applications for emergency rescue, fire and law enforcement. A member of that committee will discuss the applications of use and requirements implementing UAS equipment within the U.S. National Airspace System.

Emerging Technology – Energy Storage Systems (ESS): This session will look at this emerging technology, identify key system components, current installation practices, and fire safety techniques

for installers and responders.

“We want all our attendees to take full advantage of this unique opportunity to discuss the issues and challenges they’re facing with the shining stars of their respective fields, and to acquire new tools, insights and resources for better tackling them,” McKelvey says. “Overall, our goal is for attendees to walk away with a renewed sense of excitement, energy and empowerment for the work they do.”

While there are plenty of new seminars throughout this year’s conference, attendees will still have a chance to learn about the latest issues, opportunities and challenges for fire protection through returning sessions.

“We always offer sessions on NFPA codes and standards that will be voted on during the NFPA Technical Meeting. This year that includes NFPA 99, Health Care Facilities Code, and NFPA 101, Life Safety Code,” McKelvey says.

Everything will happen in the heart of Beantown at the Boston Convention & Exhibition Center. The location and conference center will combine American history and new age technology.

“Boston is a fun, history-packed city that offers endless opportunities for dining and site-seeing. It is also easily accessible from many New England states, which allows many attendees to come to the event by car,” McKelvey says. “Plus, the Boston Convention & Exhibition Center is a new facility offering state of the art technology and free Wi-Fi.”

People can learn more about the conference by visiting nfpa.org/conference. If you have not registered for the event, you can still do so before or during the conference.

Visitors are encouraged to be on the lookout for survey cards because they will have a hand in making sure the 2018 Conference & Expo lives up to the NFPA’s standards. ●

NFPA 2017 Seminars At a Glance

While there are plenty of exciting events taking place during the NFPA Conference & Expo on June 4-7 in Boston, NFPA'S Communication Manager Susan McKelvey recommended seminars that readers of *Plumbing Engineer* should look out for:

Testing Electric Fire Pumps? You Need to Understand the Arc Flash Hazards: This presentation will expand on the provisions of NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, that mandate precautions to be taken when testing and maintaining electric fire pump controllers. Included will be an in-depth look at the provisions of OSHA and NFPA 70E, *Standard for Electrical Safety in the Workplace*; an exploration of the true hazards of arc flash associated with electric fire pump installations; and calculated examples of incident energy associated with typical electric fire pump installations. The discussion will also address determination of the required PPE for such work, and instances where no such PPE is available, as well as recommendations for limiting work

activities inside live electric fire pump controllers to reduce undue personnel exposure. Monday, June 5, 2 – 3 p.m.

NFPA 25, Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems: Hands-On Training for Contractors: This training will allow service providers to get hands-on experience operating and inspecting sprinkler system valves. Multiple sprinkler risers connected to a water source will be used to illustrate how sprinkler valves work. After a demonstration by the instructors, the attendees will be able to flow water through the valves to see how they function and how they must be inspected, tested, and maintained. This hands-on learning opportunity will be accompanied by a presentation on the roles and responsibilities of the service provider in the ITM process detailed in NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. Tuesday, June 6, 11 a.m. – 12:30 p.m.

What's Eating Your Pipes? How Corrosion Leads to Sprinkler System Failure and How to Fight It: The focus of this presentation is to outline the steps that architects, engineers, building owners, and managers can take in combating corrosion. Information on various

types of corrosion found in fire protection systems will be presented, along with ways to size up your corrosion problem and an overview of specified maintenance requirements and corrosion mitigation techniques specified in NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. Case studies of existing buildings will emphasize corrosion issues associated with the upkeep of sprinkler systems. Attendees will gain an understanding of corrosion and fire protection systems that will serve as a good starting point for evaluating existing buildings. Sunday, June 4, 10 – 11 a.m.

Remediation Options for Failing CPVC Fire Suppression Systems: Chlorinated polyvinyl chloride (CPVC) piping is popular because of its ease of installation and corrosion resistance. However, as with all plumbing products, pipes or fittings occasionally fail. This session will present several unique case studies, noting the forensic tools used to evaluate CPVC piping systems and the logic behind various remediation options (e.g., increased monitoring of the system, replacement of CPVC portion of the piping system, replacement of the affected portion of the piping system). Monday, June 5, 3:30 – 4:30 p.m.

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Biggest Education Show in Years

The 2017 MCAA Convention addressed the economy, technology and the development of a new generation of skilled workers.

BY SHARON J. REHANA



MCAA past President Mark Rogers, president of the Mechanical Contracting Education & Research Foundation (MCERF), was awarded with the Distinguished Service Award. Courtesy of MCAA.

Held in San Diego in the first week of March, the Mechanical Contractors of America Association (MCAA) annual convention was the largest attended show in years. More than 2,100 attendees convened for the education convention that delivered an energized opening address, informative breakout sessions, fun networking opportunities, the latest products and services, and so much more.

“Take a moment to reflect on our success,” said former President Tom Stone as he addressed the convention Monday morning.

Stone attributed MCAA’s success to continuous learning, the best union workforce in America and a continued effort to invest in the future by working together to advocate for the industry in Washington.

Stone’s opening remarks lead to recognition of one man’s service to

the industry. MCAA past President Mark Rogers, president of the Mechanical Contracting Education & Research Foundation (MCERF), was awarded with the Distinguished Service Award (DSA) — MCAA’s highest award. The statue for the DSA embodies the infinity symbol, a never-ending loop of learning, succeeding and giving back to others, which are MCAA’s core values.

Rogers began his journey as an apprentice before starting his own mechanical contracting business, Westchester Mechanical, in the basement of his home with only two card tables, a fax machine and \$2,000. Within 15 years, Rogers went from apprentice, to successful contractor, to industry leader, giving back to the industry every step of the way. Rogers accepted the award with his family on stage and thanked MCAA for support through the years.

The opening session ended with an address from John Boehner, the 53rd Speaker of the U.S. House of Representatives. Boehner said, “Small businesses are the heart and soul of America.”

He noted that the top three challenges facing America today include economic growth and job mobility, the threat of terrorism from overseas and educational disparity.

Education was also a key theme of the convention, but by no means a challenge. Attendees had much to look forward to with a variety of different educational sessions throughout the convention designed to advance their knowledge about new industry trends, technologies and practices.

Here’s a recap of the educational sessions:

Matt Abeles’ session on Disruptors for the Built Environment previewed the newest

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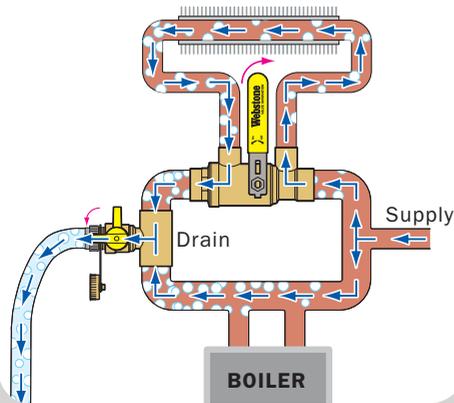
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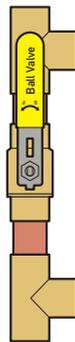


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emerging technologies designed for mechanical construction projects, followed by a discussion on augmented reality, virtual reality, project management technology, and laser scanning, and how those technologies will help the industry advance today and for years to come.

In *Service Sales Leadership and Training — Your Key to Growth*, Jim Bartolotta of Atomic Mechanical Services, the immediate past chairman of the MSCA Board of Managers, discussed the vital role of constant coaching and mentoring in developing great sales teams. He encouraged contractors to set specific sales goals and plans, and to meet weekly to ensure that teams are communicating and goals are met.

In his 2017 Economic Forecast, Brian Beaulieu predicted that another recession is unlikely until 2030, and that America will remain a leader for at least the next 100 years thanks to a combination of a growing population, abundant natural resources and a system of rights unlike that of any other country.

During *Leveraging Technology for Improved Profitability*, James Benham discussed how cutting-edge mobile apps, sensors and web-based solutions are being integrated for use in the office and on the job site. He explored the latest trends, solutions and devices in building technologies and talked about how they will rewrite the rules for construction projects.

Josh Bone and James Benham reviewed a brief history of virtual reality, augmented reality and wearable devices during their session on *The Rise of Virtual Design and Construction*. They also analyzed case studies of how

industry leaders are using innovative technology to inspire collaboration and design.

Mark Breslin presented *The Cutting Edge: Finding and Developing Your Next Generation of Leaders*. He encouraged attendees to reinvent their workforces for the future based on changing demographic trends and discussed creating an elevator speech contractors can use when talking with potential hires.

During *Younger Next Year*, Chris Crowley discussed behavioral changes that can help attendees become healthier, more energetic, optimistic, decisive and effective at any age.

Sgt. Matt Eversmann shared leadership lessons from the front lines, when lives are on the line, during the *Leadership Lessons from Black Hawk Down*.

In *Extreme Leadership*, Steve Farber encouraged contractors to, “Do what you love in the service of people who love what you do.” He showed attendees how to use the LEAP framework — Love, Energy, Audacity, and Proof — to radically improve their organizations and their lives.

During a different session, *Greater than Yourself*, Steve Farber shared leadership and mentoring tips. He encouraged attendees to mentor candidates whose values align closely with their own.

In her presentation, *Is the Light On In Your Eyes?*, Sam Horn encouraged attendees to reflect on what happiness means to them. Through a series of interactive exercises, she helped them define action plans for updating beliefs and behaviors that may be holding them back, saying every day is an invitation to evolve.

In *Mechanical Contracting 2017*

— *It’s Still about People and Pipe*, John Koontz explained that while technology has evolved, getting it built is more important than the tech you build it with. He encouraged attendees to embrace “Management by Walking Around,” saying that “Getting out of the office and visiting your job sites has never been more important.”

Through a series of roundtable discussions, Britton Langdon’s *Tales from the Road — an Exploration into Efficiency and Productivity* asked attendees to reflect on the things that could improve their companies, the results of those changes — best case, worst case and predicted outcome.

The *Hitchhiker’s Guide to Management Methods*, moderated by Dennis Shuman of Speer Mechanical, chairman of the Management Methods Committee, with help from committee members Robert Lindbloom of Apollo Mechanical Contractors, Terry James of Murray Co. and Richard Perosa of H.T. Lyons Inc., explored one of MCAA’s most valuable resources, its Management Methods Bulletins. These unique resources have helped many MCAA contractors grow their businesses and become even more successful.

During *The ConAppGuru Reviews Tables and Apps for the Field*, Rob McKinney reviewed the evolution of mobile technology used throughout construction projects. Among the topics discussed were: app selection, BYOD (Bring Your Own Device) policies and hardware selection.

During *Power Entertaining with Food and Wine*, Eddie Osterland showed attendees how to wow friends, families and business colleagues by entertaining in different ways. Among the tips he offered, he suggested educating guests about new foods and wines to give them a unique experience that will leave them wanting more.

In *Delivering Lean IPD*, Victor Sanvido explained how this methodology can bring projects to completion more quickly, efficiently, productively, and profitably, by eliminating waste, duplication, delays, excess costs, and misunderstandings between owners and contractors.

In *Exit Planning — Dancing in the End Zone*, Patrick Ungashick led attendees through a series of interactive exercises designed to help them determine whether the



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decisions they are making today are helping or hurting the potential for a successful exit. He explained the difference between growth and value and showcased the Seven Elements of Transferable Value, providing attendees with the tools they need to assess their business' strengths and weaknesses in each area.

More than just education

Attendees had full days with the plethora of educational sessions. But there were plenty of opportunities for networking and socializing, too. There were a few different roundtable discussions and exhibits that provided attendees with key takeaways and food for thought.

Bright and early on the second day of the convention, attendees were treated to new products and services at the Manufacturer/Supplier Exhibit. Representatives from 135 member companies were on hand to share information and answer questions about how these exciting innovations can help their companies achieve greater efficiency, enhanced productivity and increased profitability.

At the same time, contractors were able to connect with students from top schools of construction management, mechanical engineering and other disciplines related to the industry during the Student Chapter Exhibit.

Recognizing excellence

After a full two days of learning and networking, it was time for recognition.

MCAA's Awards of Excellence Breakfast honored and celebrated MCAA members' and future professionals' excellence throughout the year. Stone kicked off the event by announcing the winners of the NIBCO Tennis Round-Robin, the Anvil International Fun Run/Walk and the Victaulic/Carrier Golf Tournament.



University of Missouri – Columbia Student Chapter of the Mechanical Contractors Association of America as its Student Chapter of the Year. Courtesy of MCAA.

Mark Wilke of CNA joined Stone to present the Safety Excellence Awards. To be eligible to win the award, a company has to submit a written application with detailed information on: the contents of its safety and health program; the reasons why it believes it deserves to win a safety excellence award; and an innovative initiative that helped it achieve such a high degree of safety excellence.

Companies are divided into five categories by the number of hours worked last year, and a winner is chosen in each. The 2017 winners were:

- Ceroni Piping Co. of Belvidere, Illinois, in the 100,000 work hours and under category.
- Quality Plumbing & Heating of Bunker Hill Inc. of Bunker Hill, Indiana, for the 100,001 – 250,000 work hours category.
- Armistead Mechanical Inc. of Waldwick, New Jersey, in the 250,001 – 400,000 work hours group.
- Baker Group of Des Moines, Iowa, for the 400,001 – 1,000,000 work hours category.
- ACCO Engineered Systems

Inc. of Commerce, California, in the over 1,000,000 work hours category.

Mark Rogers, who received the DSA during the opening session, joined Stone onstage to present four scholarships created to honor the industry leaders they are named after. The students receiving these scholarships were selected by MCAA's Career Development Committee for their exceptional academic performance, leadership skills, interest in developing a career in the mechanical industry, work ethic and technical abilities. The 2017 recipients were:

Sarah Drummey, a junior at the University of Nebraska – Lincoln, took home the Foster J. McCarl, Jr. Memorial Scholarship for \$2,500.

Robert Ryan Schneider, a junior at Colorado State University took home The William A. Bianco, Jr. Memorial Scholarship for \$5,000.

Sarabeth Haworth, a junior at the Milwaukee School of Engineering, received The Reilly Family Memorial Scholarship for \$5,000.

Francesco Pisano, a junior at the Wentworth Institute of Technology, took home The Alan O'Shea

Representatives from 135 member companies were on hand for the Manufacturer/Supplier Exhibit. Courtesy of MCAA.

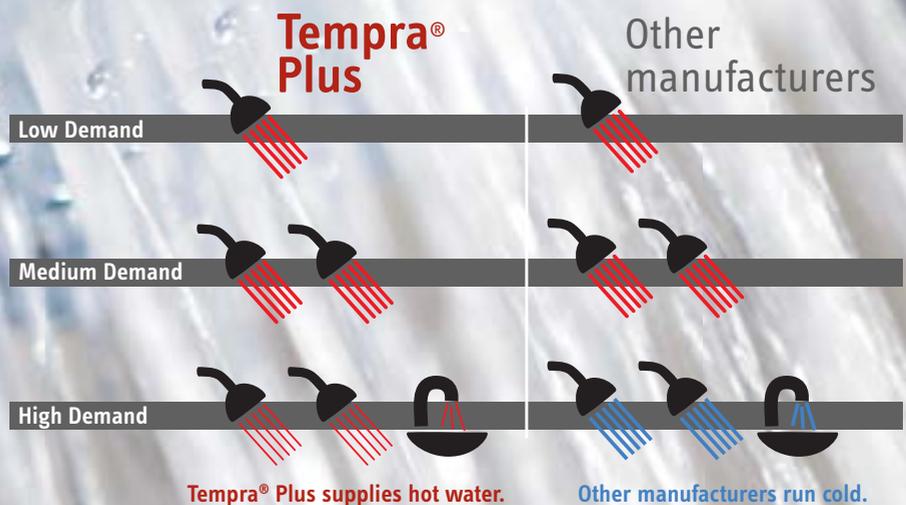


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Former President Stone passes the gavel to incoming MCAA President Greg L. Fuller. Courtesy of MCAA.

Memorial Scholarship for \$2,500.

Troy Aichele, the chairman of MCAA's Career Development Committee, joined Stone for the presentation of MCAA's Career Development Awards.

The Educator of the Year award was split between two superb educators — Dr. Mostafa Khattab and Dennis Pettitt of Colorado State University. The award, which included a check for \$5,000, honored the educators' mentoring abilities, industry knowledge and involvement, and active participation in MCAA's Student

Chapter program activities.

The University of Missouri – Columbia Student Chapter of MCAA received the Student Chapter of the Year award. The chapter was selected based on how well it promotes an understanding of the mechanical industry and the career opportunities MCAA offers. In addition to a trophy, Student Chapter President Nick Kniesche and all of the students from the University accepted a \$3,000 check.

The University of Missouri – Columbia Student Chapter of MCAA received first prize and

\$10,000 for their work in this year's Student Chapter Competition.

Second place honors and a \$5,000 prize went to the MCAA Student Chapter at the Milwaukee School of Engineering. The other two finalist teams, from the Student Chapter for Mechanical/Electrical Specialty Contracting at the University of Nebraska – Lincoln and the Rocky Mountain Chapter of MCAA at Colorado State University, took home checks for \$2,500.

Teams from six additional universities received Certificates of Merit and checks for \$1,000. They were:

- The University of Washington
- McMaster University
- The University of Wisconsin – Stout
- Wentworth Institute of Technology
- Fairleigh Dickinson University
- California Polytechnic State University, San Luis Obispo

Passing the torch

In concluding the program, past President Stone offered a final word of thanks to all those who contribute to MCAA's success before passing the gavel to MCAA's 2017 President, Greg L. Fuller.

"I promise you that I will work hard to build on and continue the fine work of those who came before me," Fuller said. "It is an incredible honor to stand before you as the president of MCAA." ●



Courtesy of MCAA.



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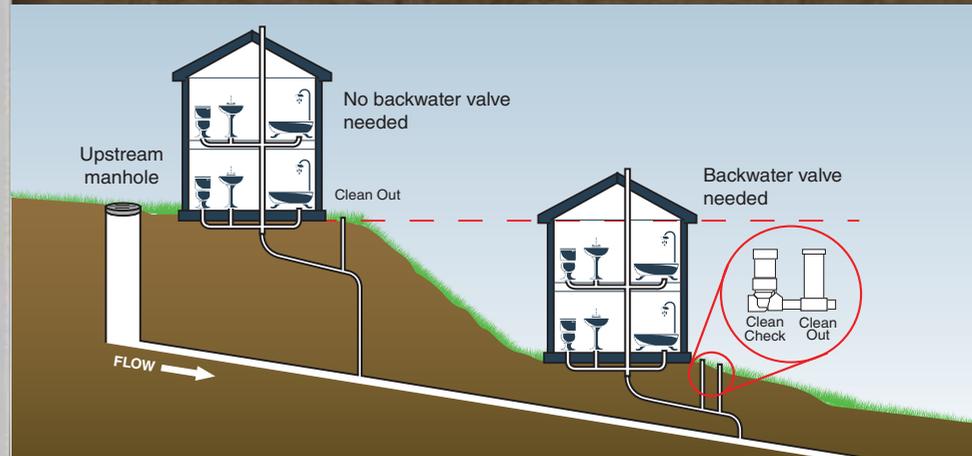
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Venting Systems

What you need to know about standards and testing for systems of fuel-fired appliances.

BY DOUG PAGE PE, CPD, MPA, LEED AP BD+C, CEM

Energy codes are driving the installation of boilers and domestic hot water heaters that are high-efficiency condensing Category IV appliances. The venting for these appliances tends to be factory-built, corrosion-resistant steel or PVC, CPVC, or PP. The following article discusses two critical issues regarding venting and possible solutions. First, there is no nationally recognized standard for plastic venting in the U.S. Second, there are no nationally recognized test criteria or standards for field testing installations of factory-built or plastic venting.

The problem with plastic venting

First, a brief summary of basic definitions is in order. From the International Code Council (ICC), a chimney is “a primarily vertical structure containing one or more flues, for the purpose of carrying gaseous products of combustion and air from a fuel-burning appliance to the outdoor atmosphere.” A chimney can be factory-built (a listed and labeled chimney composed of factory-made components, assembled in the field in accordance with the manufacturer’s instructions and the conditions of the listing), a masonry chimney, or a metal chimney (similar to an unlisted NFPA 211-compliant smoke stack).

A vent is “a pipe or other conduit composed of factory-made components, containing a passageway for conveying combustion products and air to the atmosphere, listed and labeled for use with a specific type or class of appliance.” The 2015 International Mechanical Code (IMC) Commentary states, “In Code terminology, vents are distinguished from chimneys and are usually constructed of factory-made listed and labeled components intended to function as a system... Some appliances are designed for use with corrosion-resistant vents, such as those made of plastic pipe and special alloys of stainless steel.”

So what is the plastic pipe that conveys combustion by-products

from the appliance to the exterior? It certainly is not a chimney. The IMC Commentary indicates that it is a vent; however, it also says a vent is listed, is labeled, and is a system.

Forgiving our friends at the ICC for the deviation from UL’s definition of labeling, to what standards exactly are we listing and labeling? In 2012, UL provided a white paper entitled “Venting Gas-Fired Appliances” to help provide some clarity. Among others, it mentions the following standards:

UL 103: Standard for Factory-Built Chimneys for Residential Type and Building Heating Appliances

UL 959: Standard for Medium Heat Appliance Factory-Built Chimneys

UL 1738: Standard for Venting Systems for Gas-Burning Appliances, Categories II, III, and IV

These are some of the standards to which vents (and chimneys) are tested. UL indicates that “U.S. codes permit Category IV gas-fired appliances to be vented using unlisted plastic vents where such vents are tested and covered under the specific appliance listing.” By definition, an unlisted plastic vent is not a vent, at least applied to non-gas-fired appliances defined in the IMC.

We also should consider section 501.14 of the International Fuel Gas Code (IFGC), which states, “The design, sizing, and installation of vents for Category II, III, and IV appliances shall be in accordance with the appliance manufacturer’s instructions.”

Additionally, 502.1 of the IFGC states, “Plastic vents for Category IV appliances shall not be required to be listed and labeled where such vents are as specified by the appliance manufacturer and are installed in accordance with the appliance manufacturer’s instructions.”

Does this language absolve plastic pipe manufacturers of liability in cases where unlisted plastic pipe venting fails? This is unclear, and no doubt the U.S. courts will provide a response. What is clear is that appliance manufacturers are required by code to provide information to design, size, and install venting for

their appliances.

However, in general, it does not appear that appliance manufacturers are providing instructions for venting systems.

Let’s explore one well-known and respected Category IV appliance manufacturer’s installation instructions. Its table of materials includes the following standards for vent pipe and fittings:

- PVC Schedule 40, 80:

ASTM D1785

- CPVC Schedule 40/80:

ASTM F441

- Polypropylene: ULC-S636

- Stainless steel AL29-4C:

UL 1738

ASTM D1785 “covers poly(vinyl chloride) (PVC) plastic pipe, Schedules 40, 80, and 120, for use with the distribution of pressurized liquids only,” according to the abstract. Additionally, Section 1.2, Note 2 of the Scope states, “This standard specifies dimensional, performance, and test requirements for plumbing and fluid-handling applications only. It does not include provisions for the use of these products for venting of combustion gases. UL 1738 is a standard that does include specific testing and marking requirements for flue gas venting products, including PVC.” ASTM F441 also explicitly states that the standard is for “pressurized liquids only.”

ULC-S636 is a Canadian standard that provides some hope for a template of a U.S. or international standard, but it is noted that the temperature ratings listed in ULC-S636 exceed the working temperature ratings of many plastic pipe manufacturers.

Factory-built steel venting generally conforms to UL 1738. On a side note, Section 502.1 of the IFGC requires Category II and Category III appliance venting to be tested to UL 1738.

This appliance manufacturer does not provide a conformance standard for plastic fittings, nor is a support spacing listed. Plastic pipe manufacturers publishing hanger spacing generally base their



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requirements on the pipe being filled with liquid. Table 305.4 of the IMC lists the horizontal hanger spacing at 4 feet on center. Something as simple as vent support is not being provided by appliance manufacturers, which is a major problem.

Included in the appliance installation instructions is the following: "Installation of a PVC/CPVC vent system should adhere to the PVC/CPVC vent manufacturer's installation instructions supplied with the vent system." However, the U.S. plastic pipe manufacturers I spoke with discourage the use of their products for appliance venting, so it is unclear exactly what vent manufacturer instructions need to be complied with regarding plastic venting. I also spoke with a Canadian plastic pipe manufacturer that instructs conformance to ULC-S636.

In summary, the industry has applied drainage pipe to venting fuel-fired appliances, but these vent systems have not been fully tested and are certainly not listed and labeled in most instances. Appliance manufacturers are now being held responsible for the vent system

design, sizing, and installation, but their installation instructions are generally incomplete regarding fittings and support spacing. Also, most of the standards cited are explicitly limited to liquid applications.

What would improve the safety of plastic venting? The vent and appliance manufacturers need to develop and agree on testing protocols. Appliance manufacturers need to explicitly test and list the venting to their appliance as well as provide complete installation instructions. Appliance manufacturers also need to place temperature-limiting devices on the appliances that can only be changed by factory-authorized personnel. This will prevent operators from overriding supply water temperatures and hence the maximum temperatures to which plastic venting is exposed. Finally, contractors need to be trained to install plastic and steel venting by the vent manufacturers.

Appliance vent testing

So, how do we test plumbing sanitary piping? If we decide to conform to the International

Plumbing Code (IPC), we might fill the pipe with at least 10 feet of water, 5 psig of air, or smoke and see if it leaks. However, most plastic pipe manufacturers prohibit testing their pipe with air, and in the 2012 IPC, air was prohibited as a test fluid for plastic piping.

Of the pipe manufacturers I spoke with, all of them espouse the need for safety and workplace protections, which would prohibit the use of air for testing. It appears that litigation and the fear of lawsuits have driven pipe manufacturers from permitting plastic piping being tested with air. This leaves those in cold climates to test with water and antifreeze, waiting for temporary heat or warm weather, or to choose materials other than plastic. Oddly enough, the Technical Standards & Safety Authority (TSSA) of Ontario, Canada issued a 2007 Advisory permitting the use of air to test plastic venting.

How do we test ductwork? The engineer might specify the duct seal class, leakage class, and pressure class to provide the parameters to construct it and then require compliance with a standard such as

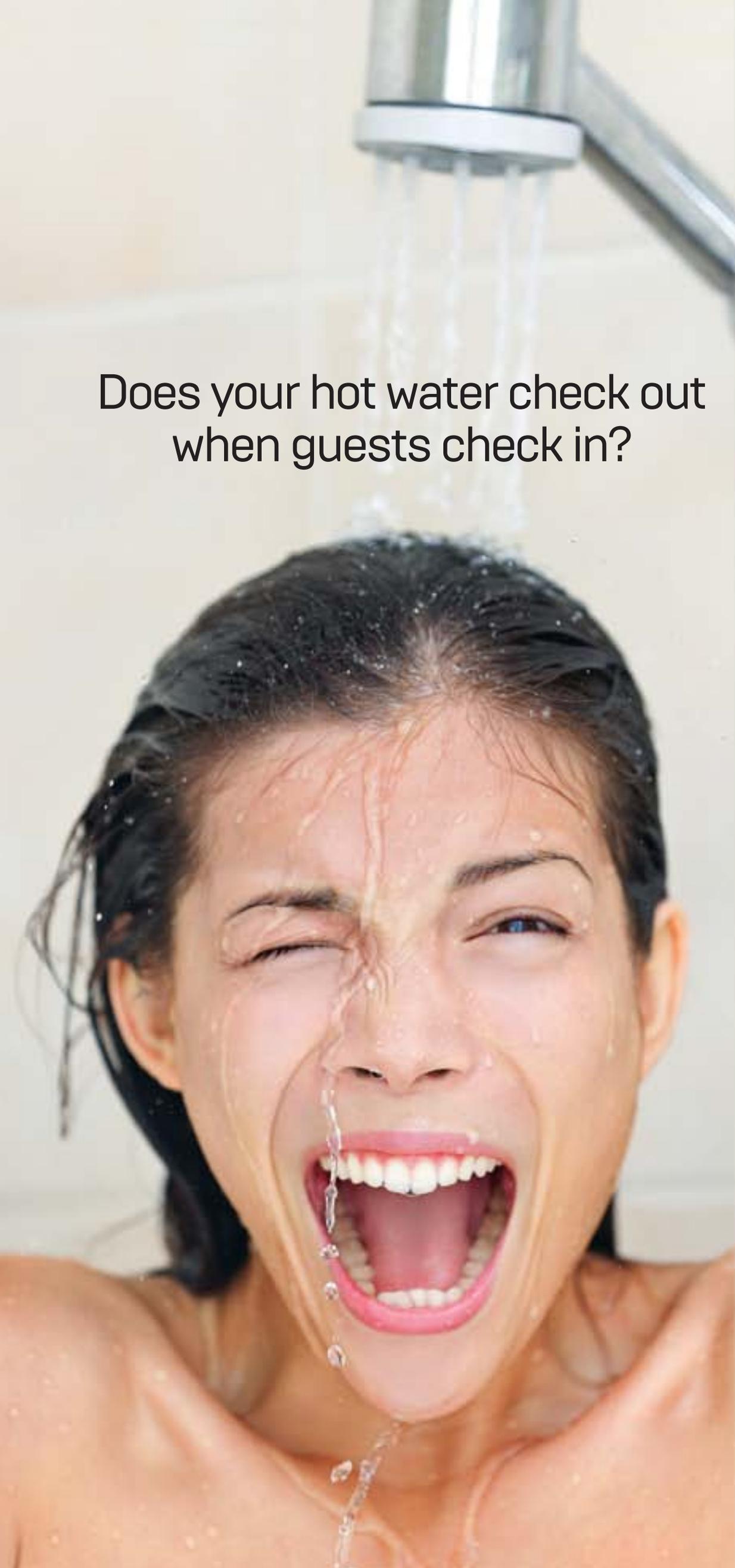
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the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) *HVAC Air Duct Leakage Test Manual*. In short, you blow air into the duct at a specified pressure and see how much it leaks — not all that much different from a smoke test of sanitary piping.

Until 2016, I have heard of no manufacturer of factory-built metal venting agreeing to pressure testing of their installations. For many decades we have tested drain, waste, and vent piping and ductwork to improve energy efficiency/leakage, but we do no field testing of the system that can cause deaths. This appears to be a problem.

Appliance venting carries the products of combustion that can, and in unfortunate conditions do, kill humans. What do the IPC, IMC, IFGC, NFPA 211, most vent manufacturers (including plastic pipe), and appliance manufacturers say about testing installed appliance venting? Well, they say virtually nothing. However, NFPA 211 requires smoke testing of masonry chimneys, and the New York City Mechanical Code requires smoke testing of chimneys. The NYC MC smoke test requires “a pressure equivalent to ½-inch (13-mm) column of water,” but this violates the plastic pipe manufacturers’ recommendations and the code prohibition against testing with air.

Until 2016, I have heard of no manufacturer of factory-built metal venting agreeing to pressure testing of their installations. For many decades we have tested drain, waste, and vent piping and ductwork to improve energy efficiency/leakage, but we do no field testing of the system that can cause deaths. This appears to be a problem.

However, this certainly is not a technical problem, and we have the skill set to test appliance vents. There may be many root causes driving the trend against testing — from manufacturers of piping (venting) and appliances not wanting to be placed at a competitive disadvantage, to raw liability for individual manufacturers. One solution is for existing organizations to step up to the plate and drive consensus on a test standard. Some organizations that could facilitate resolution are the Plastics Pipe Institute (PPI), ASPE, ASHRAE, NFPA, UL, ICC, and a host of others.

In an effort to address this life-

safety issue, I identify core activities to help. First, manufacturers need to train the installers of factory-built chimneys and other systems. Training those who actually install the materials can only help reduce failures. We have pre-installation conferences for roofing and fire-

smoke dampers—why not for venting? This would appear to solve the immediate short-term need. In the long run, manufacturers may need to certify their installers.

Second, we need to test the installed vent. Visual observation coupled with the human sniff test does not equate to testing. Almost all AL-294C and other steel vent systems I observed post-construction have leaked. You may want to inspect yours when you are done reading this.

Finally, the manufacturers must take responsibility for their products and certify in writing that the installation conforms to their installation instructions. If we can do it with kitchen floor assemblies, we can certainly do it with venting.

Working with Pathfinder Engineers (pathfinder-ea.com) and Precision Vent (a vent distributor, precisionvent.com), we arrived at consensus language to achieve the above. This language is:

FABRICATION: Prior to the installation of AL 29-4C double-wall flues, there shall be an onsite pre-installation training conference. The flue manufacturer shall send a factory representative to the site to review installation procedures with the contractor and the owner's field representative prior to commencement of installation.

The representative shall be from the manufacturer's factory, not the local sales representative.

Topics to be covered at the pre-installation meeting shall include:

- Joining of Materials
- Pitching Pipe
- Hanger Systems
- Draining Condensate From Low Points

- Repair and Replacement of Unsatisfactory and Leaking Joints
- Dry Fitting the Flue Components without O-Rings Installed Prior to Final Assembly

The manufacturer shall provide a written certification of the chimney installation once it is complete.

Testing of flues for CO leakage: The contractor shall provide an independent testing agency to “sniff test” the joints of each flue assembly for CO leakage while operating the boilers and water heaters. Defective joints and assembly shall be repair, replaced, and re-tested.”

We have included this language on multiple projects. It has been limited to AL 29-4C venting, but certainly could be expanded for other materials. The concentration limit of carbon monoxide is not yet defined, although OSHA 1910.1000 requires a maximum exposure of 50 parts per million (ppm) for general industry. Bluntly, if the vent is leaking, it should be fixed.

Additionally, a sniff test cannot be readily used for the vent assembly prior to the appliances being on site. In a tight construction schedule, it is common for the factory-built chimney (or plastic) to be installed and enclosed with brick prior to appliances being energized. As an alternate for testing the vertical vent, the NYC smoke test could be used with the manufacturer’s approval. We have done so with a pressure of not more than 2 inches of water column.

The final message here is to test appliance vents. You also may want to “retro-test” your vents in the immediate future.

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Doug Page PE, CPD, MPA, LEED AP BD+C, CEM, has been involved in the plumbing and mechanical industries for more than 33 years and is currently an engineer with the EME Group. Page received his BS from Clarkson University and has an MPA from the University at Albany/Rockefeller College. He is a Code Enforcement Official and a past member of the NYS Plumbing, Mechanical, and Fuel Gas Code Technical Subcommittee. He holds several industry certifications including CPD and is Past President of the Capital Region New York ASPE Chapter. Page can be reached on LinkedIn or via email at dpage@emegroup.com.

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PEX 101

Recommendations on how to make your PEX installations simpler.

BY DON RACKLER

Use of PEX (cross-linked polyethylene) has become very widespread among contractors in the plumbing industry, largely due to its ease of use. Whether the contractor is dealing with new construction or renovations, PEX piping makes the project simpler, saving time and labor expenses.

Provide enough clearance for expansion and contraction

When installing PEX, remember that it expands and contracts in response to temperature; for every 10 F of temperature change, the length of PEX changes by 1 inch/100 feet of piping. Consequently, ensure you adhere to the following:

- Allow 1/8-inch of slack for each foot of PEX.
- For longer PEX runs, add loops to provide further slack. Leave enough space for these loops to contract and expand without being pressed against structural elements such as joists and wood studs.

Make sure that PEX is adequately supported

Horizontal runs of PEX must be supported every 32 inches if hanging, or every 72 inches if installed above beams. For vertical runs, PEX must be supported at least once per floor, and also keep in mind that joints add weight and require dedicated support as well. With respect to accessories, consider the following recommendations:

- Ensure that hangers are properly sized, or they can crimp and damage PEX.
- Plastic (rather than metal) hangers and straps are preferred to reduce weight.
- Protect PEX when routing through studs.

When PEX must cross wooden joists or studs, make sure the hole is drilled through the center. Then, install nail protector plates at the crossing points to prevent accidental puncturing.

Respect the minimum bend radius

When PEX runs must be routed through 90-degree corners using elbow supports, consider the

minimum bend radius allowed:

Cut PEX runs slightly longer than needed. As previously stated, PEX requires slack to expand and

Crimp rings involve more labor than push-to-connect fittings, but are a more cost-effective option when multiple PEX connections

PEX Nominal Thickness (in.)	Minimum Bend Radius (in.)
3/8"	4" curve
1/2"	5" curve
3/4"	7" curve
1"	9" curve

contract. Cutting PEX runs slightly longer than necessary, and trimming them is better than having them fit exactly, even if some waste is generated in the process. It is also important to leave a loop where the pipe ends, providing further clearance for expansion and contraction.

No matter how skilled you are with PEX installations, you will require high-quality tools to handle this material correctly. These tools are not expensive, and you can get a complete toolkit for less than \$200. The following are particularly important when working with PEX:

- Tubing Cutter — A squared-ended and burr-free cut ensures that PEX is connected properly. To achieve this result consistently, use a high-quality tool.
- Crimp Tool — Fundamental for fastening crimps correctly to PEX fittings.
- Tubing Expander — May be required in some connections where the crimp tool is not suitable.
- Go/No Go Gauge — Required to assess the quality of connections, with both crimp tools and tubing expanders.
- Clamp Removal Tool — Needed to remove poorly-installed crimps.

Follow the correct procedure for PEX connections.

If you are working with push-to-connect fittings and your cuts are square and clean, you should have no trouble with the installation — all you need is a good PEX tube cutter. Make sure that the pipe is seated correctly into the fitting. Push-to-connect PEX fittings tend to be expensive, so they are only recommended when very few connections are needed.

are required. Like with push-in fittings, a square and clean cut is very important, and then the procedure is as follows:

- Slide a crimp ring over the PEX tube ending that will be connected.
- Insert the fitting, ensuring there is full contact between the PEX edge and the fitting's shoulder.
- Slide a crimp ring over the fitting's connector, at a distance of 1/8 to 1/4 inch from the PEX tube edge.
- Fasten the connection with the crimp tool, ensuring that pressure is exerted around the crimp ring.
- Use the Go/No Go Gauge the crimp has been installed correctly.

Remember, there are cases where PEX is not suitable. Although PEX is extremely versatile, there are specific cases where it is not recommended. Avoid the following five applications, where PEX is unable to tolerate the long-term operating conditions:

- Downstream from a point-of-use water heater
- Within 6 inches horizontally and 12 inches vertically from recessed lights, flue gas exhausts and heating devices
- Swimming pools
- Close to petroleum-based products
- Exposed to direct sunlight ●

Don Rackler is the founder of Jon Wayne Service Co., and a leading San Antonio plumbing company. Jon Wayne is additionally the largest heating and air conditioning company in the San Antonio area. Rackler started Jon Wayne in 2001. Recent awards for the company include Bryant Dealer of the Year and ACHR News' Best Contractor To Work For in the South.



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Pipe expansion tools

This line of battery-powered Gorilla Press tools allows workers to join pipe safely and quickly. By installing fittings without soldering or welding, plumbers, pipe fitters and mechanical technicians eliminate the need for an open flame and a hot work permit on the job site or in facilities. This reduces risk of injury and increases productivity by allowing technicians to work on a wet system. Many mechanical applications require technicians to work within tight spaces, making it difficult to perform tasks and increasing the time it takes to complete the job. Gorilla Press tools feature a 350-degree rotating head to fit into tight spaces, and two separate tool platforms: the inline battery pressing tool (INLNPRESS-TOOL19kN), which has a fitting capacity of 1-1/2 inches on PEX and 1-1/4 inches on copper and stainless steel, and the pistol grip battery-powered

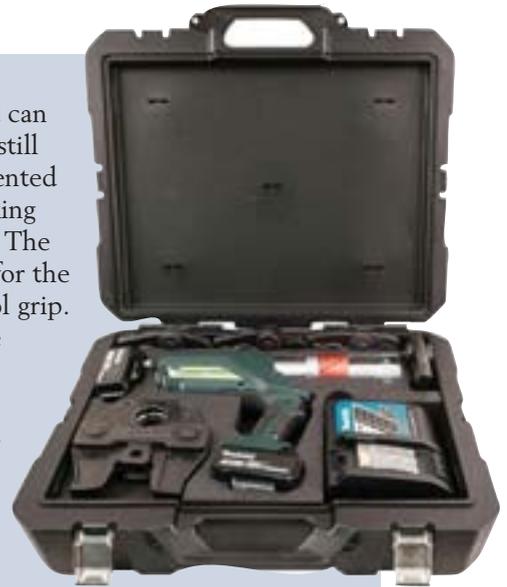


pressing tool (PSTLPRESS-TOOL32KN), which has a fitting capacity of 2 inches on PEX and 4 inches on copper and stainless steel. Both tools quickly press

watertight connections in three to four seconds, and can be used while a system is still wet. The tools have a patented twist and release pin, making jaw exchange even easier. The kits come with four jaws for the inline and six for the pistol grip.

These pressing tools use intelligence for accurate pressing and are designed with autostop technology, which automatically stops the piston when the optimal force is reached, sealing the fitting properly. Precise pressure monitoring and diagnostics ensure appropriate specifications for each fitting. In the event optimal force is not reached, the operator is notified in real time visually by the flashing LED light and an audio alert. In addition, each press is recorded and using the Greenlee Gator Eye diagnostic tool, documentation of all the presses performed can be retrieved from the tool. The quickstop feature built into both tools elicits an immediate stop to the piston once the trigger is released, safeguarding the user's hands from pinch points. The lightweight design, 350-degree rotating head, and LED work light allow for both products to be used in dark, tight spaces.

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Cold-expansion PEX fittings

For use in hot and cold potable water distribution systems, cold-expansion PEX fittings, molded from RADEL resin, are lead-free compliant and available in a range of configurations: couplings, elbows, male adapters, tees and rings with stops, all in various sizes. RADEL resin is a general purpose extrusion grade of modified polyphenylsulfone (PPSU) that provides good hydrolytic stability and toughness. The fittings comply with the ASTM F1960 specification for cold expansion fittings and PEX reinforcing rings as well as other standards including NSF 14/ NSF/ANSI 372/NSF/ANSI 61 and CS B137.5. These fittings have a maximum temperature rating of 320 degrees F and a maximum working temperature/pressure of 210 degrees F at 150 psi. **Matco-Norca.**



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It's time for our annual PHC News Internet Survey. We're tracking trends, new technologies and apps, and usage among companies and contractors. We appreciate your help in providing responses to this brief survey and will share the results of the industry with you in our July 2017 issue of PHC News.

If you would like to be included, we will need your responses no later than Monday, June 5. If you have any photos (high-resolution, 266 DPI or higher) of yourself or employees using different applications that you'd like to share, please email them directly to Sharon@tmbpublishing.com with the subject: PHC Internet Survey. Please be sure to include your contact info. Your responses will remain anonymous unless you indicate otherwise in the survey. Thank you again for your participation. You can find the survey at bit.do/PHC2017Survey.

Please feel free to share it with other contractors you know.

LUXE Linear Drains earn cUPC certification from IAPMO R&T

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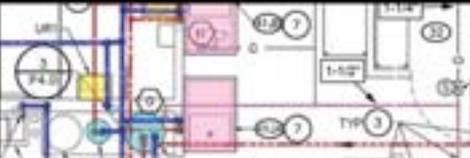
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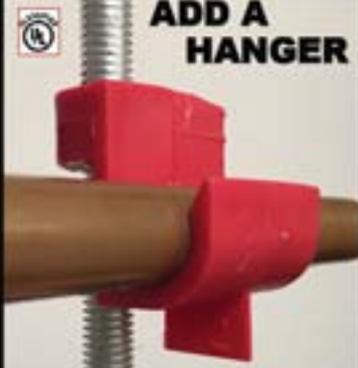


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EXPERIENCE / SKILLS REQUIRED:

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Respond in confidence to: Eric Pilas, National Sales Manager, eric.pilas@jrsmith.com
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Spring, Geese, Boilers and Other Things

BY SARAH CIMARUSTI, EDITOR



Happy spring! I take some pride in my Midwest grit and being able to withstand horrific winters, though over the last few years we've been bracing for mild ones. In spite of myself, I will take this bloom. I took three whole after-dinner walks last week and was startled by all the green. Those buds sure know how to move. I even met my next-door neighbor who likes to stand outside and watch the unruly geese clog up

the suburban streets. I would not be surprised if the geese took over our neighborhood, and inevitably, the world. I also found out my neighbor knows a lot about food and lives with his partner. This is good news because I moved in almost a year ago and still haven't met anyone who lives near me. Self-moral of the story: it's advisable to say "hi" to people and introduce yourself once in a while.

And now, onto the May issue. Speaking of geese, there

is a big, honking boiler report in here that our editorial director Sharon J. Rehana put together, and I think you should take a "gander" (aka a male goose) at it. Okay, no more lousy goose jokes. But in all seriousness, please go through our thorough boiler report, complete with trends and forecasts and innovative product lines.

We also have Flint news. We attended Flint's Water Infrastructure Summit and took back with us some status reports and interesting conversations we overheard. I also made a pit stop at an art exhibit made entirely of copper piping in Lansing. Pretty cool stuff.

Please also check out Steve Smith's piece on Milwaukee Tool. It is a hearty, close-up look at their Sawzall blade-making process. Then, turn to our cover story on a new apprentice program aimed at young plumbers, and other pieces including farmhouse hydronics, bathroom design, pipe lining, water management in the developing world and water treatment in Mexico hotels. It's a big issue, so dig in.

Oh, and before I forget, do you need a hug? Apparently, last month we celebrated "Hug A Plumber" day. But if you ask me, every day is good for hugs. Hug your friend. Hug your kids. Hug your dog. Hug it out.

Thoughts? Story ideas? Concerns? Goose stories? Email me at sarah@tmbpublishing.com. ●

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AERCO9, 185 <i>www.aerco.com</i>	General Wire, a div. of General Wire Spring21, 52, 187 <i>www.drainbrain.com</i>	Precision Plumbing Products60, 61 <i>www.pppinc.net</i>	ThermOmegaTech.....26 <i>www.circuitsolver.com</i>
Anvil International.....77, 171 <i>www.anvilintl.com</i>	Heat-Flo 38, 39, 106, 107 <i>www.heat-flo.com</i>	ProVent Systems.....66 <i>www.proventsystems.com</i>	Tyler Pipe111 <i>www.tylertough.com</i>
Apollo.....45, BC <i>www.apollovalves.com</i>	Holdrite135 <i>www.holdrite.com</i>	Raypak.....125 <i>www.raypak.com</i>	U.S. BoilerIFC, 189 <i>www.usboiler.net</i>
American Standard Water Heaters79, 139 <i>americanstandardwaterheaters.com</i>	ISUZU73, 95 <i>www.isuzucv.com</i>	RBI83, 163 <i>rbiwaterheaters.com</i>	Utility13, 15 <i>www.utilitychemicals.com</i>
AquaMotion108, 109 <i>www.aquamotionhvac.com</i>	John Guest68, 69 <i>www.jgprolock.com</i>	Rectorseal3, 181 <i>www.rectorseal.com</i>	Utica Boilers.....63, 151 <i>www.utica boilers.com</i>
Bosch113 <i>boschheatingandcooling.com</i>	Jomar104 <i>www.jomarvalve.com</i>	Rheem65, 99 <i>www.rheem.com</i>	Vesta31, 161 <i>www.vestahws.com</i>
Bradford White28, 29 <i>www.bradfordwhite.com</i>	Kissler33, 169 <i>www.kissler.com</i>	RIDGID27, 149 <i>www.ridgid.com</i>	Viega55, 177 <i>www.viega.us</i>
BrassCraft119 <i>www.brasscraft.com</i>	LAARS59, 155 <i>www.laars.com</i>	Rinnai37, 141 <i>www.rinnai.us</i>	Wal-Rich.....148 <i>www.wal-rich.com</i>
Brimar42 <i>www.pipemarker.com</i>	Legend40 <i>www.legendvalve.com</i>	Saniflo115 <i>www.saniflo.com</i>	Ward Mfg.96, 97 <i>www.wardmfg.com</i>
Caleffi35, 143 <i>www.caleffi.com</i>	Liberty Pumps117 <i>www.libertypumps.com</i>	Sioux Chief.....122 <i>www.siouxchief.com</i>	Watts51, 89, 159, 173 <i>www.watts.com</i>
Cash Acme57, 157 <i>www.sharkbite.com</i>	Lochinvar47, 147 <i>www.lochinvar.com</i>	Slant/Fin162 <i>www.slantfin.com</i>	Webstone4, 5, 175 <i>www.webstonevalves.com</i>
Centrotherm168 <i>www.centrotherm.us.com</i>	Matco-Norca84, 85 <i>www.matco-norca.com</i>	Smith Mfg., Co., Jay R.49, 103 <i>www.jrsmith.com</i>	Weil-McLain43, 165 <i>www.weil-mclain.com</i>
Chicago Faucets81, 153 <i>www.chicagofaucets.com</i>	Metropolitan Ind.....144 <i>www.ionproducts.net</i>	Solar Logic, LLC.....192 <i>www.solarlogicllc.com</i>	Weldbend18, 19 <i>www.weldbend.com</i>
Dirxion184 <i>www.dirxion.com</i>	MIFAB137 <i>www.mifab.com</i>	Stiebel Eltron87, 179 <i>www.stiebel-eltron-usa.com</i>	Whitlam.....23, 75 <i>www.flowaide.com</i>
Diversified Heat Transfer..133 <i>www.dhtnet.com</i>	Navien17, 41 <i>www.navien.com</i>	SupplyHouse.com.....129 <i>www.supplyhouse.com</i>	Worthington121 <i>worthingtonjoiningtech.com</i>
EasyFlex100, 140 <i>www.easyflexusa.com</i>	NIBCO ..11, 67, 167, 183 <i>www.nibco.com</i>	SureSeal3, 181 <i>www.rectorseal.com</i>	Zurn105, BC <i>www.zurn.com</i>
Eastern Energy Expo191 <i>www.easternenergyexpo.com</i>	Novaflex48 <i>www.z-flex.com</i>	Taco91, 101 <i>www.taco-hvac.com</i>	
Eemax131 <i>www.eemax.com</i>	Omegaflex127 <i>www.tracpipe.com</i>	The Home Depot.....7, 71 <i>www.homedepot.com</i>	



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