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THE OFFICIAL PUBLICATION OF THE AMERICAN SOCIETY OF PLUMBING ENGINEERS

October 2012

Charlotte Hosts ASPE Convention & Expo

ALSO INSIDE:

- Exclusive Q&A with ASPE's Jim Kendzel
- Water Harvesting Pump Systems
- Control Flow Roof Drains
- Recreational Restrooms
- Efficient Mechanical Rooms

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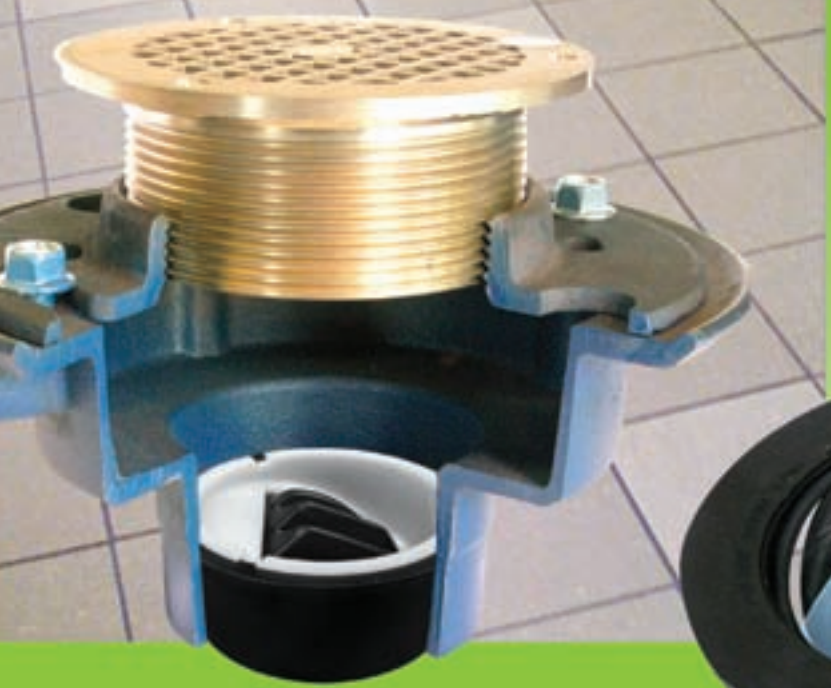

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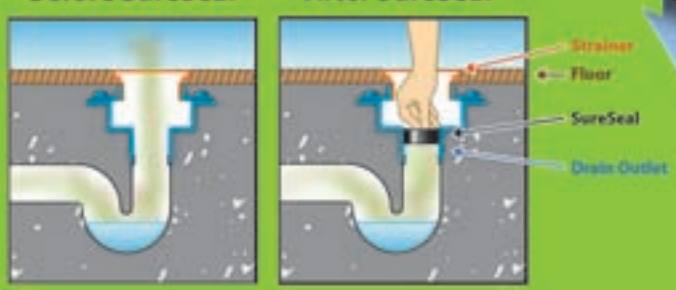

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Editor's Letter

Jim Schneider, LEED AP, editorial director
editor@plumbingengineer.com

Show Business

As I've possibly mentioned in a few of these columns, I am still, at least in relative terms "the new guy." I joined *Plumbing Engineer* back in June, which means this is a year of firsts for me. A couple of those firsts will come later this month when I make my first trip to Charlotte, N.C., to attend my very first ASPE Conference and Exposition.

After spending the past few months meeting some of you at other events and making many more connections on the phone or over e-mail, I'm anxious to get out and meet so many of you in person. I find that gatherings like this one are incredibly valuable opportunities to learn and understand both the challenges and successes of the people that make up the industry we serve. Events like the ASPE Conference & Exhibition are vital to the strength and viability of the industries they serve. It is a chance for professionals to gather, network and discuss the latest innovations, technology and techniques.

It's an opportunity even for companies and individuals who spend the rest of the year competing against each other to put on a more ecumenical hat and join in conversations that focus on the advancement of everyone involved. A rising tide does really raise all ships.

This is a particularly exciting convention for the crew here at *Plumbing Engineer*, since it will be our first in many years as the official publication of ASPE. We are honored to serve this role for the Society and look forward to a continued rich collaboration with its staff and membership. We hope to help start some buzz and generate excitement for the ASPE Conference and Exposition with a particularly robust issue of PE. It's another first for me: my first show issue. And it's a big one. We have packed the October issue with a wide array of stories to whet your whistle for the big event later this month.

On page 20, we preview the show through the eyes of long-time attendees as well as people who, like me, will be joining the party for the first time. In addition be sure to check out our ASPE Expo Product Showcase on page 118 to preview of some of the unique technology and products you will see at the show.

To learn more about trends and topics on the minds of people in our business, we conducted a series of Q&As with a number of industry leaders. We were particularly pleased to chat with ASPE's Executive Director, Jim Kendzel. In our interview on page 64, we discuss the past, present and future of the Society, and delve into some of the exciting programs and projects ASPE has in the works.

In addition to our regular roundup of expert columns covering design, codes, fire protection, sustainable design, solar and hydronics, this issue also has great feature articles discussing hot topics like rainwater harvesting, roof drainage, efficient mechanical rooms and more. There's something for everyone, so I hope you will read on and find some interesting things to discuss with your colleagues at the ASPE Convention and Expo. I'll be there, too, so if you see me, say hello and let me know what you think! I'll be the guy with the glasses. ■

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Industry News

American Standard launches product training laboratory

PISCATAWAY, N.J. — Comprised of working product displays set amidst classroom-style workbenches, American Standard has crafted a 1,600-square foot hands-on education facility within its Product Design Center in Piscataway, N.J. This operation enables in-depth training and best practices instruction on the installation, troubleshooting and repair of residential, commercial and institutional products and technologies.

Innovative product engineering and technologies are demonstrated at the new American Standard Product Training Laboratory in Piscataway, N.J. Gray Uhl, the company's design director, provides a hands-on learning experience for manufacturers' rep Vincent Muscarella of Loving & Associates and Melanie Bishop of wholesale partner Eastern Penn Supply.

Designed to accommodate up to 24 participants at a time, the laboratory includes working cutaway models of key products that allow specialized training on their unique features and benefits. Participants can compare products from across the plumbing sector to see first-hand the competitive advantages of American Standard technologies. A key advantage of the training center is its proximity to the company's existing corporate quality control operation and new product showroom, which are used as part of the product knowledge curriculum.

The training laboratory will help industry professionals acquire practical, real-world experience with the fully operational toilets, faucets, shower systems, walk-in baths, soaking tubs, urinals and flush valves on display. Product solutions for vertical markets such as hospitality and education are similarly grouped. As choices proliferate, the grouping of like-style toilets, sinks and faucets into solutions-oriented display modules helps to clarify the attributes of each style and facilitate the selection process. The showroom display includes products from the American Standard, Jado®, Porcher®, Fiat®, Crane Plumbing®, Safety Tubs® and DPI brands.

Bradford White supports industry through scholarship awards

FALLS CHURCH, VA. — Bradford White Corporation has provided $15,000 to support 2012 student scholarships through the Plumbing-Heating-Cooling Contractors (PHCC) Educational Foundation and PHCC National Auxiliary. The scholarships are designed to attract and support new talent that is essential to the future of the plumbing and HVAC/R industry.

This is the tenth year Bradford White has sponsored the scholarships, with $150,000 in total awards provided to students. $7,500 in Bradford White scholarships are awarded through the PHCC Educational Foundation each year. The 2012 scholarship award recipients are:

- Evan Aigeldinger, Broomall, Pa., is enrolling in the HVAC/R & Plumbing program at the Pennsylvania College of Technology.
- Andrew Remendowski, Garfield Heights, Ohio, is enrolled in a local four-year plumbing apprentice program.
- Christopher Taylor, Escondido, Calif., is currently in the PHCC of San Diego chapter's plumbing apprentice program.

"Bradford White is a strong believer in the value of having professional contractors installing our products," said Fred Vattimo, director – corporate advertising for Bradford White. "These scholarships are helping to train that next generation of professionals, and we are happy to support the cause."

The remaining $7,500 in Bradford White's scholarship support is awarded through the PHCC National Auxiliary.

IAPMO Standards Council issues TIAs

ONTARIO, CALIF. — The IAPMO Standards Council has issued Tentative Interim Amendments affecting the 2009 and 2012 editions of the Uniform Plumbing Code® (UPC). TIAs UPC-001-12 and UPC-011-09 revise and/or add new language to Chapters 2 and 9 of the 2012 UPC and 2009 UPC, respectively, amending and adding new definitions to Ch. 2 and revising Section 908.2 Horizontal Wet Venting for a Bathroom Group in Ch. 9.

TIAs are proposals based on the determination of: an emergency nature requiring prompt action to amend code that contains an error or omission that was overlooked during the regular code development process; contains a conflict within the document or with another IAPMO document; or to correct a hazard, promote an advancement in safeguarding the public or provide an opportunity to correct an adverse impact on a product or method of installation.

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These new TIAs identify specific requirements that must be met for the installation of horizontal wet venting. Specific requirements include:

- Limits installations to one bathroom group.
- Provisions are now applicable to both private and public use.
- Urinals may no longer be vented by a horizontal wet vent.

To examine TIAs UPC-001-12 and UPC-011-09 in their entirety, and/or any other TIAs affecting the Uniform Codes, visit www.iapmo.org/Pages/TIADecisions.aspx.

Zurn Industries receives award

ERIE, PA. — Zurn Industries LLC the received was presented with the Masters of Innovation award by MRO channel partner Interline Brands, during their 2012 Partner Conference on Friday, August 24. The award is granted to the vendor who is a proven market leader, being first to bring Interline Brands new products and trends. Award recipients routinely develop unique marketing strategies to create accelerated growth, engaging directly with Interline sales teams for new business opportunities.

In attendance to accept the award for Zurn were Patrick Sauer, director of distribution, David Kachurak, strategic accounts manager and Craig Comito, channel manager.

"Zurn is honored to receive such a prestigious industry award. It recognizes our commitment to creating innovative products that deliver superior water efficiency and safety for building owners and the newest technology and trends for retrofit, replacement and repair markets," said Craig Wehr, vice president and general manager for Zurn Industries. "We continue to strive to be our customers' very best supplier and are thrilled to be recognized by Interline."

Interline Brands is a national distributor and direct marketer of broad-line maintenance, repair and operations (MRO) products. Dedicated to the distribution of MRO products, Interline stocks approximately 100,000 MRO products in the following categories: janitorial and sanitation (JanSan); plumbing; hardware, tools and fixtures; heating, ventilation and air conditioning (HVAC); electrical and lighting; appliances and parts; security and safety; and other miscellaneous products. Their products are primarily used for the repair, maintenance, remodeling, refurbishment and construction of properties and non-industrial facilities.

Continued on page 12

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PATENT PENDING

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Eemax doubling in size

WATERBURY, CONN. — Eemax recently celebrated the lease signing of its new plant/headquarters location in Waterbury, Conn. The company's relocation to a larger facility is necessitated by an 83 percent growth in sales over the past six years. Eemax has the market's most extensive product line, ranging from small hand washing units (2.4 kW) to commercial drench shower units (150 kW). These products deliver a continuous supply of hot water at a preset temperature to any point-of-use application, with 99 percent energy efficiency.

Eemax is investing in new equipment, engineering test labs, a training center and more personnel from the local community to accommodate an anticipated doubling in size over the next five years as the company launches a new product line, which reinvents electric tankless water heaters by utilizing state-of-the-art technology.

"As the demand for high-efficiency water heaters increases and our business continues unprecedented growth, it's more important than ever for us to extend the reach of this carbon-efficient technology," said Eemax president and CEO Kevin Ruppelt.

Following some renovation, the facility will open in November, as Eemax moves from its current world headquarters in Oxford, Conn., including its engineering, marketing, sales, customer service, accounting and manufacturing divisions.

AERCO announces Direct Fired Start-up & Service certification course

BLAUVELT, N.Y. – AERCO International, the originator of modulating condensing technology for commercial applications, has announced the dates of its upcoming Direct Fired Start-Up & Service (SST) Certification classes. This course is offered to service companies, contractors and AERCO sales representatives who perform start-up and continuing service on AERCO's gas-fired equipment. The four-day course is part of AERCO's factory training program developed to provide expert support to AERCO's professional partners and end users with the goal of designing more energy-efficient HVAC systems for customers.

"We are committed to providing the highest level of support and training to help our partners grow their business," said Fred Depuy, president and CEO of AERCO International. "Our instructional courses provide a better knowledge of proper installation, operation and maintenance practices in order to reduce service time and ensure peak equipment performance to deliver greater savings to equipment owners."

The Direct Fired SST Certification course is designed to familiarize attendees with the theory and terminology surrounding AERCO's direct-fired products, including the standard Benchmark 2.0 boiler, the Benchmark 1.5, 2.0, and 3.0 Low NOx boilers, the KC1000 and Low NOx KC1000 boilers and water heaters. This course is essential for professionals performing the start-up of AERCO gas-fired equipment as the warranty cannot be validated unless they are factory certified SST attendees.

The course addresses installation; equipment specifications; theory of operation; control system(s); combustion calibration; water heater temperature control; boiler modes and control theory; troubleshooting; and the AERCO BMS and BMS II.

All classes will be held at AERCO's training center in Blauvelt, N.Y., on the following dates:

- October 1st – October 4th
- November 5th – November 8th
- December 3rd – December 6th

Registration materials and pricing for all AERCO's factory training courses are available online at: www.aerco.com/Service-Support/Training.

Uponor receives Xcel Energy award

APPLE VALLEY, MINN. — Uponor has received the 2012 Efficiency Partner Award from Minneapolis, Minn.-based Xcel Energy® for its outstanding efforts in curbing electric consumption in manufacturing operations. The award honors those who participate in Xcel Energy efficiency programs to lower their energy costs and reduce their impact on the environment.

"We were accepted into Xcel's Process Efficiency Program in 2011 and made significant reductions to our electric consumption over the past year, reducing it by 1.8 million kilowatt hours," says Dan Hughes, Uponor real estate and development manager. "In addition to the significant energy-cost savings to Uponor, this level of reduction benefits the environment by eliminating the equivalent greenhouse-gas emissions of 243 passenger vehicles per year."

Dan Hughes, Uponor Real Estate and Development Manager (right), explains some of the company's energy-saving measures to a group of employees during an Earth Day sustainability tour in April.

The Xcel Process Efficiency Program is a holistic

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approach to energy management, identifying opportunities for improving business practices associated with energy management processes, in addition to identifying potential technical energy-efficiency opportunities that reduce consumption.

Uponor currently has Xcel-funded studies in process for even more reductions and is anticipating qualifying for the award in 2013 as well.

Aqua-Rex gets UL approval

LAS VEGAS — The larger model Aqua-Rex physical water conditioners for pipe sizes of four inches and above are now UL listed. Aqua-Rex treats hard water using ultra high frequency radio waves and can be used as an effective alternative to conventional water softeners. It is the first, and so far only, device listed as a "physical water conditioner" with UL approval.

The listing is in the name of Aqua-Rex's parent company, the UK based Lifescience Products Ltd, whose Water-King equivalent has been widely specified in the UK and has an 18-year history of successful water treatment.

Aqua-Rex is now increasingly specified in the U.S., where there is a growing awareness of the need to treat hard water supplied to water heaters to retain their thermal efficiency. Hard water scale can reduce heating efficiency very significantly, even with a small buildup. The problem is further compounded by the increasing number of U.S. communities imposing softener bans to reduce the chloride discharge into the wastewater stream. Engineers are looking for proven products that can overcome the softener bans.

The smaller Aqua-Rex units have always been covered by UL as they use approved external transformers for pipe sizes up to three inches.

Victaulic acquires desalination business of MTS Valves & Technology

EASTON, PA. — Victaulic has acquired the desalination business of MTS Valves & Technology, which designs and manufactures valves for the global desalination market, including the MTS Plug Valve, a high-pressure valve for control and on/off applications that is typically utilized in seawater reverse osmosis (SWRO) applications/desalination plants.

The MTS Plug Valve is also suitable for other high-pressure membrane treatment applications in highly corrosive environments, including

Continued on page 16

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offshore oil and gas sulfate removal systems, industrial water reclamation and reuse facilities, high-purity water treatment for power and water processing for mining.

"The acquisition of the MTS desalination business unit enables Victaulic to offer the highest quality and most comprehensive product portfolio for piping systems in the desalination industry," said Jim Renner, vice president of water and wastewater at Victaulic. "Victaulic will provide the same high-quality products and services that current MTS customers are accustomed to receiving, in addition to world-class technical support."

Unclean restrooms carry consequences for business owners

MILWAUKEE — According to a national survey conducted by Bradley Corporation, more than half (51 percent) of Americans say they've had a particularly unpleasant experience in a public restroom, due to the condition of the facilities.

Bradley's fourth annual Healthy Hand Washing Survey found that gas stations outstripped other locations for the most awful restroom experiences; the majority of respondents (72 percent) cited a bad smell as the number one cause. Restrooms that looked old, dirty or unkempt and toilets that were clogged or not flushed were named as the second and third most common problems. Water collecting on the floor and jammed toilet paper and towel dispensers were also high on the restroom complaint list.

For businesses, an unclean restroom proves troublesome. When asked about their perceptions of businesses with poorly maintained restrooms, survey respondents cited poor management (62 percent), lack of care about customers (59 percent), a lowered opinion of the business (54 percent) and a sign that the business doesn't care about how they look to others (53 percent). While negative customer perceptions can hurt business, the most common action taken because of an unclean restroom is even more problematic, as nearly one-third (31 percent) said they would never frequent the business again.

"The condition of restrooms speaks volumes about a business, whether it's a public facility, workplace or otherwise," says Jon Dommisse, director of global marketing & strategic development at Bradley Corporation. "Our annual survey underscores that people really do take note of businesses when restrooms are lacking and unpleasant; sometimes that means they'll not return to that establishment."

The survey also found that Americans are not washing their hands long enough or often enough. 57 percent of respondents estimate they wash their hands for just five to 15 seconds. In fact, the Centers for Disease Control and

According to a national survey conducted by Bradley Corporation, more than half (51 percent) of Americans say they've had a particularly unpleasant experience in a public restroom, due to the condition of the facilities.

Prevention (CDC) recommends washing for at least 20 seconds and suggests singing "Happy Birthday" twice to allow enough time to remove and rinse off germs.

While it's good news that 70 percent of Americans say they always wash their hands after using a public restroom, 29 percent sometimes skip that important action. And, although the flu season peaks in February, the survey found that most Americans don't adjust their hand washing habits seasonally; 75 percent said they don't increase their hand washing during any specific time of the year.

The CDC is unequivocal about the benefits of hand

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washing, calling it critical in preventing infection and illness: "Hand washing is a simple thing to do, and it's the best way to prevent infection and illness," the agency says. And for "washing your hands," the CDC notes that nothing beats good old soap and water.

When asked about others' hand washing actions in public restrooms, 74 percent of respondents said they frequently or occasionally see people leave without washing their hands. Men were significantly more likely to see this occur than women (34 percent of men frequently see non-hand washers vs. 26 percent of women). Compared to public restrooms, the phenomena of skipped hand washing decreases significantly in the work environment. Just 42 percent of Americans report they frequently or occasionally see people leave the work restroom without washing their hands.

"Bradley's mission for this survey is two-fold," Dommisse says. "We want to call attention to the importance of hand washing as the first defense against germs, as well as to educate business owners on the value of keeping restroom facilities in tip-top shape, since that carries such great influence with customers."

Bradley's Healthy Hand Washing Survey (www.bradleycorp.com/handwashing) queried 1,046 American adults on August 1 – 3 about their hand washing habits in public restrooms. Participants were from around the country, ranged in age from 18 to 65 and older and were fairly evenly split between men (49 percent) and women (51 percent).

Xylem's Goulds Water Technology launches Data Matrix codes

MORTON GROVE, ILL. — Xylem Inc. announced the addition of Data Matrix codes on all Goulds Water Technology 5 – 25 gpm submersibles products. A Data Matrix code is a two-dimensional matrix barcode arranged in a square or rectangular pattern that provides customers with manufacturer ID, part number and a unique serial number.

The code, located on the product label, provides visibility to critical performance data such as psi, watts, amps and other operational information and is readable by most smartphones. Data Matrix readers are available from the iTunes App Store® and Google Play™ .

More Industry News on page 126

Movers & Shakers

Wilo USA appoints director of engineering

ROSEMONT, ILL. — Joe Melton has assumed the role of director of engineering for Wilo. Melton has been with Wilo since 2005 and previously held the positions of Southeastern regional sales manager and national sales manager for Wilo's Water Management segment.

Bradford White promotions

AMBLER, PA. — Bradford White announced the following promotions:

Matthew Kozak was promoted to the position of director of sales – East. Kozak began his career at Bradford White in 2007 as regional sales manager – Southeast region. He came to Bradford White after 13 years with Burham Boiler. He will be responsible for the regional sales managers in the Northeast, Southeast and Mid-Atlantic regions

Robert G. McKenney was promoted to director of sales – West. McKenney began his career at Bradford White in 2001 as a product analyst and has held the positions of district sales manager and regional sale manager. He will be responsible for the regional sales managers in the Northwest, Midwest and Southwest regions.

Weil-McLain and Marley names product managers

BURR RIDGE, ILL. — Weil-McLain and Marley Engineered Products added three new product managers to their marketing teams:

John Kopf is a senior product manager with a concentration on commercial boilers and indirect domestic hot water tanks. Kopf has 20 years of HVAC experience.

Dennis Krob is a product manager for specialty heaters, including harsh environment, infrared, radiant and unit heaters.

Olga Khavarivska is a junior product manager. She will be responsible for MEP ventilation strategy and additional product analytics.

Webstone adds to management team

WORCESTER, MASS. — Bill Chapin has joined Webstone's management team as director of engineering. Chapin comes to Webstone from his role as product compliance manager/project engineer at Reliance Worldwide (Cash Acme), where he was instrumental in product development and worked closely with OEM customers. He's been active in the plumbing industry for many years and has served on several committees. ■

2012 ASPE Convention & Expo

Benefit from Your 2012 ASPE Convention & Exposition Experience

The 2012 ASPE Convention & Exposition, being held October 27–31 in Charlotte, N.C., offers both exhibitors and attendees numerous opportunities to make new contacts, learn about innovative design techniques, and share their expertise. Participating in a show of this magnitude can seem a daunting proposition at first, so we've asked some long-time attendees and exhibitors to share their experiences with us to help you make the most out of your ASPE Convention & Exposition experience. We also talked to some first-time attendees to find out what compelled them to register and what they anticipate about their trip to Charlotte.

James Szollar, Kusel Equipment Co.

Kusel Equipment Co., in Watertown, Wis., began exhibiting at the ASPE Convention & Exposition in 2000, when the show was held in Nashville, Tenn. Kusel manufactures a very niche product—stainless steel floor and trench drains—so we asked Senior Vice President James Szollar to comment on what Kusel gains from participating in the ASPE Exposition and why the company continues to exhibit.

> "The ASPE Exposition affords us the opportunity to meet numerous specifying engineers in one place at one time,"

"The ASPE Exposition affords us the opportunity to meet numerous specifying engineers in one place at one time," he says. "The Exposition lets us present our product line to engineers and inform them of our products, even if they may not specify our products on a regular basis. It also gives us time to meet with reps, competitors, and friends in the industry. While the ASPE Exposition is an excellent networking vehicle, it also provides us with excellent teaching and learning opportunities.

"The ASPE Exposition simply brings the right people together in one location at one time. It has been very successful for us because we see the people we need to see. The ASPE Exposition delivers what we need for our product line."

We also asked Jim what he thinks makes the ASPE Exposition stand out from other national plumbing-related trade shows.

"The ASPE Exposition differs in the respect that ASPE brings engineers together. These are the individuals who specify our products, which is very important to us. ASPE is focused on one of our key audiences, and they deliver.

"One of the things that has always impressed us is the fact that ASPE has gone out of its way to thank exhibitors for exhibiting and solicit input from exhibitors. This may seem minor, but it is very important to exhibitors."

Curtis A. Ray Jr., CPD, Phoenix Engineering Group Inc.

West Coast Florida Chapter President Curtis A. Ray Jr., CPD

West Coast Florida Chapter President Curtis A. Ray Jr., CPD, has attended six ASPE Conventions primarily to network with other ASPE members and increase his knowledge in plumbing design. "I feel that attending ASPE Conventions is essential to my career, for I am constantly learning," he says. "What I take away from each Convention is the chance to see new products, learn about design topics, and learn about an experience on a similar project from a colleague."

In addition to learning from his peers, Curt also is afforded the chance to inform manufacturers about their products. "What I enjoy the most about the Exposition is that I get to meet with the manufacturers one on one. I can talk to them about products I have used and give them my viewpoints on the good and, most importantly,

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the bad. They are always receptive to my comments."

Curt is a plumbing/process engineer with Phoenix Engineering Group in Tampa, Fla., and he encourages young engineers in his firm and also from the West Coast Florida Chapter to attend the ASPE Convention & Exposition. "I have always stressed to young, upcoming engineers and designers that they need to attend for the wealth of knowledge and experiences you get from meeting and talking to other ASPE members."

Robert J. Shorey Jr., CPD, FASPE, TLC Engineering for Architecture

Robert Shorey Jr., CPD, FASPE, Co-chair of the 2012 ASPE Convention & Exposition

Robert Shorey Jr., CPD, FASPE, who is co-chair of the 2012 ASPE Convention & Exposition, works for TLC Engineering for Architecture in Tampa, as a plumbing/fire protection specialty designer. "Attending the Convention & Exposition has greatly helped my growth and development as a plumbing and fire protection designer," he says. "ASPE Conventions allow you to gain and share knowledge with design professionals in the industry with hundreds of years of experience combined. You get to know people from all over the country with all degrees of knowledge that you could someday call on and ask questions or opinions regarding plumbing or fire protection design."

From the six ASPE Conventions that he has attended, Rob says he has benefitted from "learning about the latest and greatest plumbing and fire protection products that could make my experience as a design professional a greater value to my company, as well as gaining new knowledge on the latest design methods or sharpening my mind on design topics that I occasionally use."

In addition to learning about new products during the Exposition, Rob appreciates the fact that you can meet the top executives of the exhibiting manufacturers. "Now, not only do you know the major players of those companies, but you also know how to get information straight from the top," he says.

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Hal Alvord, CPD

Hal Alvord, CPD, a member of the Los Angeles Chapter, joined ASPE in 1996 and has attended six ASPE Conventions. Based on his experiences, he says that he would encourage engineers of any age to attend because of the benefits you receive: the up-to-date knowledge from the technical sessions, as well as the chance to meet other plumbing designers and sales representatives from around the country, learn from them

"At the Exposition you see the most up-to-date equipment and plumbing products. This is a one-stop location for many manufacturers..."

and make lifelong friends. The fact that you can do all of this in just a few days is an advantage as well, he says.

"At the Exposition you see the most up-to-date equipment and plumbing products. This is a one-stop location for many manufacturers, so in a condensed time you can visit with reps from many companies and get the latest information. The Exposition saves you time." Hal also enjoys the free lunches on the Exposition floor. "Then you can keep investigating the products and not need to leave to get something to eat," he says.

Attendees to the ASPE Convention & Exposition receive up-to-date knowledge from technical sessions, as well as a chance to meet other designers and reps.

The education program sessions also help engineers save time. "The technical sessions have the most current topics and information from experts in those fields," says Hal, who started his career as a drafter and has been involved in plumbing engineering for 23 years. "If you want the latest information in a condensed format, the technical sessions are where you can find it."

Another intangible benefit is finding out how ASPE works and the satisfaction of being involved with a worthwhile organization, Hal says. From his experience in chapter leadership as corresponding secretary, vice president, technical, and president of the Los Angeles Chapter, he knows that "going to the Business Meeting will keep you informed about what is happening in ASPE, which is both your organization and mine."

Philip F. Parisi Jr., PE, LEED AP, Jaros, Baum & Bolles Consulting Engineers

Philip Parisi Jr., PE, LEED AP, Jaros, Baum & Bolles

First-timer Philip Parisi Jr., PE, LEED AP, an associate with Jaros, Baum & Bolles Consulting Engineers in New York City, decided to attend this year's Convention & Exposition to take advantage of the technical sessions on green building systems, emerging technologies and management, which are relevant to the work he does, as well as to experience the Exposition. As the New York City Chapter president, Phil will be a delegate to the Business Meeting and is looking forward to

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spending time with his fellow chapter board members.

"The Convention certainly will allow me to meet many people from the national Society and network with other engineers from around the country," he says. "Working in New York City has its benefits; however, the majority of the country is made up of vastly different municipal infrastructures. By speaking with other engineers from different parts of the country, it gives me a better perspective on plumbing outside of New York."

Emily Smith, LEED AP, Metro Design Associates Inc.

Emily Smith, LEED AP, Metro Design Associates

This will be the first ASPE Convention & Exposition that plumbing design engineer Emily Smith, LEED AP, with Metro Design Associates located in Elgin, Ill. has attended. After being encouraged to attend by fellow Chicago Chapter members, Emily registered to take advantage of the opportunity to meet and exchange ideas with engineers from other regions, as well as to enhance her growth as an engineer and fulfill her quest for knowledge. She also is representing the Chicago Chapter as a delegate to the ASPE Business Meeting.

"I definitely inquired about the experiences and opinions from the many members from my local chapter who have attended in the past," she says. "Considering their opinions and the knowledge they brought back, my decision was easily made that I have been missing out by not attending."

Emily plans on attending technical sessions in the emerging technologies track. "There is never a dead end in this industry, and being informed and prepared are ideal actions on the path to being a great engineer. I anticipate leaving with plenty of enthusiasm for applying the acquired knowledge," she says.

"Attendance to the Convention will definitely help me in my career such that I will have new knowledge, but really I will have more understanding of how fluid (pun intended) plumbing design and engineering actually are. There are multiple methods of achieving a successful plumbing design, and the Convention is the perfect think tank to discover them to help me grow and progress in my career." ■

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ASPE REPORT

AMERICAN SOCIETY OF PLUMBING ENGINEERS

From the President's Pen

William F. Hughes Jr., CPD, LEED AP, FASPE
2010-2012 ASPE PRESIDENT
aspepres@aspe.org

The Philippines Society of Plumbing Engineers recently invited ASPE Executive Director/CEO Jim Kendzel, MPH, CAE, and me to their conference, Water-Tech 2012, which was held in Manila in September. This was a historic event for ASPE. As the keynote speaker, I was able to tell members of this prestigious organization what ASPE is all about and what we can offer plumbing engineers around the world.

The members of PSPE welcomed us with open arms, and their promotion of American ideas and willingness to embrace all we have to offer made this trip an experience I will not forget. The enthusiasm of the members of the Philippines Society of Plumbing Engineers and their dedication to the advancement of the profession of plumbing engineering are equal to the enthusiasm and dedication of any ASPE member. The development of plumbing engineering across the world is an area that ASPE cannot ignore. Taking part in the global advancement of the plumbing engineering profession as well as promoting the health, safety, and welfare of the public should be important goals of our organization.

Meeting with the board of directors of the Philippines Society of Plumbing Engineers face to face was, for me, the opportunity of a lifetime. Their passion and dedication to the profession and their desire to promote the advancement of plumbing engineering were great to see. Educating their membership with quality technical programs is one of their key goals. We had several discussions about how we can share educational information and programs. It was also amazing to see how much both organizations have in common, especially regarding educating younger members. Both organizations strongly believe that the education of our younger members is critical to our continued growth and development.

Jim and I also met with the board of directors of the Philippine Society of Sanitary Engineers. Forming open channels of communication with both of these organizations is another sign of ASPE's commitment to advance our industry across the world. To have the opportunity to share knowledge with other organizations and promote an understanding of the plumbing engineering profession internationally is a giant step for ASPE.

Jim and I invited the board members of the Philippines Society of Plumbing Engineers and the Philippine Society of Sanitary Engineers to attend our 2012 Convention & Exposition in Charlotte, North Carolina. I am looking forward to welcoming representatives from both organizations.

Speaking of the Convention, by now you probably have received all of the promotional information about the event, and **I hope that you have the opportunity to attend. If you are still undecided about attending, I hope that you will consider taking advantage of the excellent educational and networking opportunities that are a very big part of the Convention. We are offering many incentive programs to help people attend, such as the First-Timers program and the Bring Your Boss program. Visit aspe.org/expo or contact your local ASPE chapter for more information on these incentive programs.**

The ASPE staff has worked hard all year to make this year's Convention & Exposition extremely beneficial to all attendees. The educational sessions will cover everything from green design techniques and medical gas systems to basic plumbing design and fire suppression. We also are offering a tour of Charlotte Pipe and Foundry as part of the education program. All of the speakers

are experts in their fields, and each session offers CEUs/PDHs for your professional certifications and licenses.

During the Exposition on October 29–30, the industry's top manufacturers will be showcasing their latest products and technologies. At more than 350 interactive exhibits, you will get hands-on experience with the newest plumbing products, and product engineers will be on-site to answer all of your questions about the products you will be designing around, specifying, buying, or using during the next year.

Before the Exposition opens on October 29, we invite all attendees to the keynote address featuring auto-racing icon and champion of philanthropy, Kyle Petty. This is one keynote speech you do not want to miss, so even if you are unable to attend the entire Convention, make plans to attend the Exposition. Entrance to the exhibit hall is free!

The 2012 ASPE Convention & Exposition is open to everyone within the plumbing industry, so spread the word and tell everyone you know that they do not want to miss this spectacular event, especially if you are within driving distance of Charlotte. However, time is getting short, so make your plans now for this premier plumbing engineering event. I look forward to seeing you in Charlotte! *ASPE*

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ASPE is recognized as an approved provider and sponsor of CEUs and PDHs throughout all 50 states for registrations and licensing requirements. ASPE CEUs also may be used for Certified in Plumbing Design (CPD) recertification requirements.

Tests are valid for one year, so you can earn up to 1.2 CEUs by successfully passing each test. (You can only receive one credit per test.) The cost is free for ASPE members and $35 per test for nonmembers.

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McClure Engineering Joins ASPE's Honor Roll of Employers

McClure Engineering, a full-service engineering firm in St. Louis, recently became the latest company to be recognized on ASPE's Honor Roll of Employers. Keith Cooper, PE, a principal with McClure Engineering, attended the ASPE St. Louis Chapter September 2012 meeting to accept the award.

The ASPE Honor Roll of Employers is a unique program recognizing organizations that provide substantive support for their employees' participation and involvement in ASPE programs. McClure Engineering was nominated for the company's commitment to helping its employees become ASPE members and attend networking events, including paying dues, allowing time off to attend educational events, supporting local chapter events through sponsorships, and reimbursing travel expenses to ASPE events.

For almost 60 years, McClure Engineering has provided engineering services including MEP, fire protection, lighting, telecommunications, audio-visual, theatrical, security, acoustics, and commissioning. Their more than 500 clients include building owners, architects, and facility managers for commercial and campus systems across the United States. Recent projects include the Anheuser Busch Brewing Process Control Center, University of Missouri–Columbia Brewer Fieldhouse and Natatorium, University of Missouri–St. Louis Touhill Performing Arts Center, and the City of Aspen Recreation Center Commissioning. You can learn more about the company at mcclureeng.com.

Green Plumbing Designer Certification Program to Be Launched This Month

The American Society of Plumbing Engineers and the International Association of Plumbing and Mechanical Officials have joined forces to develop the Green Plumbing Designer certification program, which will be launched at the 2012 ASPE Convention & Exposition in Charlotte, North Carolina. The goal of the certificate program is to introduce green plumbing theory and concepts to plumbing designers who hold the CPD or PE. To learn more about this exciting new program, stop by the ASPE Pavilion (booth #520) in the Charlotte Convention Center during the 2012 ASPE Exposition on October 29–30.

ASPE Executive Director/CEO Jim Kendzel, MPH, CAE, (left) presents the Honor Roll of Employers plaque to Keith Cooper, PE, a principal with McClure Engineering.

Watch Live Demos of the Most Innovative New Products at the 2012 ASPE Exposition

At this year's ASPE Exposition, October 29–30 at the Charlotte (North Carolina) Convention Center, manufacturers will demonstrate their most exciting new products at the New Product Innovation Showcase, located in the ASPE Pavilion (booth #520). Stop by and watch representatives from the following manufacturers explain how to best utilize their product to create efficient, sustainable plumbing system designs.

Josam Company Stainless Steel Retrofit Liners
Monday, October 29: 12:05 p.m.
Josam's Stainless Steel Retrofit Liner inserts into most commercial floor sinks or drains without disrupting the surrounding floor area. The Replacement without Removal process results in a superior stainless steel product less the costly labor bills.

AGF Manufacturing Inc. COLLECTanDRAIN Model 5400
Monday, October 29: 12:30 p.m.
AGF's 5400 COLLECTanDRAIN provides temperature-controllable environments for dry sprinkler condensation collectors via a float switch that monitors accumulation levels. When condensation increases, the 5400 notifies the fire control panel, which activates an alarm.

QuantumFlo iQFlo
Monday, October 29: 1:00 p.m.
iQFlo is a green, state-of-the-art software solution that ensures energy-efficient pressure booster system performance. It monitors and predicts water demand, responds by accurately cycling the pumps, and guarantees shutdown when no demand is present.

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KYLE PETTY KEYNOTE ADDRESS

Help us kick off the Exposition at 10:15 a.m. on Monday, October 29, when auto-racing icon and champion of philanthropy, Kyle Petty, will deliver the keynote address.

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Watch the top manufacturers launch their most innovative new products at the New Product Showcase in the ASPE Pavilion (booth #520).

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T&S Brass & Bronze Works
EC-3122-HG Above-Deck Electronic Sensor Faucet with Hydrogenerator
Monday, October 29: 1:30 p.m.
Designed with convenience, security, and conservation in mind, the EC3122--HG has all above-deck features, including a built-in manual mixing valve and advanced programmable controls. Lead-free, low-flow, and self-powered, the EC-3122-HG offers reliability, performance, and sustainability.

The Jomar Group T-100NGDZ Dezincification-Resistant Brass Ball Valve
Monday, October 29: 2:00 p.m.
The Jomar T-100NGDZ is a dezincification-resistant, lead-free brass ball valve. With a distinct annealing and controlled cooling process, Jomar's new brass alloy yields better third-party dezincification test results than bronze valves.

Jay R. Smith Manufacturing Co.
Enviro-Flo II Trench Drain System
Monday, October 29: 2:30 p.m.
Jay R. Smith's new trench drain is an engineered system designed for easy installation and made out of recyclable materials. The design incorporates rebar installation features, an improved tongue and groove channel connection, additional channels, and innovative accessories.

Potter Electric Signal Co.
Potter Nitrogen Generator
Monday, October 29: 3:00 p.m.
Potter Nitrogen Generators provide a low-cost, reliable, and efficient method of producing 95 to 99% pure nitrogen onsite. It is specifically designed for use in fire protection sprinkler systems to slow the corrosion process by filling system piping with clean, dry nitrogen.

Allied Technical Services (ATS)
ATS' Visual Spec Builder ("VSB")
Monday, October 29: 3:30 p.m.
ATS' Visual Spec Builder ("VSB") is a revolutionary free online software platform that allows engineers to package an entire code-compliant plumbing specification, visually. Packages come with images, drawings, written specifications, budget pricing, 3D BIM families, and much more.

Trapzilla-Big Dipper EZKlear
Monday, October 29: 4:00 p.m.
EZKlear is the easiest-to-clean semiautomatic grease trap in the world. With no moving parts and no electricity required, EZKlear quickly removes free-floating FOG from wastewater with the simple pull of a handle.

Stingray Systems LLC Stingray Modular Emergency Equipment System
Monday, October 29: 4:30 p.m.
This next generation of ANSI-compliant solutions for eye/facewash and drench shower specifications features centralized activation, a Drain-It feature that eliminates stagnant water, easy installation and maintenance, and patented emergency valve technology for ease of specification and compliance.

Watts Water Technologies
Orion Polystar Polypropylene Piping System
Monday, October 29: 5:00 p.m.
Polystar is a state-of-the-art polypropylene piping system intended to convey potable and nonpotable water made from an advanced resin and Orion's innovative Fibercore Technology, which reduces thermal expansion by 70%, adds significant insulating value, and provides excellent flow characteristics.

Viega Viega MegaPress
Tuesday, October 30: 12:05 p.m.
Viega MegaPress is the first and only carbon steel press fitting system for both gas and water applications. Available in IPS sizes ½" to 2", Viega MegaPress fittings make flameless, clean, consistent connections with ASTM A53, A106, A135, and A795 Schedule 5 to Schedule 40 black iron pipe.

Aqua Mizer Inc.
Aqua Mizer Toilet Tank Flush System
Tuesday, October 30: 12:30 p.m.
Serious green technology comes to the toilet bowl with Aqua Mizer's Toilet Tank Flush System. This remarkable retrofit kit dramatically reduces water usage, improves flush performance, and prevents water waste from leaking toilets. It is easily installed and does not require tank removal.

Cimberio Valve Co. Cim 771
Tuesday, October 30: 1:00 p.m.
Cim 771.1 valves make it easy to select a project's differential pressure with a switch and direct reading of the pressure on the on-board display. They offer flexibility of use, lowered costs for balancing operations, energy savings, and improved environmental comfort.

A.O. Smith Water Products Co.
A. O. Smith Solar Gas Backup
Tuesday, October 30: 1:30 p.m.
This innovative hybrid technology blends the features of the Cyclone high-efficiency gas water heater with a storage tank optimized for solar thermal applications. Its single-tank design combines storage for heat captured by renewable energy sources with 96% thermally efficient gas backup.

Cla-Val Company
X143IP Power Generator
Tuesday, October 30: 2:00 p.m.
The X143IP Intermediate Power Generator is a self-contained power generation system that mounts on a Cla-Val Automatic Control Valve. It is capable of generating up to 14 watts of power to operate electronic equipment at the valve site, without the need to tie into the local power company grid. ASPE

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Designer's Guide

Timothy Allinson, P.E., Murray Co., Long Beach, Calif.

Autodesk autocracy

Many of you, faithful readers, are old enough to have seen the development of CAD technology during the course of your careers. When I first started in this industry in 1984 most architects were already drawing with AutoCAD, although the smaller firms were still drawing by hand. All of the engineering firms were still drawing by hand on Mylar halftone backgrounds provided by the architect. Some of the older plans at my former NYC firm were drawn on calendered linen, a process that dates back to the 9th century, used until the mid 20th century, and some of those plans were drawn with ink. That was an old and honored skill – no mistakes allowed.

So, for more than a thousand years, the drafting industry used an unchanged standard, followed by a relatively brief period of improvement, thanks to the development of plastics; then came AutoCAD by Autodesk in 1982.

Back in N.Y., we first started dabbling in AutoCAD with Release 10 in 1989. If memory serves, that version still used a drafting tablet, since pull-down menus had not been developed, and we had to draw the architectural background ourselves. Our first real project was done in Release 11 in 1990; that was a very frustrating experience, because the standardization of architectural CAD backgrounds for engineering purposes was in its infancy. At the time, I was certain that CAD would never be as fast as hand drafting, but time and development proved me wrong.

Autodesk continued to make improvements to AutoCAD with new Releases issued nearly every year until its current Release 2013. In the interim, Autodesk acquired a remarkable number of companies to broaden its market potential. Since 1996, it has made at least 34 technology acquisitions that have included aspects of the video gaming industry and movie animation, providing portions of the graphics for movies such as *Avatar* and others.

One of Autodesk's most recent acquisitions was MAP (Micro Application Packages Limited) based in the UK, which produces, among other things, a software used by detailers in the plumbing sub-contracting industry called CADmech. This software is sold in the U.S. by TSI (Technical Sales International), which was part of the MAP acquisition.

For years, Autodesk has made software called Navisworks, acquired in 2008, that is used as the platform to interface CADmech with AutoCAD, Revit and other 3D programs. They are also in the final stages of developing another program called FabMEP, developed by MAP, which interfaces their 3D drawing systems with the pipe fabrication process.

I'm not sure what is happening elsewhere in the country, but here in California the BIM craze is generating RFPs that require design drawings to be created in 3D rather than 2D design followed by 3D detailing. Thus, engineers are being pushed to design in Revit or AutoCAD 3D, which makes the design process more cumbersome, especially for plumbing. Our discipline has been the slowest to be perfected by the software developers because of all the different piping materials required for the various systems, as well as the complication of our pitched drainage systems. Software developers are catching up on the plumbing side, but this still leaves us at the bottom of the 3D curve relative to our HVAC peers.

Technical issues aside, the aforementioned acquisition of MAP/TSI by Autodesk leaves Autodesk holding all of the cards. Being the card holder allows them to check up on any of their AutoCAD/CADmech design-build sub-contractor customers to be sure their licenses are up to snuff. Since every station of CADmech requires a corresponding AutoCAD license, it is easy for Autodesk to initiate an audit to determine whether these numbers jibe. If not – and chances are they won't – the offending sub-contractor is subject to the mandatory purchase of new licenses in order to have their software packages clean as a whistle. For even the most well intentioned large sub-contractor, such an audit can result in six-figure mandatory software purchases, to say nothing of the fines that could be levied if intellectual property fraud is suspected.

I really don't understand why Autodesk is not considered a monopoly at this point. Their answer to this question is, of course, that there are competitors out there, many of them free of charge, such as Google SketchUp. But do you know anyone who actually uses these alternatives in a professional environment?

Adding to the complexity of the Autodesk aura is Microdesk, an Autodesk partner, value-added reseller and design technology consultant. Microdesk is frequently in charge of the sale and service of Autodesk products, as well as the training that goes along with such purchases, if required. And, of course, they too get involved in policing the software licenses to which we are all obliged to subscribe. In short, the Big Desk is watching you from many angles.

Forgive me if I poke a little fun at the Autodesk Corporation and their partners. Truth be told, they are the fulcrum of our industry. We are all married to them, and it is hard sometimes not to tease your spouse. As I write this, nearly 10,000 people across the country are making plans to attend the 2012 AU (Autodesk University) in Las Vegas. I attended last year, and it was quite spectacular, if you can stomach spending the better part of a week surrounded by computer nerds. If you missed it, consider it for next year. It is something that everyone in our industry should attend at least once, even if you don't spend your days plugging away on AutoCAD. ■

Timothy Allinson is Vice President Engineering with Murray Co. mechanical contractors in Long Beach, Calif. He is licensed in both mechanical and fire protection engineering in various states and is LEED accredited. He can be reached at laguna_tim@yahoo.com.


Suggestifications ***[suh g-jest-uh-fi-kay-shuns]*****:**
n. vague descriptions or loose assessments of what a job may or may not need. *The engineer suggestifications stated cast iron pipe so they chose plastic.*
Don't redefine the engineer assessment. Remember, they're called specifications for a reason.
When an engineer specifies cast iron pipe for a specific job, it's because they believe it's the right material needed to get the job done correctly and efficiently. Engineers know that using cast iron instead of plastic for specific jobs eliminates costly extra steps for things like fire-stopping, noise reduction and thermal expansion. And they know that even after the extra steps are taken to make plastic comparable to cast iron, plastic is still outperformed because it's just the wrong material for the job. Simply put, there's a time for plastic and a time for cast iron. The time for cast iron being when the engineer specifies it. Because if you think about it, they don't call them specifications for nothing.
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Code Classroom

Ron George, CPD
President, Plumb-Tech Design & Consulting Services, LLC

Grease interceptor requirements

I was recently talking with a colleague about an issue he was having with grease interceptors. He does a lot of engineering for several national restaurant chains. He site-adapts standard drawings of various size buildings based on the building's orientation and utility locations. One of his biggest complaints is that grease interceptor sizing and grease waste requirements change from municipality to municipality, depending on which code or AHJ is involved in the project. We had a long discussion about why there are so many different local code requirements for grease interceptors. The problem stems from the lack of a grease waste system design standard. It seems that every agency has a different but conflicting way of routing the piping and sizing and locating grease interceptors. Food codes and ordinances also have conflicting language.

Sewer department or utility district ordinances regulate the discharge in many areas, with maximum allowable effluent levels and requirements for sampling manholes or monitoring wells on the building drain. When a food waste grinder is installed and bypassed around a grease interceptor it can cause the sanitary waste effluent to exceed the allowable levels in the sewer.

These various ordinances affect the installations my colleague works on, and they are not consistent. He said he wished there was a credible source of information such as a grease interceptor sizing guideline and a standardized design method for the piping installation that everyone agreed upon and that the codes could agree to reference. My experience has been that the codes are very political and easily changed depending on the whims of various interests.

Sizing and grease waste system design is a complicated issue. We need some organization, such as the American Society of Plumbing Engineers (ASPE) to develop a Grease Waste Design Standard and, maybe, a grease interceptor sizing method.

Food waste grinders

Because a food waste grinder could quickly plug up a grease interceptor with solids, many ordinances allow the grinder to bypass the grease interceptor. When grease adheres to food particles it acts like the aggregate or filler in a concrete mix and makes a gooey ball, causing problems with the drains downstream. Some ordinances require only the wash sink of a three-compartment sink to flow through the grease interceptor; they mandate that the other two sinks flow directly to the building drain.

Some ordinances require various handwash sinks in the kitchen and kitchen floor drains to bypass the grease interceptor, while others require every fixture in the kitchen to go through it. There is no code language mandating a greater slope for grease waste lines to get the grease to the interceptor quicker, although slope is mentioned in several engineering resource books.

Pre-wash sinks with a food waste grinder are probably where the most grease enters the waste system, yet these are allowed to bypass the interceptor in a few local ordinances because they do not know how to address the solids and the grease, which seems counter-productive. There seems to be a marketing campaign by food waste disposal manufacturers to dismiss the grease waste from a pre-wash sink as a myth.

Grease interceptor terminology and requirements have flip-flopped in the codes recently. Over the last eight years, there have been many efforts to change or fix terminology problems in the two model plumbing codes with respect to the industry standards for grease interceptors. A recent code change cycle saw several code changes proposals put forth with good technical justifications, but the sheer quantity sometimes seemed to overwhelm the plumbing code committees. A few changes went through, but it was clear more work was needed to standardize the language in the two model codes. The term for "grease trap" in one code meant something completely different in the other code.

For example, in the past in the Uniform Plumbing Code, the term "grease trap" referred to devices that removes grease and were smaller than 750 gallons. The UPC also referred to a "grease interceptor" as a device that removed grease and was 750 gallons or larger. So the UPC terminology changed based on the size of the device. The term "trap" is defined in the codes in relationship to trapping sewer gasses, not trapping grease waste. The proper terminology is "grease interceptor" and "interceptor" is the terminology used in the industry standards for these products. The devices have air vents between the chambers to allow air to move freely from the inlet to the outlet. Because of this airway, it should not be referred to as a trap.

Grease removal devices are hydro-mechanical or gravity-type grease interceptors with either a heater and grease pump or a heater and a skimmer wheel to remove the fats, oils and grease (FOG) that floats at the top of the interceptor and pump it or drain it by gravity to an adjacent container for easy removal.

The American Society of Mechanical Engineers (ASME) standard for grease interceptors, ASME A112.14.3, addresses hydro-mechanical grease interceptors, and the ASME A112.14.6 standard addresses grease removal devices.

Many proposals have dealt with the terminology updates that started the grease interceptor debate. Everyone wanted to change the code to require something unique to their area or to the products they sold. Concrete tank manufacturers supported a code change proposal

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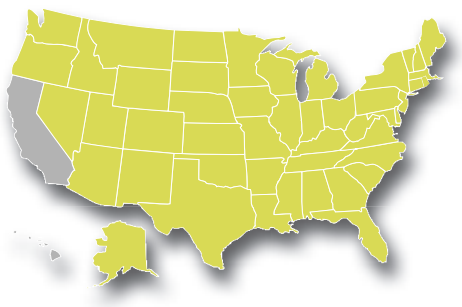

Highlighted states indicate adoption of an ICC PMG code at state or local level

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allowing only large outside grease interceptors. The reason given was that grease interceptors were smelly and objectionable when opened in the kitchen area. Smaller grease interceptor manufacturers supported a code change that allowed only inside grease interceptors. Their reasoning was that grease coagulates in long runs of piping leading to outside grease interceptors and that food decays in large interceptors, causing odors and concrete spalling. Still another code change proposal was that the minimum size of any grease interceptor be at least 1,500 gallons. During the code change discussions on the 1,500-gallon minimum, someone testified that the minimum size should be 2,500 gallons because that was the requirement in their area of the U.S.

The ensuing debate stirred a lot of emotions, including asking that, if the minimum size were 2,500 gallons and the interceptor was located outside, what would happen to Mom and Pop sandwich shops or delis in an urban area or downtown location with only a three-compartment sink and practically no grease waste discharge.

Some codes require a solids interceptor between the food waste grinder and the grease interceptor. The additional cost of a solids separator is significant, so some food waste grinder manufacturers have been lobbying the model code organizations to allow an exception to allow the grease waste to bypass the grease interceptor if there is a food waste grinder on the sink. That logic allows the most grease-laden waste mixed with a high concentration of food particles to be introduced into the building drain and the sewers. Bypassing the grease interceptor with greasy food particles will likely lead to an increase in clogged building drains and sewers. Most drain and sewer cleaning companies would likely welcome this option because it will guarantee increases in their future business.

Grease interceptor facts

1. Cooking and preparing foods results in the production of fats, oils and grease, (FOG), which can congeal or solidify in the sanitary sewer pipes inside a building or downstream from a building as the grease laden wastes cool down. This is harmful to building drains and sewers.
2. The purpose of a grease interceptor is to remove FOG from the waste flow before it gets into the public sewers.
3. The congealing of grease in a building drain or sewer can cause sewage to back up into a building or multiple buildings, or sewage can fill a manhole and flow out of a manhole cover in the street and down the storm drain to the natural waterways.
4. Sanitary sewer overflows near major bodies of water have contributed to many fish kills and to contamination of natural waterways, lakes and oceans.
5. Sewage backups inside a building or in the public sewer are a health hazard and an environmental hazard. For this reason, model plumbing codes require removal of all harmful substances that can be detrimental to the sewers. (Sand interceptors, grease interceptors, oil interceptors, lint interceptors, etc.)
6. The EPA has fined many water and sewer districts for not properly addressing grease waste issues after sanitary sewer overflows contaminated waterways because local codes and grease interceptor ordinances were found to be inadequate and because they did not address the issue after earlier citations.
7. The amount of grease waste production varies depending on the restaurant, the type of foods served and the cooking habits of the staff.

Proposed Grease Waste System Design Standard

I would like to see ASPE develop a Grease Waste System Design standard that covers:

1. Grease waste potential of various restaurant types
2. Calculation of the number of meals served per day, week, month, year.
3. Amount of grease waste developed based on number and type of meals
4. Fixtures likely to produce grease waste
5. Design and layout of grease waste piping system
6. Types of interceptors

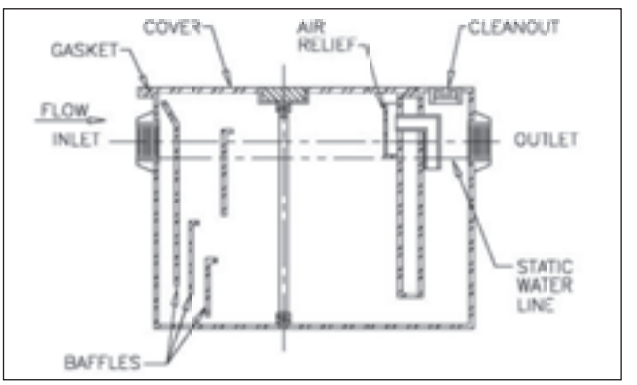

Figure 1 – Typical hydro-mechanical grease interceptor.

7. Size and location of the grease interceptor
8. Maintenance requirements of a grease interceptor
9. Recommended grease interceptor maintenance ordinance
10. Maximum number of days between cleanings based on grease production
11. Recommended grease interceptor cleaning frequency ordinance

I would like to see the ASPE Research Foundation and/or the Plumbing Efficiency Research Coalition (PERC) study some of these grease waste issues. I would also like to see ASPE consider the development of a Standard for the Design of Grease Waste Systems.

Hydro-mechanical grease interceptors utilize a flow control device that limits the flow of waste through the interceptor and through a series of baffles. The baffles cause the waste to start flowing upward on the inlet side of the interceptor. This improves the efficiency of the interceptor, especially when hot water or detergents have broken up the grease into tiny droplets that are more difficult to separate by gravity. The increased velocity of the waste flow through the smaller interceptor can make it difficult for separation without the flow control device, baffles or partitions. The FOG attaches to the debris in the

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waste stream and can pass through if the flows are excessive. This type of interceptor will plug up in short order if a food waste grinder is connected to the unit without a solids separator.

There can be problems with this type of installation if

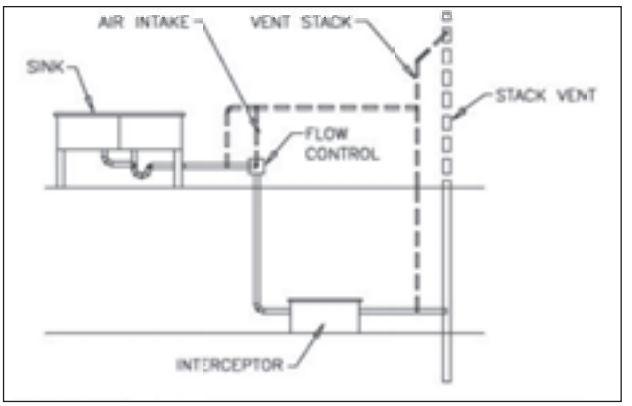

Figure 2 – Two-compartment sink with a vented flow control orifice on the same level as the sink and the grease interceptor on the floor below.

the flow control device is at a lower level than the grease interceptor. This increases the head pressure on the inlet to the flow control orifice, and the flow rate through the flow control device and interceptor increases proportionally. If the elevation change is significant, the flow can be so high it flushes the grease right through a smaller interceptor. Make sure the flow control device is near the sink. The Standard calls for the flow control device to be about 11 inches below the sink so that the flow will be consistent from each tested device. In the field, it can vary an inch or two without much of a change in flow.

A gravity-type grease interceptor works based on a much larger volume, while it slows the waste flow down through the interceptor to the point that the grease is allowed to rise to the top of the interceptor over a time period of a minimum of 30 minutes.

A flow control device is used to maintain the correct flow rate through the grease interceptor to avoid excessive flow turbulence and velocity, which could allow grease to pass through the interceptor. Flow control devices are typically not installed on the larger outside interceptors, because the pipe size is the flow restrictor.

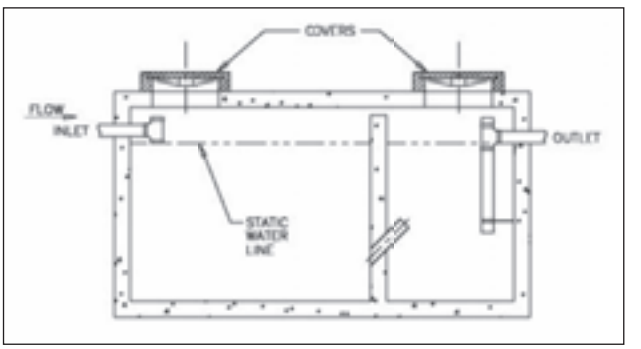

Figure 3 – Typical gravity grease interceptor.

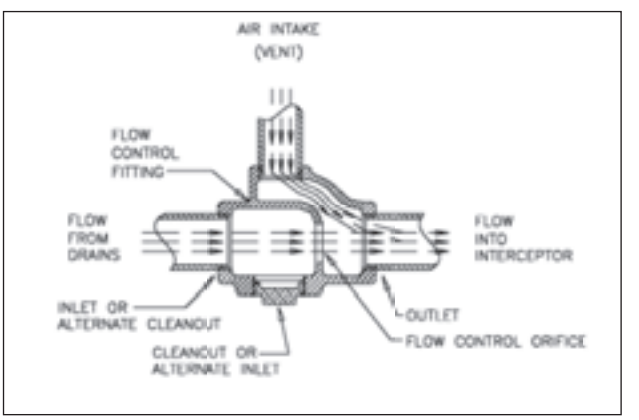

Figure 4 – External vented flow control device.

The interceptor is large enough to take care of the flow.

A number of proposals from a variety of sources and members of the ASME committees dealt with grease interceptors and grease removal devices, solids interceptors and food waste grinders. A few code changes were submitted to both model codes in an effort to bring both codes in line with the terminology from the ASME standards. The code changes were intended to have been working for common terminology in the model codes.

IAPMO had a FOG task group that met over a period

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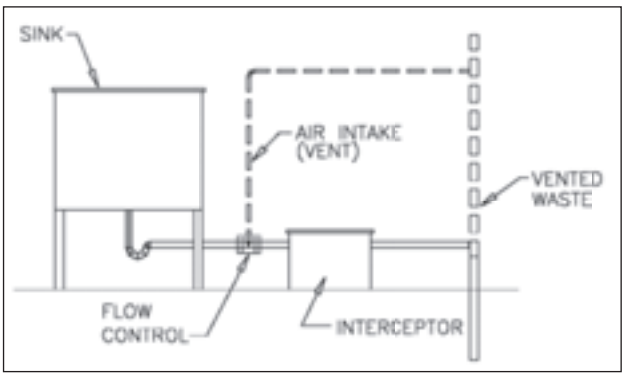

Figure 5 – Typical grease interceptor serving a single sink with a vented flow control device.

of several years at the IAPMO headquarters in Ontario, Calif. There was a push to differentiate the types of grease interceptors. It was also pointed out that there was a need for a consensus standard that addresses gravity type or large outdoor concrete grease interceptor performance. Standards for concrete septic tanks and an IAPMO product standard for grease interceptors did not address performance. Both seemed to focus on reinforcing, concrete strength and structural traffic loading for the tops. I am still not sure if IAPMO/ANSI Z1001 addressed lining of the concrete tanks to resist the acidic environment; at last check, they were not addressing the grease removal efficiency of the concrete interceptors. They only were addressing concrete strength and traffic loading. I'm not sure how that turned out. ■

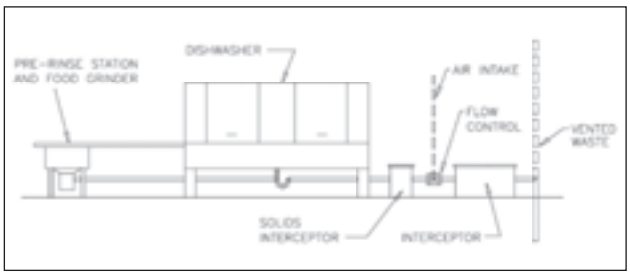

Figure 6 – Typical grease interceptor that serves a dishwasher and pre-wash sink with a disposer and solids interceptor.

Ron George is president of Plumb-Tech Design and Consulting Services LLC. He has served as chairman of the International Residential Plumbing & Mechanical Code Committee. Visit www.Plumb-TechLLC.com, email Ron@Plumb-TechLLC.com or phone 734/755-1908.

The views and opinions expressed in this column are those of the author and do not reflect those of *Plumbing Engineer,* TMB Publishing, or ASPE.

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FPE Corner

Samuel S. Dannaway, PE, FSFPE
President, S.S. Dannaway Associates Inc., Honolulu

NFPA 20 – Changes in the 2013 edition

The next new standard up for us is the 2013 edition of NFPA *20 Standard for the Installation of Stationary Pumps for Fire Protection*. Here are some of the changes I see as significant. Where paragraph numbers are cited they refer to those in the current 2010 edition of NFPA 20.

• **New Definition: In Sight From (or Within Sight From, Within Sight)**. Fire pump controllers have always been required to be located "within sight" of their associated fire pump motor or engine. This is now defined (as extracted from the NEC) to be "visible and not more that 15 meters (50 feet) from (one another)." An annex note indicates that the controller may be located in a separate room, provided glazing is provided to meet the "visible" portion of the requirement.

• **Water Flow Testing.** Paragraph 4.6.1 requires that the water supply to fire pumps be reliable. A new paragraph 4.6.1.2 is added to match a similar provision in NFPA 13 that requires water flow tests used for the design of the fire pump system to be performed within 12 months of submission of the working plans (shop drawings). The requirement may be modified by the AHJ where the 12-month requirement cannot be met. I understand this situation is common in Frostbite Falls.

In paragraph 4.6.5.2, the 2010 edition technically permitted the water supply to provide less than 100 percent of the rated flow of the fire pump as long as it could still meet the demand for which the fire pump system was designed. The change to this provision requires that the water supply must be capable of providing at least 100 percent of rated capacity.

• **Anti-Vortex Plate.** In paragraph 4.14.10, the term "vortex plate" has been changed to the more correct "anti-vortex plate." Illustrations have been added to the annex to provide examples of anti-vortex plate design.

• **Backflow Prevention Assembly (BPA).** An annex note has been added to paragraph 4.15.7 to point to A.4.15.6, which identifies conditions where the system side of the BPA can be used as the required discharge control valve.

• **Suction Pipe and Fittings.** The prohibition against valves other than OS&Y valves within 50 feet of the pump suction flange has been clarified. The prohibition applies to other control valves (such as butterfly valves) and not valves otherwise permitted (such as backflow prevention devices).

• **Seismic Protection.** Where earthquake protection is required, a specific provision has been added to require that pipe and fitting comply with the requirements of NFPA 13.

• **Meters and Testing Devices.** Where a flow meter is provided and arranged to flow around the pump or back to a tank, it must also be arranged so that flows through the meter can be routed through the hose test header. The diagrams in the annex have been revised to also show this arrangement.

• **Fire Pumps for Very Tall Buildings.** Significant new provisions have been added to Chapter 5 Fire Pumps for High Rise Buildings for "Very." Though not specifically defined in the code text, a new annex note identifies very tall buildings as those that have levels in which fire department apparatus cannot pump into fire department connections and achieve pressures of 100 psi at topmost hose valve outlets. The annex note goes on to say that this limit is normally reached for buildings in the range of 200 to 350 feet tall and above, depending on the water supply and the fire department capability.

The new Section 5.7 Very Tall Buildings contains the following: The provisions for water tanks have been moved into this section. Additional provisions have been added addressing refill of elevated water tanks. The fire pump backup provisions have been moved into this section and expanded to require either a complete independent fire pump system or another means acceptable to the AHJ.

• **Electrical Equipment Clearance.** Under Section 4.12 Equipment Protection material has been added to address space requirements in fire pump rooms. The new provisions are as follows:

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Notes

The NFPA Fire Protection Research Foundation, in collaboration with Chicago and Illinois chapters of the American Institute of Architects, the Chicago Highrise Committee, the Society of Fire Protection Engineers and the Council on Tall Buildings and Urban Habitat presents the Fire Protection Research Foundation Symposium on Fire Safety Design and Sustainable Buildings: Challenges and Opportunities, November 7 – 8, 2012, at the Courtyard Marriott Chicago Downtown/Magnificent Mile.

This symposium will feature perspectives from architects, engineers, the sustainability community and research institutions on the challenges and opportunities of integrating fire safety and sustainable design. The goal of this event is to bring the fire protection and architectural communities together to discuss these topics and to share ideas and best practices for sustainable fire safe design.

For more information, Google the NFPA Research Foundation.

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FPE Corner

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"4.12.1.1.6 The pump room or pump house shall be sized to fit all of the components necessary for the operation of the fire pump and to accommodate the following:

(a) Clearance between components for installation and maintenance

(b) Clearance between a component and the wall for installation and maintenance

(c) Clearance between energized electrical equipment and other equipment in accordance with NFPA 70

(d) Orientation of the pump to the suction piping to allow compliance with4.14.6.3"

(I wonder whether this will help us to get architects to give us enough room to design our fire pump systems.)

• **Power Supply Reliability.** There will be new provisions to quantify when a primary power source is reliable. The lack of a quantitative definition of reliability has been a problem for us when we contend that an electric motor-driven pump may need a secondary power supply. This new requirement may give us what we need. Introducing the acronyms SAIDI and SAIFI:

"9.3.1.1 For a primary power source to be considered reliable, it shall have a System Average Interruption Duration Index (SAIDI) weighted average rating with Major Events included of 200 or greater unless the AHJ requires a higher rating.

9.3.1.2 For a primary power source to be considered reliable, it shall have a System Average Interruption Frequency Index (SAIFI) weighted average rating with Major Events included of 1.2 or greater unless the AHJ requires a higher rating."

In your designs you should not allow electric motor-driven fire pump systems to have only one primary source of power unless the SAIDI and SAIFI ratings are known and meet these requirements.

• **Alternate Power Sources.** Regardless of the reliability of the primary power, an alternate power source is required for any fire pump serving a facility with overnight residents or which is classified as an IBC 2009 occupancy category IV. (What happened to NFPA 5000?)

• **Limited Service Controllers.** The NFPA 20 Technical Committee reversed a vote during the Report on Proposals which deleted the section on limited service controllers, reinstating the section but requiring that they be provided with locked rotor overcurrent protection. Some argue that this is a more subtle way of eliminating LSCs without eliminating them from the code. This appears to be a big win for manufacturers of fire pump controllers.

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FPE Corner

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• **Dikes for Fuel Tanks.** A useful exception has been added to the requirement for fuel tanks for diesel engine drives to make it absolutely clear that monitored double wall tanks need not be provided with additional containment.

• **Low Oil Pressure and High Engine Temperatures.** Requirements have been added to signal the controller when a critically low oil pressure or critically high engine temperature have been reached.

• **Full Load Current Test.** During acceptance, a one hour "full load (150 percent rated flow) current test" shall be performed. (Hope you have somewhere to put the water.) This, in effect, will force all fire pumps, with no tank to dump water back to, to have an around the pump means of flow testing and a flow meter. Buy stock in meter manufacturers.

• **Water Mist Positive Displacement Pumping Units (WMPDPU).** There are several new provisions including:

1) A new definition
2) Requirements regarding shop curves for these systems
3) Acceptance test requirements for units with variable speed drivers to meet performance curves for both the variable speed condition and non-variable speed conditions
4) Provisions for use of WMPDPU for pressure maintenance.
5) A new section in Chapter 8 Positive Displacement Pumps applicable to WMPDPU.
6) Acceptance test provisions

• **Fire Pump Test Form.** The "Centrifugal Fire Pump Acceptance Test Form" has been improved and updated.

Two significant new items passed by the committee were rejected by the membership in floor actions at the NFPA Technical Meeting in June 2012 and thus will not appear in the next edition.

• **Location of Pumps in Series.** This would have required all pumps in series to be located in the same room. This was done to improve the reliability of the system. Additional provisions allowing for an exception to this requirement were also to be included.

• **Fuel Quality Maintenance.** This would have required "listed active fuel maintenance systems" on the fuel systems of all liquid fuel driven engines. ■

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Sustainable Design

By Winston Huff, CPD, LEED AP BD+C

Water-efficient data centers

Data center owners and operators have recently made great strides in energy and water efficiency. It is commonly known that data centers use significant amounts of energy, and consumers are starting to recognize the ripple effect from such energy usage. This is becoming a big public awareness issue with data centers. Consumers are concerned about the environmental or political impacts of some energy sources and understand that they have the ability to reduce their use of the energy and, as a result, decrease the harmful environmental and political impacts of certain energy sources. Thus, data centers that are good stewards of power will most likely be viewed in a positive light by the public and gain more clients.

However, did you know that data centers also use significant amounts of water as well? Data center operation is a good example of how water and energy efficiency are interlocked, but in some cases water efficiency is sacrificed to maximize energy efficiency. The following column examines how energy and water are used in data centers, organizations that are developing ways to promote water efficiency and examples of water-efficient strategies for data centers.

Benchmarking

When new designs that use less power and water are under consideration, the team should look at data from other projects so design decisions can be based on real-world operations. Energy and water models are becoming very important when choosing the type of energy system to be used at a particular site. Benchmarking is also helpful to verify that the system will be more efficient. Unfortunately, developing a benchmarking system can be difficult.

The Green Grid (thegreengrid.org) is an organization that is taking this challenge to task and promoting energy and water efficiency in data center design and operations by developing metrics to advance energy and water effectiveness. Some of the metrics it has introduced in the past few years include power usage effectiveness, data center energy productivity, energy reuse effectiveness and data center compute efficiency. A new metric, water usage effectiveness, calculates the annual water usage of a facility (in liters) divided by the IT equipment energy used in the facility (in kilowatt-hours). Combined with the other metrics, the water usage effectiveness metric will enable data center operators to quickly assess the water, energy and carbon sustainability of their facilities, compare the results and determine whether any improvements need to be made.

The Green Grid guidelines are concerned with the amount of water that is used to generate electricity offsite, because offsite power generation can be part of a facility's entire water footprint. Why should a facility take extra measures to reduce water usage in energy production at the data center site when the utility wastes water when electricity is initially generated? TGG suggests referring to the National Renewable Energy Laboratory report, Consumptive Water Use for U.S. Power Production (http://1.usa.gov/S022bL) to determine how much water is used in the production of power per kilowatt-hour in each state.

The U.S. Green Building Council Water Efficiency Technical Advisory Group discussed water used in offsite energy generation when developing the current LEED guidelines and the next generation of guidelines due out next year. Should this be another way for a building to obtain LEED credits? The group realized the importance of reducing water in a building and in power generation offsite. After much discussion it was decided that, at this point in time, the USGBC development guidelines should focus on water usage on-site in a building's design and operations. Introducing complex submittals to track offsite water would be difficult when important on-site water issues still need to be addressed.

Water and energy use in data centers

Determining the right mix of energy and water-efficiency strategies is a delicate balancing act. In some cases a water-based system can be more energy efficient than a system using air, but is it really efficient to use more water to save energy?

Data centers use energy in two major ways. One is to operate the servers; the other is to move heat away from the servers. Servers operate most efficiently at a specified temperature and humidity, so, while they are operating, any excess heat produced must be removed and the proper humidity level must be maintained. The amount of power and the availability of the power are very important factors, because the power must be dependable and continuous.

Operators looking for ways to reduce water usage should first consider retro-commissioning. One common problem that can be discovered with commissioning is when computer room units and humidifiers work against each other. A computer room cooling unit removes the humidity in the air stream by cooling the air, but then the downstream humidifier adds humidity back to the same air stream. ASHRAE Technical Committee 9.9: Mission Critical Facilities, Technology Spaces and Electronic Equipment, recently recommended a reduction in the humidity levels in data centers, but many centers are reluctant to reduce these levels.

More creative options are available that use less water and energy to remove heat and maintain humidity. Green power, such as solar, wind and fuel cells, is an option to consider in power generation. These systems can reduce the amount of water used in the power generation process and can be installed on-site or offsite.

Thanks to the Internet and cloud computing, most tasks are being done in remote data centers located around the world. Because of this, data center operators can reduce energy and water usage by locating their facilities in suitable

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areas. For instance, a location in a cool climate can reduce the amount of cooling that is required to operate the center. In theory, a data center that can use the free, cold, dry air from outside the facility will use less power than a facility located in a region with a hot and humid climate. The cool outdoor air needs little dehumidification, so in these conditions the use of a cooling tower and the associated concerns regarding water usage can be reduced or, possibly, eliminated.

Case studies

An interesting case study is the Facebook data center in Prineville, Ore. Information about the facility's water and energy systems can be found on the Open Compute Project website (opencompute.org). The facility's WUE has been tracked on a quarterly basis, and it is on target to achieve approximately 0.22 L/kWh for the first-year annualized calculation. Other water-efficiency strategies include a water meter to track the data center cooling water usage, reclaimed water and waterless urinals. Most of the water savings are due to the elimination of the need for a cooling tower.

The data center's mechanical system utilizes 100 percent outside air economization with a direct evaporative cooling and humidification misting system. It differs from typical data centers because it uses outside air instead of recirculating 100 percent of the air used to cool the server room. Traditional systems use chillers and cooling towers to maintain the proper conditions. This was not required in this facility, in part because of the low temperature and humidity of the outside air.

The facility uses water in a misting system for cooling in the direct path of the supply air to the data hall. The small orifices on the spraying system require high-quality water, so the water goes through a carbon filter, softeners and reverse osmosis. Approximately 75 percent of the water that is brought into the data center cooling operation is used, while 25 percent is blown down. The next Facebook data center planned on the site will use a membrane system instead of the misting system to reduce water use even more.

Not all data centers are designed the same. Apple is in the process of building a data center in Prineville to also take advantage of the cool night air, but, unlike the Facebook facility, Apple plans on using a geothermal system to provide cooling for the building. Geothermal systems typically use less water compared to a system using a cooling tower.

Another Apple data center in Maiden, N.C., earned LEED Platinum certification. Outdoor weather conditions are much different in this location than they are in Prineville, so this facility uses a waterside economizer during the night and cool weather hours. Chilled water storage systems improve chiller efficiency by transferring 10,400 kWh of electricity consumption to off-peak hours each day. These systems allow the chillers to be turned off 75 percent of the time. The building does have a cooling tower; however, it is not used as much as a typical cooling tower system.

Google is not to be outdone in the sustainable data center competition. The company is looking into using seawater from the cold Baltic Sea in Hamina, Finland, in an old paper mill that will be converted into a data center. The cold water will be used to cool the servers, so cooling towers will not be required.

The creative minds that have designed computing systems and data center technologies have changed the way we live, socialize and work. Complicated tasks are made easier, and data is more readily available. These same creative minds may develop ways for data centers to use water and energy more efficiently. This new test bed of technology in data centers can benefit other building types and raise the bar on building water and energy efficiency. ■

Winston Huff, CPD, LEED AP BD+C, is a project manager, plumbing fire protection designer and sustainable coordinator with Science Interactive (scienceinteractive.net) in Nashville. He serves as an ASPE representative on the ICC Green Construction, Energy and Water Code Development Committee and is on the U.S. Green Building Council's Water Efficiency Technical Advisory Group for v3.0. He was the founding editor of Life Support and Biosphere Science and has served as its editor-in-chief. He also is editor of Me Green You Green (megreenyougreen.com), a LEED credit databank.

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Solar Solutions

Bristol Stickney, chief technical director, SolarLogic LLC, Santa Fe, N.M.

Bristol's Six Principles for Good Solar Hydronic Design

#51: Best ideas from the past 50 episodes

Last month this "Solar Solutions" column passed an auspicious milestone — 50 episodes and counting. In these past columns I have presented a wide spectrum related to the design and installation of solar heating systems in whole buildings, a.k.a. solar combisystems. Each article represents a single puzzle-piece of a larger picture puzzle that provides a roadmap for hydronic solar heating system deployment on a larger scale. Just in case you missed some of the earlier articles, I would like to take this occasion to sum up some key topics covered in the last four years, starting with a concept I have recently come to think of as the "Prime Directive" (with apologies to *Star Trek*).

The Prime Directive (for solar heating)

We cannot expect solar heating to be widely accepted in the larger consumer market today unless it is "at least as reliable and trouble-free" as conventional hot water boiler systems. It will not become a sought-after and desirable upgrade by homeowners and building managers unless it achieves consistent "performance and longevity better than conventional heating," with the fingertip control that we have come to expect in hybrid cars and PV electric systems.

> Always design and install solar heating equipment that is at least as reliable and trouble-free as the conventional system it replaces.

This defines the Prime Directive: Always design and install solar heating equipment that is at least as reliable and trouble-free as the conventional system it replaces. Whenever possible, provide performance, longevity and controls that surpass the conventional alternatives.

So, for example, we would shy away from a system that requires that the collectors be covered with tarps during the fall season, because a hot water boiler system does not require this; it would be unreasonable if it did. We would also avoid a system that might stagnate and blow steam during a daylight power failure, because a hot water boiler never does this; no one would want one if it did. We do have the technology to make solar heat as good as, or better than, conventional heating technology. To ensure that solar heating is always seen as an advance in technology and an upgrade to the building, follow the Prime Directive. To do this, try starting with the Six Principles of Good Solar Hydronic Design.

The Six Principles

As many of you already know, in this series of articles, I have been making the case that the key ingredients for solar/hydronic design and installation can be divided into six categories, listed below, roughly in order of their importance.

1. Reliability. Make it reliable.

There is no "solar payback" and no benefit when it stops working.

2. Effectiveness. Think user satisfaction.

The user expects consistent, controllable and comfortable results from their space heating and DHW heating, solar or no solar.

3. Compatibility. Make it compatible in every possible way.

Avoid temperatures, pressures, fluids or components that are not compatible with existing systems, the architecture, materials, human skill levels or anything else at each jobsite.

4. Elegance. Use less to do more.

Fewer parts mean lower cost and fewer things to go wrong. Think of ways to use a single component to do two or three different functions.

5. Serviceability. Make it easier to install, repair and adjust.

Isolation valves, balance valves, air bleeders and unions can save a lot of grief. Data logging and remote control are often worth the savings in service trips.

6. Efficiency. Build in thermal and electrical efficiency.

The solar equipment, the electrical components and the controls must all work together to provide high energy performance with some way to verify it. The success of any solar hydronic home heating installation depends on the often-conflicting balance between any of these six principles. Finding the balance between them defines the art of solar heating design.

Top seven design and installation measures

In the past 50 articles, we have presented a lot of discussion about the details of solar combisystem design. Many of my recommendations are in direct response to the incomplete and unreliable installation details found in past solar heating installations. I have repaired, remodeled and dismantled many solar heating systems over the past 30 years. Here is the short list of ideas that appeared in past columns and have withstood the test of time. In recent years, they have proven their worth in many solar installations, both retrofit and new. I now include virtually all of these measures in every combisystem I design these days.

1. Documentation. Make a complete piping, wiring and control diagram.

Solar plumbing design and the controls are two sides of the same coin. The plumbing system will not work without compatible controls and vice versa. This does not happen by accident, and must be planned carefully before

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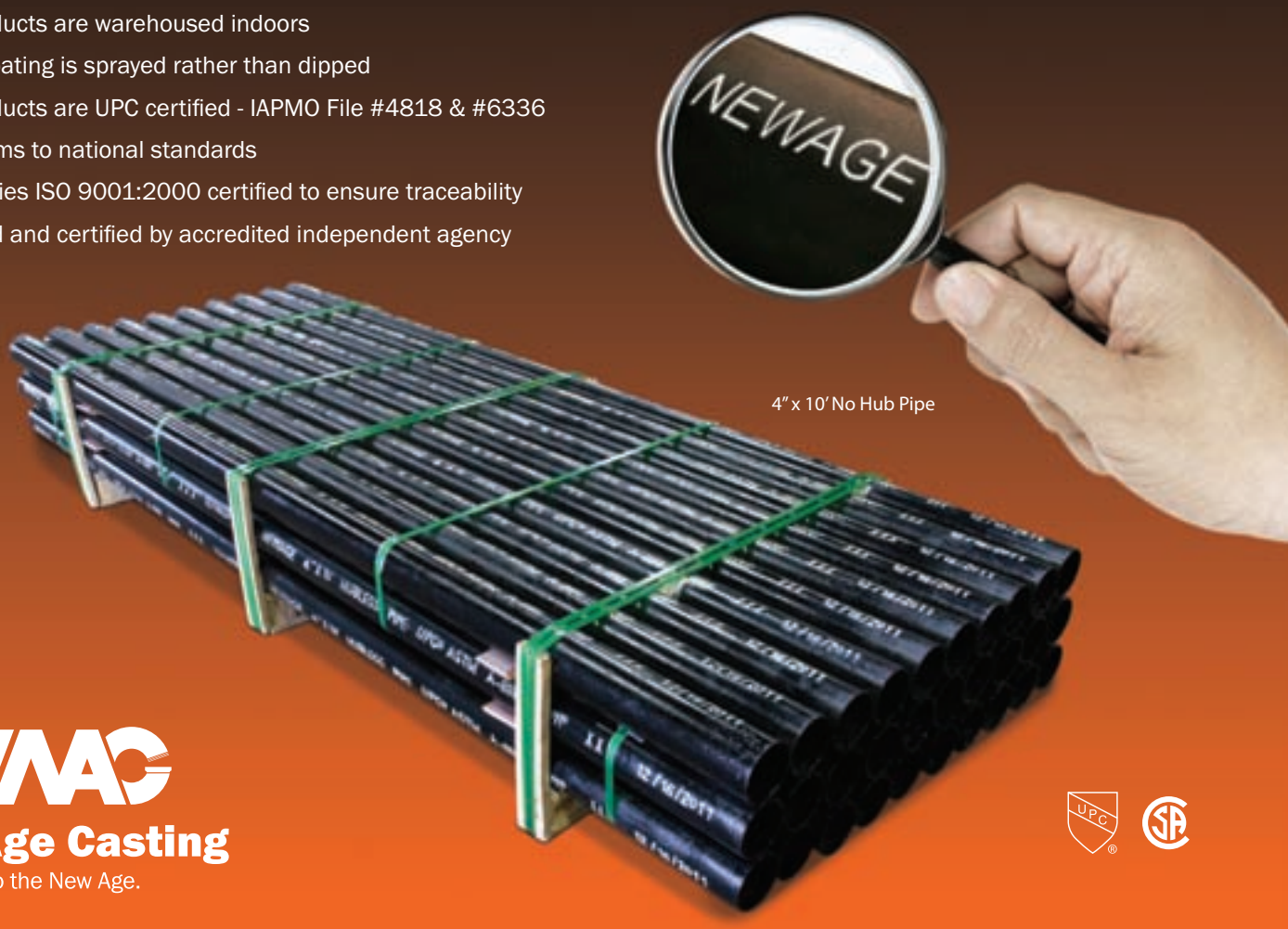

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construction starts. The time spent documenting a complete piping and wiring plan is rewarded many times over in the time saved during installation, startup and maintenance. It is also invaluable to the future users and service people throughout the considerable decades in the life of the system.

2. Primary loop configuration. Standardize the solar/hydronic piping.

A primary loop "flow center" piping configuration allows multiple heat sources to be connected to multiple heat loads and to provide heat directly, to bypass any source or any load or to allow simultaneous operation of any source or load. In past articles, I used a simple primary loop combisystem called "Combi 101" to illustrate these features on a system that includes a bank of solar heat panels, a boiler, a domestic hot water tank and warm floor space heating. Larger primary loop systems may also include swimming pools, baseboard zones, wood boilers and heat storage water tanks attached together on the same loop (just to mention some examples from recent installations). Here at my company, Solarlogic, we have developed a software design tool that speeds the design process of the standard primary loop system. We call it the "Slash-D," and it is available (free) through our website.

3. Direct in-floor solar heat storage. Use concrete floors instead of water tanks.

By using two-stage heating room thermostats integrated into the solar control system, the considerable thermal storage capacity of concrete radiant heated floors can be used directly as solar heat storage. In many cases, this will downsize, or even eliminate, the need for large heat-storage water tanks. (The "Slash-D" design software will help make that determination.) The same principal has been used successfully to heat swimming pools and hot tubs when radiant heat tubing is embedded in the concrete shell of a pool or spa.

4. Controlled overheat dissipation. Prevent collector overheat by heat dumping.

Solar heat collectors can cause a lot of trouble if the liquid inside them is allowed to overheat. We now employ control systems that can dissipate extra heat safely into an existing garage floor, ice melt sidewalk or other normal masonry heating zone to cool the collectors in a controlled way. When controlled properly, human comfort is not compromised, and steam is prevented in the collectors, using existing in-floor or in-ground zone loops. This can eliminate the need for more complex cooling system add-ons.

5. Passive self-cooling. Some self-cooling methods work during a power failure.

Thermosyphon self-cooling fins can be added to any bank of flat plate solar heat collectors, as long as the piping inside and outside the collectors meets some simple prerequisites. Most of our recent solar combisystem installations include this cooling option to reduce the need for service over the long term. Drain-back solar heating systems will also survive power failures just fine, because they empty themselves when the solar pump loses power.

6. Night sky radiant cooling. Flat plate panels can be used at night for cooling.

NSRC cooling can be accomplished using glazed flat-plate solar "heat" panels or (even better) using unglazed flat panels (often used to heat swimming pools). In many recent installations, we have included control settings that allow the "warm floors" to be cooled at night in summer by running the solar collectors backwards at night. Similar control systems can be programmed to dissipate heat at night from overheating water tanks when the stored heat is not being consumed.

7. Performance verification. Data-loggers, remote display and remote control.

One of the chronic problems that have plagued the solar heating professional in the past is the difficulty in verifying that a complex solar control system is working properly from season to season. This usually requires a site visit, with hours spent in the mechanical room meditating over a slew of manual control settings. More hours can be spent on-site trying to observe proper system response, which varies with the weather conditions. Some installers have added data-loggers to record temperatures and system status, so that a long-term record of performance can be used to make better informed adjustments. "HOBO" data loggers, for example, from Onset Corporation have been used this way. Some conventional solar controls now come with a built-in data card that can be removed and downloaded to your computer. These kinds of data-loggers still require a trip to the site to gather the data.

Here at SolarLogic we have overcome this problem by developing the SLIC system. This is an integrated control system for solar home heating that includes data logging that can be downloaded over the Internet. The SLIC also provides remote monitoring and remote adjustment and control over the Internet. As an added bonus, it provides all the control functions and capabilities mentioned in items 2 through 7 above in a single control box.

Final notes

These articles are targeted toward residential and small commercial buildings smaller than 10,000 square feet. The focus is on 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 only to provide examples for illustration and discussion and do not constitute 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 SolarLogic LLC in Santa Fe, N.M., where he is involved in development of solar heating control systems and design tools for solar heating professionals. Visit www.solarlogicllc.com for more information.

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Modern Hydronics

By Bob "Hot Rod" Rohr, Radiant Expert

Have trade, will travel

Tough economic times call for creative answers. Many tradesfolk are struggling to find work and facing low-ball bids on the little work in the pipeline. Perhaps you could consider dusting off your passport and thinking globally. Many U.S. military bases are undergoing energy and alternate energy upgrades, thus providing jobs stateside, as well as at bases abroad. It seems there are few general contractors that specialize in the design and installation of this government work, and there appears to be a steady flow of work on the books.

We recently sent a large solar thermal order to Cuba. The Guantanamo Bay Naval base in Cuba (Gitmo) is upgrading some of their housing units. The old, outdated, "out of code" structures are being demolished and new buildings being built in their place. The base serves the Navy, Marine and Coast Guard fleets and is busy all the time with ships harboring for upgrades and decontamination. It is the logistics center for the Counter Drug Operation in the Caribbean.

I traveled down South to help with installation of the solar project. The trip to Gitmo from Miami was on a small twin-engine prop plan. The flight took me around the eastern end of Cuba, as their air space is closed to most air travel. While it looked on the map to be a short hop, the flight took several hours. Beautiful blue waters welcomed me to the base, a diver's paradise. It was a short, swift boat ride across the bay to the base, which covers about 45 square miles of land and water. I was surprised to see that the landscape is mostly brown, sun-scorched ground. I was expecting to see a lush tropical landscape.

The Cuban government shut down power and water to the base many years ago. Electricity comes from generators and four large wind turbines, which were installed in 2005. The wind spinners provide about 25 percent of the base's electricity. A desalinization plant provides more than three million gallons of potable water per day. A large PV array was under construction as I toured around the area. Taking pictures of the energy sources is strictly forbidden; numerous guard towers along the 17-mile fence line were adequate in discouraging me from any attempt at snapping shots. The fence is patrolled 24/7 on both sides. Also on patrol are plentiful, large iguanas, strutting across the walkways and parking lots to give the place a *Jurassic Park* feel.

The new, brightly colored, stucco buildings were much more family friendly than the beige concrete block buildings that they were replacing.

With a lot of hands-on demonstrations and charades, we managed to get several systems up on the roof and piped back to the mechanical room.

Access to the base is by invitation only; you must have a sponsor unless you are enlisted in a branch of the service that is stationed on the base or travels to it. The "Cactus Curtain" separates the base from Cuban territory and keeps locals from entering. The U.S. pulled up the land mines surrounding the base, but the Cuban government has kept their minefield in place. Over 50,000 mines had at one time been placed around the "No Man's" zone. Workers tell me that, as viewed from the rooftops, an occasional puff of dust in the distance indicates that unsuspecting livestock or wildlife has stepped on a mine.

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WATTS® WATER TECHNOLOGIES

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Early each morning, I was picked up and transported at 20 mph (the strictly-enforced speed limit), to the temporary office facilities of the general contractor and engineering team. After a brief safety meeting and after picking up a handful of safety equipment, I was on my way to the jobsite, which was spread across several locations and consisted of duplex and quad units on hilly settings with gently curved roadways. The feeling was much "homier" than that of the previous rows of housing units. The new, brightly colored, stucco buildings were much more family friendly than the beige concrete block buildings that they were replacing.

I met with the plumbing foreman to look over some of the thermal solar systems he had completed. Master plumber/pipefitter Michael Simeone hails from the Rochester, N.Y. area. With commercial and industrial work in his home market hit and miss, Mike searched the Tradesmen International website (tradesmenInternational.com) for opportunities. A former Marine, Mike is a perfect fit for life on the base and for leading his team through the large, fast-tracked project. His craftsmanship is first class.

With an eye to a good, tax free paycheck to provide for his family, Mike signed a two-year contract. He is an avid diver; access to the reef around the base played into his decision to sign on for the job. Families of the service personnel live on the base; much like any small town it has schools, ball fields and even fast food stores. The surrounding waters are tourist-free and offer amazing diving and snorkeling opportunities.

I met tradespeople from across the U.S. There were roofers from Alabama, stucco crews from Texas and HVAC installers from various southern states. Many of the people I met had been on other overseas projects with the same general contractor, BRDC Inc. Among the list of projects they have worked on were power plant construction, desalinization plant projects and large resort development.

The various crew foremen consisted of experienced tradespeople from the U.S., while foreign nationals serve as the labor force. The crew I worked with had been hired from the Philippines. It seemed the majority of workers on the island are from the Philippines, Jamaica and Puerto Rico.

My plan was to get my hands dirty and help the crew with some installations and a run- through of the startup and control programming. While it was plenty hot on the roofs, gentle breezes from the bay kept working topside bearable. I enjoyed my conversations with installers Edilberto and Elmo from the Philippines. My very limited Spanish and their limited English skills led to some good laughs. The language of the tradesperson, for me, is skill with the tools. With a lot of hands-on demonstrations and charades, we managed to get several systems up on the roof and piped back to the mechanical room. Edilberto and Elmo were happy to be learning a new skill and grateful for the wages that a project like this provided, compared to the hourly wage they were used to in their home country.

Perhaps work has slowed in your area and you are up for an adventure. If you like to travel to faraway places, maybe a search through the offerings at www.tradesmeninternational.com could provide a ticket to a new chapter in your career. Think of it as an extended Boy or Girl Scout trip for the over-30 crowd.

One more thing. It was an honor to work on this project, knowing that we were helping provide safe, comfortable energy for the U.S servicemen and women stationed in Cuba. Thanks for all you do! ■

Bob "Hot Rod" Rohr has been a plumbing, radiant heat and solar contractor and installer for 30 years. Rohr is a longtime RPA member and Plumbing Engineer *and* Phc News *columnist. Bob joined Caleffi North America as manager of training and education.*

The views and opinions expressed in this column are those of the author and do not reflect those of *Plumbing Engineer,* TMB Publishing, or ASPE.

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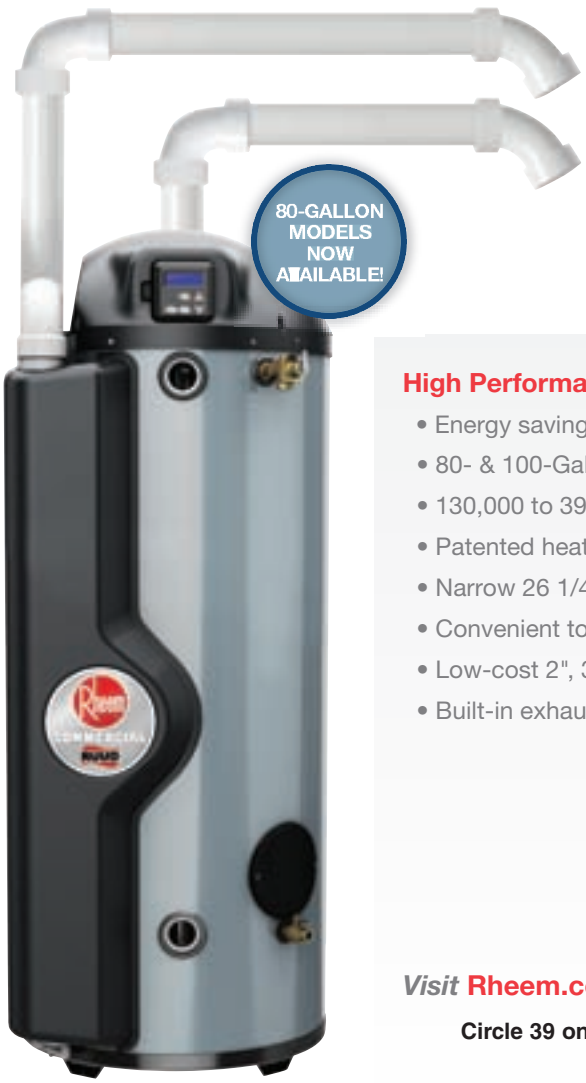

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GreaseStopper saves NYC market headaches and money

Food service establishments (FSE) generate varying amounts of fats, oils and grease (FOG). Over time, these build up and restrict the flow of wastewater through the drainage system. Eventually, FOG accumulation can clog sewer pipes, resulting in sanitary sewer overflows (SSO). As a result, many authorities having jurisdiction (AHJ) establish best management practices (BMP) designed to help food service establishments comply with environmental regulations.

Densely populated metropolitan cities such as New York City, Philadelphia, San Francisco, etc., have limited options available for grease abatement. Zero property lines and connections to inverts further complicate matters. Installing large external passive grease interceptors in properties in these cities can be prohibitive.

Highland Tank worked with the engineers on a job for a large supermarket chain in New York City. They provided a solution to avoid the cost of multiple grease interceptors and instead install one large automatic grease interceptor.

Interior grease interceptors, sometimes referred to as grease traps, require daily to weekly cleaning, which often results in costly maintenance fees. The accumulation of FOG and solids has a direct impact on the effluent quality from a grease interceptor. In many cases, local regulations require all interior grease interceptors to be of the automatic grease removal type (AGRU, GRD). These types of units provide some means of daily maintenance. Highland Tank's GreaseStopper® Automatic Grease Interceptors (AGI) have an integral solids interceptor, reducing total suspended solids (TSS) readings. A programmable controller operates an oleophilic diskimmer that skims fats, oils and grease into an adjacent container at a rate of 20 pounds of grease per hour.

Commercial kitchens often have multiple fixtures, including three-comp sinks, dishwashers, mop sinks, etc. In many cases, the fixtures are spread out and would work best with several small GreaseStopper AGIs. However, the installation of multiple grease interceptors can prove to be costly during installation and regular maintenance.

A large supermarket chain in New York City found itself in the exact scenario just described. Highland Tank worked with the engineers on the job and provided a solution to install one large automatic grease interceptor. The NYC Department of Environmental Protection requires sizing of grease interceptors to be based on aggregate volume in cubic inches of fixtures. In the case of this market, a grease interceptor that could handle a volume of 200 gpm was required to comply. It should be noted that the maximum penalty for non-compliance is currently $10,000 per day, per violation. Therefore, it is important to understand the regulations established by the authority having jurisdiction.

In this application, the GreaseStopper AGI-200 needed to be located in a basement. This required effluent to be pumped up to the sewer main via a packaged lift station provided by Highland Tank. The lift station included pump rails to allow for ease of maintenance of submersible pumps, floats, controls, etc. An elevator is used to take the drums of yellow grease removed from the market's discharge to ground level. Most municipalities have services available that will arrange pickup of the grease removed by the GreaseStopper AGI and recycle it.

There are many considerations when working to eliminate FOG from an FSE's discharge to the municipal sewer system. Highland Tank's professional team works with engineers and customers to provide the best possible solution for each unique scenario. With a complete product line of grease removal systems, Highland Tank will work hard to save you headaches and money.

For more information on the GreaseStopper® AGI product line, visit www.highlandtank.com or call Highland Tank at 814/443-6800. ■

Preventing Grease Discharges into Sewers: Guidelines for New York City Businesses, New York City Department of Environmental Protection: http://on.nyc.gov/NxClTF.

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Q&A

with Jim Kendzel
ASPE Executive Director

Tell us a little about yourself. Where do you hail from, and what path brought you to ASPE? Do you have any special interests or hobbies outside of the Society?

I was born and raised in Lorain, Ohio, and received a Bachelor of Science in Environmental Health at Bowling Green State University and a Masters in Public Health from the University of Michigan.

I have spent my entire career focused on public health, with an emphasis on environmental health and safety. For more than 20 years, I worked for NSF International, a standards developer and product/systems certifier whose mission is focused on public and environmental issues. During my time with NSF, I was involved in the plumbing community through many diverse areas, including standards and code development, audits for plumbing system and component manufacturing facilities, and quality assurance and developing training programs.

Jim Kendzel's Favorite Things

Favorite movies: The *Rocky* and *Bourne* series

Favorite books: From a business standpoint, my favorites are the books written by Jim Collins, including *Good to Great*, *Built to Last* and *How the Mighty Fall*. I am a great fan of John Steinbeck when it comes to fiction.

Song or band on the top of your playlist right now: Amy Grant (my wife is a huge fan so I must include her), Glenn Miller, and Fiona Apple

Favorite restaurant: Spiaggia on Michigan Avenue in Chicago, followed by Twin Anchors in Old Town, Chicago

Favorite place to relax: My leather chair

Favorite thing about ASPE: All of the wonderful people I get to interact with, including the board, staff, members and folks throughout the plumbing community. It is really a wonderful community filled with dedicated professionals.

After leaving NSF, I decided to gain experience in association management with the goal of ultimately leading an association or society focused on public health and safety. In fulfilling this objective, I gained experience by running associations such as the Institute for Credentialing Excellence, Battery Council International and others. During this time, I obtained certification as a Certified Association Executive (CAE).

When considering the executive director/CEO position at ASPE, I saw four opportunities for synergy and success in helping the ASPE board of directors lead the Society forward: (1) my love for and background in public/environmental health, (2) my experience in standards and code activities, (3) my experience in leading the preeminent U.S.-based accreditation program for personnel certification bodies (such as ASPE) and (4) my experience and validated knowledge in successfully running and growing associations. Fortunately, the ASPE board agreed and hired me.

As far as special interests and hobbies, my top priority is my wife, Barb, and our children and grandchildren. I am also a diehard Michigan Wolverines and Cleveland Browns football fan. My remaining recreational time is focused on reading, relaxing and exercise.

Can you talk about your time at ASPE so far? What were some of your impressions coming in? What were some surprises that you had along the way? What are your thoughts on where things are today and where they are going in the future?

When I first came to ASPE, I was concerned about the financial status of the Society and what I perceived as a need for "bridge building" with our chapters and other organizations serving the plumbing community. What I quickly learned is what a great team I had at ASPE headquarters and how eager they were to step up to the challenge of continuously improving ASPE and improving our services to the membership and the plumbing community.

In addition, I began to have heartfelt discussions with the leadership of our Society at the chapter level and our long-standing members as soon as coming on board with ASPE; what I found was a clear passion and love of the Society by members and the common interest and drive to ensure ASPE's long-term success.

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Combining a strong staff with members who are passionate about fulfilling the mission told me that ASPE will grow, and we will get through any obstacle put before us and continue to serve the plumbing community in a valuable manner.

How much emphasis are you putting on growing the ASPE membership base? Is there a special focus on any particular demographic? Are you working to bring more youth into the equation?

As with most professional societies, we experienced a drop in membership after 2008; however, we have reached a steady state in the last year. I am very pleased with our member retention rate, and I know many of my peers in the association world are jealous of our greater-than-95 percent retention.

The board has developed a strategy around membership growth based on one simple tenant: If you provide the community with what they need and continue to improve the value they receive as members, our membership will grow. This is why we have focused on improving our technical publications and educational programs, providing greater value to our members by offering members-only services such as our recently released Plumbing Systems Tables app, evaluating our pricing strategy to ensure our members receive significant discounts and, finally, providing increased support and resources to our chapters to help them provide services and greater value at the local level.

We are in the process of initiating a new outreach program to young engineers and designers to encourage their involvement in Society activities, as well as to attract new young members. I am pleased to say that we already have a significant number of young members, but I think we can do better. Toward that end, we are holding focus group conference calls with our young members to gain feedback on how we can serve them better. We also will be holding a breakfast meeting for young engineers at the upcoming ASPE Convention & Exposition in Charlotte, North Carolina, where we will discuss the results of the focus group discussions and start to develop clear objectives and action items on how to attract young engineers. They are the future of our Society and critical to our long-term sustainability.

In addition, I am very pleased with the strong support we receive from our Affiliate organizations (product manufacturers and service providers). Their financial and volunteer support at the Chapter and Society levels allow ASPE to be successful, and I cannot thank them enough.

Finally, I have come to realize that many of our members pay out of their own pockets for their dues and attendance at ASPE events and some of our

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Kendzel Q&A

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members must take vacation days from work to attend events or participate in Society activities. Although this is one testament to the value of ASPE, it also indicates to me that our members' employers may not have a clear understanding of the value ASPE can bring to their firms. Thus, we will be implementing outreach programs to engineering, architectural, and contracting firm principals to promote the value of ASPE and the importance of helping their employees belong and actively participate in the Society. In addition, and probably more importantly, we will be actively seeking feedback from company owners and principals on how ASPE can improve our value to both their employees and their firms.

What role does education play in your plans for ASPE? What are some of the programs you have going on currently, and what are some things that we can look forward to in the future?

One of our key strategic objectives is to advance the profession and help our members advance in their careers.

One of our key strategic objectives is to advance the profession and help our members advance in their careers.

Providing professional education and training programs and credentialing programs is crucial to meet this strategic objective. We offer monthly webinar programs that provide the most current information on key technologies and practices impacting the plumbing engineering and design community. The webinars are recorded and available for viewing online anytime following the live webinar.

We are also looking to provide more regional workshops, covering such topics as plumbing codes, rainwater harvesting, sustainability and water heating efficiency.

Of course, our cornerstone educational programs are provided at our Technical Symposium and Convention & Exposition, which are offered in alternating years. The seminars go into great technical depth and provide hands-on practice in many cases. I am really excited about our recent partnership with UCLA Extension to develop an online course for plumbing engineering. Registration numbers for the first class are excellent. In addition, we recently received a three-year grant from the National Science Foundation to develop, in partnership with the City College of San Francisco, an associate degree program for plumbing engineering and design and a credentialing program for plumbing design technicians.

We also are developing with IAPMO an exciting new certification program in green plumbing design, which we are launching at the 2012 Exposition. The Green Plumbing Design certification is intended is to introduce green plumbing theory and concepts to plumbing designers who hold the CPD or PE. To learn more about this new program, I encourage 2012 Exposition attendees to visit the ASPE Pavilion booth on the show floor.

In addition to education/training programs, we also are placing an emphasis on the need for research through the ASPE Research Foundation. We recently completed a research study cosponsored by IAPMO on roof drain design; the final report will be available at the ASPE Convention & Exposition. Julius Ballanco, PE, CPD, FASPE, president of the ASPE RF, will hold a technical seminar during the Convention to explain the results of the study. Data from the research is already driving model code changes. In addition, the ASPE RF has developed a research protocol to help us better understand the role that manual and electronic (hands-free) faucets may play in

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increased levels of biofilm growth. Once we have received sufficient funding for the project, we will move forward.

Do you envision any partnerships with other groups or associations now or in the future?

One of my philosophies is that societies that believe they can accomplish their missions and achieve long-term success by themselves will fail. Collaboration with other organizations is a critical tactic in the ASPE long-term strategy and a cornerstone of our future sustainability. I have spent a significant amount of my time with ASPE reaching out to other organizations, always looking for those opportunities to collaborate and partner that provide value to ASPE and our members. We have had significant success with our existing partner organizations. The following are just some examples:

- Membership discount rates with ICC
- Research testing and sponsorship with IAPMO
- Joint training and standards development with ARCSA
- Development of a joint plumbing dictionary with ASSE

We also have implemented signed partnership agreements with ABPA, PERC, and NSF International.

In addition to the above, we have joined the World Plumbing Council, which will enable us to work with plumbing organizations from around the world on plumbing issues and promote sound engineering practices.

I am extremely excited about this year's Convention & Exposition. The staff has done an excellent job planning the event, and attendees can expect a very streamlined and enjoyable experience.

I recently had the pleasure of working with my counterparts Russ Chaney at IAPMO and Barb Higgens at PMI to bring together leaders from more than 13 societies and associations serving the plumbing community at the inaugural meeting of the Plumbing Industry Leadership Council. I have high hopes that this coalition of leaders will continue to come together and provide a valued and strong voice in achieving the goals common to all of us.

It is my hope, as well as the hope of the ASPE board of directors, that we will continue to expand our relationships, especially with other engineering societies. I plan to reach out and build stronger relationships in the near future with organizations such as NSPE, NFPA, ASME and ASHRAE.

What are some of the trends, concerns or hot topics you're hearing about from engineers and other members in the industry?

In discussions with our members and other plumbing industry professionals, I've found the following to be recurring themes:

- Continued and increased emphasis on water efficiency and the impact of water usage on energy conservation
- Development of professional credentialing programs for individuals in the plumbing industry, providing validation of the growing number of specialty areas
- Incorporation of the concept of "management systems" in building maintenance and upkeep to ensure that ongoing water and energy efficiencies are built into designs and maintained
- Need for increased understanding and respect for the value provided by plumbing engineers and designers in ensuring safe and healthy plumbing system designs
- Increased collaboration among societies and associations serving the plumbing community, resulting in a stronger and uniform voice advocating for sound plumbing design and uniform codes

Do you have any forecasts or predictions for 2013?

I am hearing from members that work is picking up, and that is good news. Although it does not seem that anyone has the ability to predict economic trends, I am hopeful that we will see an increase in work for plumbing engineers and designers in 2013. Our members should continually be checking our career center website for position openings as well as to post their resumes: This service is free to our membership.

As far as ASPE is concerned, I see nothing but increased success and growth in 2013. With the strong leadership of the ASPE board members, who have drawn up a strategic vision that will guide us into the future, and an ASPE staff that is passionate about implementing and achieving the objectives to reach that vision, I am confident that we will see many successes in 2013.

Let's talk about the ASPE Convention & Exposition. What can attendees look forward to this year? What will make this show stand out? What are you most looking forward to?

I am extremely excited about this year's Convention & Exposition. The staff has done an excellent job planning the event, and attendees can expect a very streamlined and enjoyable experience.

One of the most noteworthy features of this year's event is our keynote speaker, Kyle Petty. He will be speaking before the Exposition opens on Monday, October 29, at the Charlotte Convention Center. We invite all attendees to join us for what should be a very inspirational speech.

This year we are offering two brand-new features. The first of these is the New Product Innovation Showcase, which will be held in the ASPE Pavilion on the show floor during the Exposition on October 29–30, where numerous manufacturers will be holding 15-minute demonstrations of their newest products. Second, as part of the technical education program, we are offering tours of Charlotte Pipe & Foundry. I'm pretty sure that all of the tour spots have already been reserved, but I encourage Convention attendees to check at our registration desk to see whether any spots have opened up to take part in this informational tour.

I want to remind everyone that the Exposition itself is free, so you can walk the show floor and visit with more than 300 plumbing product manufacturers for just the cost of travel.

I personally am looking forward to meeting as many ASPE members and other plumbing industry professionals as possible, so when you see me, please do not hesitate to introduce yourself! ■

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Q&A

with E. Niles Wilcox
President, Leonard Valve Co.

Mix masters: Leonard Valve stands on a century of water temperature control

From its headquarters in Cranston, Rhode Island, Leonard Valve Co. has produced thermostatic mixing valves for more than 100 years. Over that span of time, the company has grown and evolved while staying true to its founding principles. Plumbing Engineer had the opportunity to chat with E. Niles Wilcox, the president of Leonard Valve Co. since 2008. Wilcox has been with Leonard Valve since 1974, and was vice president and general manager from 1991 to 2008. His father, Everett C. Wilcox, was president of the company from 1953 to 1991. With his family playing such an integral role in the firm's history, Wilcox was able to offer some perspective about where the company and the industry has been and is going.

Tell us a little about the history of Leonard Valve. We understand that some of the original inspiration came from founder Frederick C. Leonard's love of a good shave.

Frederick C. Leonard came to Rhode Island from the Midwest in the first decade of the 1900s. He was a watchmaker, an astronomer and a licensed electrician. Upon arriving in Providence, legend has it that he was scalded when getting a hot shave at the local barbershop. He then decided to apply his talents to inventing a product to make hot water safe for the end user.

By 1912, he had set up shop in Providence, designing the first bi-metal thermostatic water mixing valves. He dedicated his talents to designing and manufacturing hot water mixing valves. Prior to that time, hot water was sent to the faucet directly from a steam boiler, with no control. His first mixing valves were installed at the Rhode Island State Hospitals. By 1913, he had installed more than 20 thermostatic valves. Early letters from the institutions attest to the safe performance of these products.

The Leonard Thermostat Mixing Valve Company was later incorporated in 1913. In 1930, the factory moved to its present location in Cranston, Rhode Island.

has the company changed over the years? In what ways has Leonard Valve worked to remain on the cutting edge while still remainng true to its core values?

For the first 30 years prior to the outbreak of World War II the Company continually expanded the product line. They produced valves in ½ inch to 2-inch sizes. They concentrated on hospital applications but also were specified for hotels, YMCAs, schools and public baths. It must be remembered that showering was a new concept. Without tempering hot water there could be no shower.

The company survived the Great Depression and flourished until the beginning of World War II. During the war years, Leonard Valve was 100% dedicated to the war effort, which included making thermostatic mixing valves for U.S. army barracks. Following World War II, Leonard rededicated itself to providing ever-improving water temperature controls.

How is technology impacting the way you do business, both in terms of production and new product technology available in the marketplace?

Throughout this period Leonard Valve never strayed from its original mission of providing safe water to the end user. Leonard Valve has strived to continually improve the product and has embraced cutting edge technology all along the way. Our design team uses the latest design software. We have continually invested in the newest CNC machinery that now allows 24-hour unmanned machine operations on several machining centers. We also embrace computerized Building Management Systems with our water temperature control systems.

It would seem that you folks wrote the book on employee retention. Can you talk a little about your employees and the relationship the company has built with them?

Our median employment tenure on the manufacturing floor is over 21 years. Leonard Valve Company is small enough that there is a real intimate relationship with all of our employees. Decisions made at the highest level are always mindful of the impact on the employees. I think

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there is a trusting relationship which may be rare in the 21st century. We run the Company with old school values but new school technology. Many or most of our employees will have the opportunity to finish out a career with one company as opposed to hopping around every few years.

Having toured your facility, we know that Leonard Valve puts a lot of emphasis on testing and quality assurance. Can you talk about that philosophy and describe your approach to testing?

At Leonard Valve we try to produce the best quality products that we can. We are mindful of the cost involved in correcting mistakes after the fact. We endeavor to produce zero defects. To try to meet that goal, we extensively test all of our products throughout design and manufacturing, well before shipment to the customer. We want to be true partners with the engineers, mechanical contractors and end users. To have the loyalty of the engineering community we have become experts in water temperature control. We want the engineers to know that we "have their backs" and will never walk away from the difficult situations that may arise.

What are some of issues and hot topics facing the industry right now? What are some of the things on the minds of your customers?

Water conservation and other green initiatives are hot topics today. We are working to provide controls and systems that will operate with less water. We continually strive to lower our carbon footprint with less waste and more recycling of resources.

Are there any particular code or standards issues on your radar? How goes the transition to lead-free?

Our industry is guided primarily by ASSE standards. We are involved in standards working groups for all applicable standards in our industry. Lead-free compliance is a huge undertaking. We have committed significant engineering resources to transitioning all of our applicable product lines to lead-free compliance. We are well along in the process. We will be fully compliant prior to the January 2014 deadline.

Any predictions or forecasts for 2013 and beyond?

We look forward to 2013 to be an exciting year of new products and continued innovation. At ASPE 2012 in Charlotte we will take a break to celebrate our 100th birthday with the engineering community.

If Frederick C. Leonard could see Leonard Valve today, what do you think he would say?

Wilcox: My late father Everett C. Wilcox, who worked for Mr. Leonard for many years and later became president of Leonard Valve Company, would say that Mr. Leonard was a serious man of few words. But I think he would have been proud to see his legacy continuing for more than 100 years. ■

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Q&A

with Paul Knight, *Director of Global Hot Water Markets, Armstrong International*

Established in 1900, Armstrong International has built a reputation for providing single-source solutions for steam, air and hot water systems. With 112 years of history, the company has a long view of the industry's past, present and future. We had the opportunity to discuss industry trends and issues with Paul Knight, Director of Global Hot Water Markets for Armstrong.

How is condensing boiler technology evolving into the space traditionally taken by steam water heaters? What reasons are there for this evolution?

Our observation would be that in cities like New York, Philadelphia and Chicago who operate a district steam service, it is becoming increasingly more expensive to buy the steam from the utility. The green initiatives, which continue to impact our industry, combined with historically low natural gas prices, make the newer condensing gas boilers for space heating more attractive to owners and developers. Adjacent to this paradigm shift is a move away from the traditional steam to water heaters for the domestic hot water (what we like to call people-washing water) within these buildings. With high temperature water already on hand, boiler water-to-domestic hot water plate and frame heat exchangers are surfacing in specifications at a significant pace.

How have advancements like digital technology, connectivity and building automation systems impacted the industry and the products you produce?

The advancement from analog to digital touches all of us every day in pretty much everything we do whether we notice it or not. Clearly in a building utility as important as the domestic hot water system it is a natural progression. The level of importance varies from building type to building type of course but in a facility which caters to the very young, the very old, the infirm or the injured, hot water system visibility, communication and safety is absolutely critical. This sounds like an oversimplification, but if the hot water is too hot we risk a scald injury, if the hot water is not hot enough we risk a bacterial incubation such as Legionella. We really need to pay attention here and there are solutions inherent within digital technology that are vital to the way we design, operate and apply our products, solutions and systems.

You've said that Thermostatic Mixing Valves are not designed for the application for which they are generally used. Can you explain and expand on that?

It is simple and uncontestable – Thermostatic Mixing Valves (TMV) are not designed to mix hot water with hot water yet in a continuously pumped recirculating domestic hot water system under zero demand that is exactly what they are asked to do. I love TMV's; we supply as part of our product line and we have numerous very worthy competitors, some who have been in business for as long as we have and they make excellent high quality mixing valves. Placed ahead of a bank of lavatories in an airport, a series of shower columns in a school or on a therapeutic bathing tub in a nursing home they perform admirably. They get to mix hot water with cold water to deliver a third adjustable temperature somewhere in between. They are in a three-way "dead leg" application per their original intent, there is typically an acceptable inlet to outlet temperature differential (TMV's rarely work well if either of the inlet supplies is too close to the set point) and it is easier to select the TMV or otherwise zone several of them to meet the minimum low flow requirements for each valve, which they all possess – some of those being quite significant. In those applications, TMV are great but get them out of the mechanical room because without installing a number of support components like manual throttling valves and temperature actuated switches (aqua stat) on pumps the TMV will almost assuredly creep the loop temperature up during periods of no demand.

The suggested accessory components associated with TMV's can really create a system design conundrum. The aqua stat on the pump, for example, seems to be a recommendation in virtually every TMV suppliers' installation schematic. Yet turning the pump off as a means of system temperature control is one – not what pumps are designed to do and two, specifically compromises a Legionella incubation control advisory from OSHA and the new ASHRAE 188 standard. If you do a web search on the OSHA website and then do a Legionella "search" you will find the OSHA Technical Manual. Section V Controls C Domestic Hot Water Systems 3 Maintenance then item C. Who does the

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Knight Q&A

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plumbing designer pay attention to the manufacturer or OSHA? Typically the more stringent requirement should be followed.

What questions do codes and standards like ASSE 1017 and ASSE 1070 raise for Armstrong and for the industry in general? What should engineers and manufacturers be aware of? What are some of the points of dispute/debate?

I will get myself into trouble now. I really think that ASSE 1017, which is titled "Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems," serves no purpose. We spend a small fortune on product testing and certification maintenance inclusive of annual fee based audits in order to maintain a standard that does not test the product in a realistic application condition. Some of the most basic dated mechanical mixing valves can sail through 1017 because the requirements are so tepid. I do not think that the seal tells anybody anything.

Here is my point: ignoring heat traced dead leg designs for a moment, the ASSE 1017 test protocol still does not actually test a valve which is clearly destined for a re-circulating hot water system in an actual recirculation related test.

Mixing hot and cold water, where there is a wide differential between each of the incoming temperatures to achieve a third temperature somewhere in between is one thing, but mixing hot water with system return hot water to maintain a set point which is also hot water is significantly more difficult and requires a totally different approach and test protocol.

If the reason for the three-way dead leg test lies in the fact that most of the approved test locations do not have test rigs that could currently simulate re-circulation system heat loss, they need to add the capability. If that is simply not feasible, then I once suggested that ASSE consider an additional procedure in the current 3-way dead leg test.

If the standard would include a test which raised the inlet cold water temperature (which for most manufacturers is also how the re-circulated return re-enters the mixing valve) in 10-degree increments until the inlet

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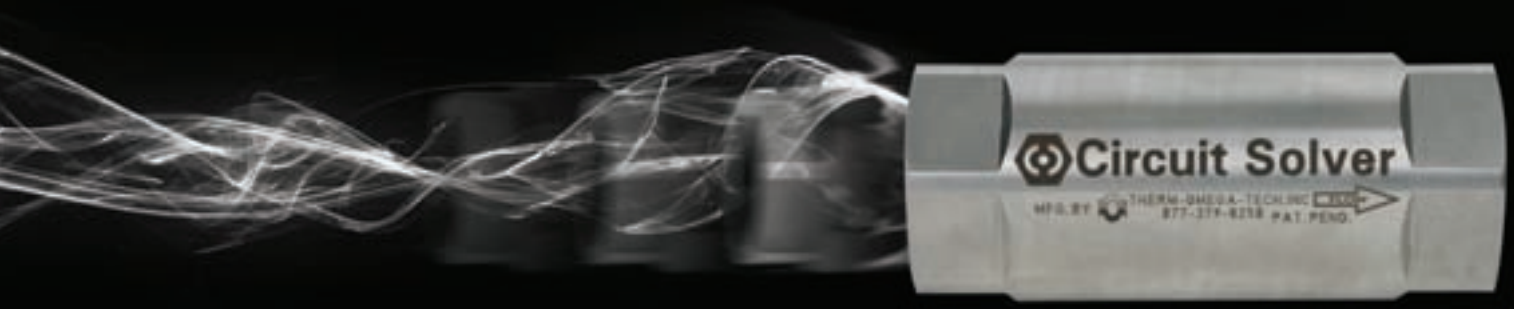

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CW/mixed return reaches a point where it is 10 degrees below mixing valve set point and recording the outlet set point variation at each interval. This would simulate a mixing valve in a system, which is under zero fixture demand "idling" mode with a reasonably typical 10-degree system radiant heat loss.

Plumbing systems can idle up to 80 percent of the time which by definition means that the current ASSE 1017 test addresses performance characteristics which the mixing valve may experience only 20 percent of the time.

Similarly I see issues with ASSE 1070. 1070 is titled "Performance Requirements for Water Temperature Limiting Devices" and it is creating all sorts of confusion. 1070 was adopted by the Uniform and International Plumbing Code and subsequently many states and local authorities have adopted 1070 as a function of adopting UPC/IPC.

IPC specifically references ASSE 1070 and follows with the term "public washrooms" and therein lies the issue. There is no definition of what a public washroom is. I would put forward that using a hospital as an example the men's and ladies rooms resident on the public areas represent the public washrooms and the washrooms in the semi-private and fully private patient rooms are not. That was not the case at a large university children's hospital in my home state a few years ago when a local plumbing code enforcement official insisted that the general public accessed the patient rooms during visiting hours and that qualified the lavatories as public and he wanted approximately 600 ASSE 1070 certified under sink TMVs installed in an already completed building. I lost track of the project and presume that clearer heads may have prevailed, but the debate continues.

Perhaps the most significant issue we have to process outside of the U.S. is the point at which different countries choose to exert water temperature control.

The City of Pittsburgh, or more specifically the Allegheny County Board of Health Plumbing Department, are well known for their position on ASSE 1070. Their enforcement has been significant and one only has to chat with an area plumbing contractor or building operator about the maintenance issues that surround a building with hundreds of small inexpensive point-of-use TMV's to develop an appreciation of the impact.

But the issues with 1070 enforcement might actually extend well beyond the purchase, installation and maintenance expense.

There are guidelines within the OSHA document I referenced earlier, which suggest a periodic system super heat and flush which includes elevating the hot water system to 158°F or above and then drawing that water through each point of use. Try that in a hospital where the ASSE 1070 code interpretation just landed 600 mixing valves at every sink! Without manually overriding every value, often requiring tools to do so, you cannot get a disinfecting temperature in the branch and fixture supply piping to each sink beyond the mixing valve.

There is digital technology available, which not only offers a 1070 solution for points of use in public washrooms but offers a programmable disinfection feature for those facilities seeking to follow guidelines resident within the referenced OSHA document along with similar suggestions from CDC and the New York Department of Mental Health.

How do factors like technology, common use, codes and standards vary between the U.S. and other parts of the world? How do those differences impact your business?

We are a global company with manufacturing locations in Canada, China, India and Belgium and sales offices in hundreds of locations worldwide so yes, by definition we must stay in tune with systems and standards on a global basis

Where do I start? The Safe Drinking Water Act, dubbed "Lead Free" in the U.S., does not have the same profile across the globe, although the EC is trying to agree on a uniform standard for valve materials. Perhaps the most significant issue we have to process outside of the U.S. is the point at which different countries choose to exert water temperature control. It is nearly universal that the hot water generation temperature is at or above 60°C/140°F for reasons of higher temperature water access (kitchens and laundries) and 60°C/140°F is considered a safe stagnant storage temperature to mitigate Legionella incubation.

60°C/140°F will scald you pretty quickly no matter what language you speak, so it is really a matter of where the different systems opt to insert the TMV. The broad brush would be that we tend to re-circulate at 120°F here in North America. Thus, we mix once in the mechanical room and then mix again at the point of use to blend to 105 – 110°F for user access either thermally (TMV), manually (mixing faucet/shower or two taps) or with a pressure balance shower valve.

Outside of North America there is a greater preponderance of 60°C/140°F recirculation temperature and then point of use TMV in the form of under sink mixers and thermostatic shower valves. The latter often significantly increasing the first cost and downstream maintenance expense.

Armstrong is required to deploy different marketing strategies and different product mixes accordingly but at the end of the day it all comes down to a common theme – we serve the customer best when we base our effort on intelligent system solutions.

On the hot water side, how have systems solutions been at the core to your business?

While Armstrong is an iconic name in the steam business, people seem to think that we are new to hot water. Nothing could be further from the truth. Steam has always been and integral heat transfer medium often used to generate hot water within industry, large institutions such as university campuses and major medical facilities, and in cities that operate a district steam service. We know hot water very well and brought our first fully commercial shell and tube steam/water heater to market in 1989. Since then we have expanded the steam/water heater range, added a direct fired 99.7 percent plus efficient industrial water heater with standard units with capacities up to 18M BTU and acquired a niche market gas fired high efficiency condensing commercial water heater. To compliment our hot water generation

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platform, we also market Rada Water Temperature Controls and a complete range of industrial (Emech Digital Control Valves) and institutional (The Brain) digital mixing valves.

Armstrong recently entered into a partnership with Marriott. Can you share a little about that?

Nothing makes us prouder or more secure in our belief that digital technology offers a superior design, installation, operation, maintenance and user personal hygiene experience than a global design standard adoption by one of the worlds iconic hospitality brands. Marriott did their homework and we do not take their belief in us or our system solutions lightly.

What new products or services will you be focused on at the ASPE show?

Our booth is called "Digital Hot Water Innovation" and that is what visitors will experience. The next generation digital recirculating valve, The Brain, has arrived. In concert with our technology partner Kohler-Mira in the UK we have enhanced the platform with the addition of DRV40 a smaller digital valve destined for smaller hot water systems such as nursing/assisted living, K-12 education, higher-ed dorms, etc.

We are also bringing digital technology to the point of use by launching Outlook also developed with Kohler-Mira. Outlook is a six-outlet digital group control valve with programmable delivery temperature and flow control, which is perfect installation in the aforementioned "public washroom" for installations where ASSE 1070 certification is desirable. Outlook is the solution I was referring to in my answer to your previous question about ASSE 1070.

Once a product set goes digital, the opportunities are enormous. At this year's show in Charlotte, we will also be displaying steam/water and boiler water/water heaters that use The Brain for primary control; we call them Digital-Flo.

What are some things on the horizon? What do you see for the industry in 2013?

We see a day where point-of-use fixtures are data logging water usage, which will drive maintenance schedules while at the same time automatically reporting water temperatures during usage periods to central systems in applications where local health authorities mandate set point maximums.

Lead free will continue to be impactful as Louisiana joins Maryland, California and Vermont ahead of the entire country requiring lead free products in the domestic hot water system on 1/4/14. The cost of plumbing system construction will elevate significantly as a result. In my humble opinion, with regard to Thermostatic Mixing Valves controlling hot water, it seems like a lot of time, money and effort to protect people who brush their teeth with hot water, drink their own bathwater or choose to make coffee, tea or warm food using water from the hot water system. It is a little ironic that the legislation is focused on the faucets, valves and water supply components, yet the existing water infrastructure in the U.S. consists of public water mains with lead pipes, cast iron pipes with lead and oakum joints and existing copper plumbing with 50/50 lead solder. But the faucets and valves connected to these systems must be virtually lead free.

Technology will continue to march forward and at Armstrong we look forward to being an active participant. System visibility and the commensurate user safety that digital technology brings to the equation are significant. We see a day where point-of-use fixtures are data logging water usage, which will drive maintenance schedules while at the same time automatically reporting water temperatures during usage periods to central systems in applications where local health authorities mandate set point maximums.

We see digital valves at all points in the system with self-diagnostic features that The Brain already has signaling unsafe conditions through a variety on BMS based alerts and default conditions that ensure user safety.

We see shower valves that upon activation turn off once the overnight dead leg has been purged to drain and desired water temperature is achieved as a conservation measure while the prospective bather attends to other morning hygiene and comfort duties.

We see digital valves that are actively engaged in Legionella incubation mitigation, whether through programmable super heat and flush or out of temperature range reporting. Really, I could go on forever. This is an exciting time and a place to be helping to lead the charge. ■

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If a compact, high efficiency boiler can heat a home in Alaska reliably, it can heat a home anywhere

Proven performance, plus substantial fuel and space savings, make the gas-fired Baxi Luna condensing wallhung boiler a preferred heating solution, anywhere in North America. No bigger than a kitchen cabinet, this whisper-quiet wallhung appliance saves valuable living space. It normally reduces fuel consumption by up to 50% and greenhouse gas emissions by up to 90% over conventional boilers.

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- **Quality and Safety:** Baxi Luna is CSA and Energy Star approved. The boiler's nickel chrome stainless steel pre-mix burner (AISI 316L) bears the ASME H-Stamp. All Baxi products comply with lead-free standards.

  Other Baxi residential boiler built-in safety features include: electronic, gradual ignition (no open flame); flue high limit, central heating high limit, fan pressure and differential pressure switches; flame sensing electrode; back flow prevention; circulator pump with integrated air vent; expansion tank; automatic self-diagnostics; frost protection and a Legionella prevention function.

Baxi Luna wall-hung boilers must only be installed by qualified plumbing and heating contractors who are Baxi trained and certified, and who purchase Baxi supplies through authorized regional Baxi distributors. The manufacturer and Marathon International, the exclusive Baxi products distributor in North America, are committed to quality, safety and environmental protection, and will not authorize the sale of Baxi equipment over the Internet.

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Q&A

with Tim Baker, *VP & General Manager, Moen Commercial Division*

Plumbing Engineer took a moment to discuss technological innovation, water conservation and overall industry trends with Tim Baker, vice president and general manager of Moen's Commercial Division. He shared some thoughts about where business is today and where it looks to be going in the coming year.

What are some of the trends you see in the industry today? What are engineers, owners and specifiers asking for?

An emerging trend, especially in healthcare facilities, is the need to create environments that are not only durable and reliable but are also reminiscent of residential spaces. The performance still needs to withstand the rigors of the commercial environment, all while providing a pleasing and stylish experience.

In which market segments are you seeing the most activity?

We are seeing activity across many of our market segments. Our primary target market segments for Moen's Commercial Division include healthcare, educational and office and government facilities. On the residential side, Moen is committed to maintaining its strong relationships with builders, remodelers and showroom consultants, as well as the multifamily segment. We also service the retail channel and provide innovative products to consumers and DIYers. We continue to maintain our leadership role and grow our business within all these categories.

Do you do much work in retrofit? Any trends you're seeing in that segment?

We continue to see that owners, operators and maintenance professionals are looking for sustainable and hygienic options that also provide cost savings and lower lifetime costs for their facilities. That said, Moen offers a number of retrofit options for facilities. Our manual-to-metering conversion kits allow engineers to convert any M·Dura 8200 series faucet to an M·Press metering faucet. We also provide a retrofit kit that converts a facility's existing manual flush valves to one of Moen's M·Power™ sensor-operated versions. We feel that, by having these kits available, we're able to meet these needs within the marketplace.

Are there any particular codes, standards or regulations that are causing particular impact to your business? How are you dealing with them?

As a company, Moen is committed to creating sustainable, eco-friendly products that provide the same experience users are accustomed to. All of our residential lavatory faucets are certified to meet EPA WaterSense criteria, as are a number of our commercial lavatory faucets, showering options and flush valves. In addition, many of our products — including faucets, flush valves and showerheads — contribute toward achieving LEED certification, earning a building up to two points in the Water Use Reduction category.

Eco-performance faucets, flush valves and showerheads all help to achieve LEED points for water efficiency; however, achieving water savings in commercial showering applications often involves more than just a quick swap to a water-saving showerhead. In fact, the installation of water-saving showerheads in older structures could lead to performance and safety issues, such as an increased risk of thermal shock and scalding, if not done properly. To avoid these risks and to ensure a safe, reliable experience, we offer complete commercial showering and tub/shower packages with automatic compensating valves that are certified to meet ASSE (American Society of Sanitary Engineering) 1016 performance requirements for controlling pressure and temperature variation.

What technological innovations or changes are shaping your business and how?

Hands-free technology continues to be a key innovation within the commercial market. As the electronics advance and improve, so does the user's experience. Moen Commercial's M·Power™ sensor-operated faucets feature hands-free activation and are designed with conservation, hygiene and durability in mind. These faucets are ideal for commercial, healthcare and educational facility applica-

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BAXI LUNA SAT

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Together with a Baxi high efficiency central boilers plant, the SAT system features Zenner pulsed water and BTU meters, as well as remote data collection and communication.

Baxi Luna SAT puts the user of each residential or commercial unit of a property in charge of their own energy conservation, while lowering condo fees for everyone. Property managers can monitor utility use for each unit remotely, and produce accurate, irrefutable billing for each suite.

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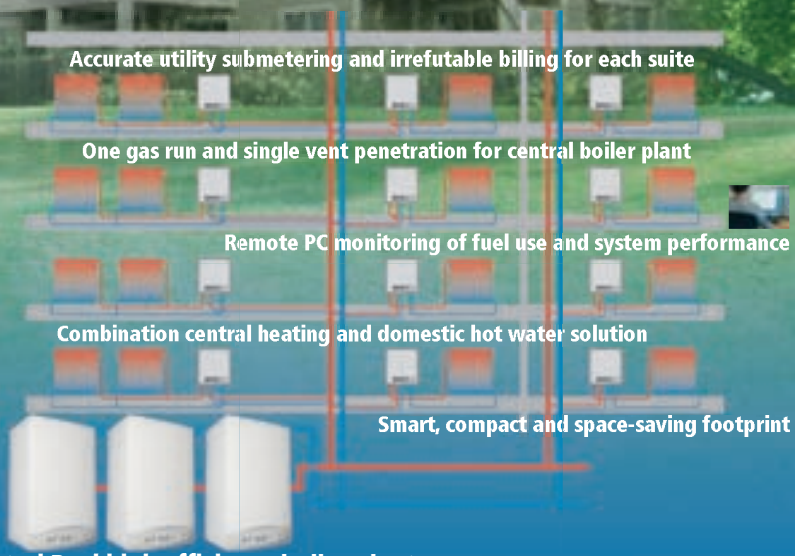

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tions. Our electronic faucets aid in conserving precious resources, with a unique motion sensor that starts and stops the flow of water. This automatically reduces daily gallons used, lowers sewage bills, limits hot water consumption, saves energy and prevents the risk of accidental overflow.

What are you forecasting for 2013? What do you see on the horizon?

In 2013, we're continuing to invest and improve upon our commercial portfolio of products. We also strive to provide increased flexibility to specifiers and building owners with additional configurations and finish options. Moen will also remain committed to delivering lower lifetime costs, a best-in-the-business warranty, industry-leading technical support and customer service to all who engage with our brand.

In what ways does Moen communicate and work with the engineering community?

Moen strives to be a leader within the plumbing industry and to deliver helpful information, relevant tools and innovative products to the engineering community. On a day-to-day basis, our sales team serves as a valuable resource in the field, answering any questions and providing quick, reliable customer support. Engineers rely on our representatives to educate and offer comprehensive technical product knowledge. We also provide BIM models and three-part specs for engineers.

Moen recently introduced MoenPro.com, a website completely tailored to the distinct needs of trade professionals. MoenPro.com delivers the tools that trade professionals most often request to help them work faster and smarter, including product information, literature, customized sell sheets, technical specifications, trend reports, warranty information and more. When visiting MoenPro.com, engineers will find a personalized web page with optimized content tailored specifically to their needs.

For commercial building professionals, Moen also offers its bi-monthly In-Spec eNewsletter. It includes information regarding industry best practices and real-life case studies. In-Spec also delivers the latest breaking sustainability news, vandal-resistant tips for successful projects, information about innovative products and tools and much more.

What do you have on tap for the ASPE show? Any big announcements?

Moen is excited to be a sponsor and exhibitor at the 2012 ASPE show. We'll be showcasing our full line of products, including our metering, heavy- and medium-duty and hands-free lavatory faucets. Moen's showering portfolio for commercial applications will also be on display, as well as our innovative flush valve offerings. ■

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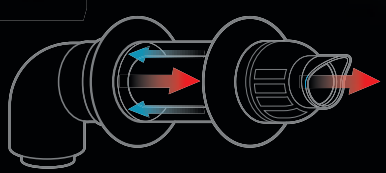
RU80i



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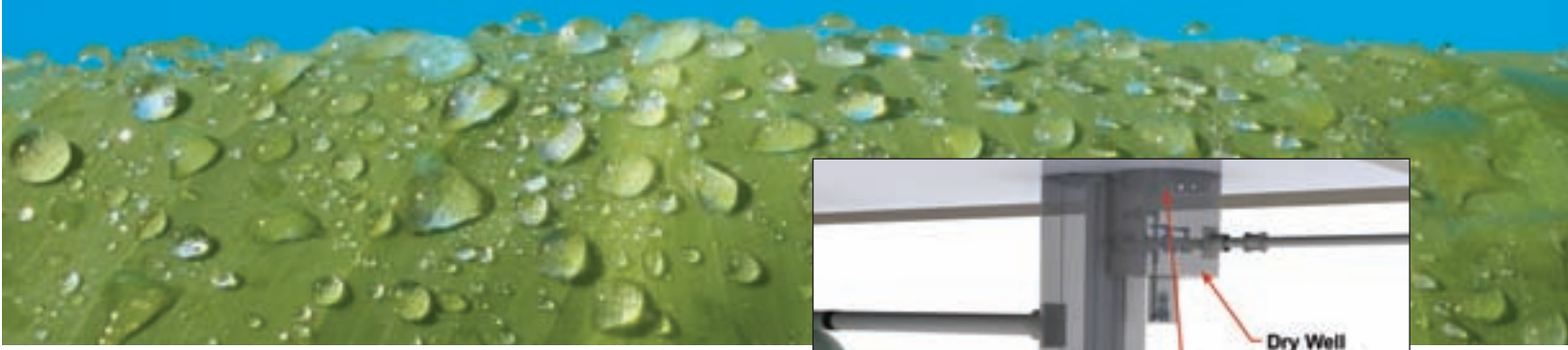
Demand for Water Harvesting Pump Systems on the Rise

By Brendan Bates, System Engineer
AquaHarvest Technologies



Global freshwater demand has tripled during the second half of the 20th century as the world population more than doubled and technological advances allowed users access to groundwater from greater depths than ever before. As global demand continues to soar, the demands on the world's water resources are straining fresh water systems worldwide. Rivers are running dry, lakes are disappearing and aquifer water tables are dropping.

Population growth and economic development are the driving forces behind a steadily increasing demand for new water supplies. The earth's water is comprised of 97.5 percent saltwater. The impact of this statement can be further illustrated by the following example: If the world's water supply could fit into a bucket, only one teaspoonful would be drinkable.

In this next century, the demand for water harvesting pumping and treatment systems will increase as municipalities, homeowners, business owners, commercial and industrial building owners realize the benefit of capturing, storing, filtering and using harvested rainwater for such purposes as flushing sanitary plumbing fixtures, irrigating lawns, gardens and fields, laundry washing, vehicle washing, fire-fighting water-storage and mechanical make-up feed-water for hydronic and industrial processes.

The benefits of water harvesting systems are numerous. They reduce water bills and alleviate demand on municipal systems, but, more importantly, they reduce demand on our limited potable water supplies.

AquaHarvest Technologies, a division of Metropolitan Industries in Romeoville, Ill., are experts in the design and manufacture of pre-engineered integrated water harvesting systems. A recent project involved working with design-engineer Mark Nykowski of HP Critical Facilities Services, located in Chicago, to design a large-scale data-center in the Carolinas known as Project Dolphin.

The critical computer data-center project required the harvesting of rainwater, which is used as a pressurized source of water for flushing sanitary plumbing fixtures, as well as an emergency source of water for the data center's critical cooling tower make-up demand.

The pressurization station includes two variable speed submersible pumps, each designed to pressurize the rainwater at a peak flow-rate of 80 gpm, with a target output-pressure of 80 psi and a combined peak flow of 160 gpm.

How it works

During periods of rain, the rainwater falls on the "harvest zone." In the case of Project Dolphin, the harvest zone is the rooftop of the facility. The rainwater is collected via the roof-drain system and eventually flows into four massive underground reservoirs. Each of the reservoirs has a gross storage capacity of 40,000 gallons, for a total gross storage capacity of 160,000 gallons.

The underground storage reservoirs were installed using an interconnecting piping arrangement. This arrangement allows each of the reservoirs to store equal amounts of water and allows all of the water to flow towards an AquaHarvest Technologies factory-prefabricated underground rainwater pressurization station.

The pressurization station is designed to collect the gravity-flow from the underground reservoirs and direct the flow of the water through two "aspiration units," which will reduce the particulate matter in the water down to 20 microns before being pumped. The station includes two variable speed submersible pumps, each designed to pressurize the rainwater at a peak flow-rate of 80 gpm, with a target output-pressure of 80 psi and a combined peak flow of 160 gpm.

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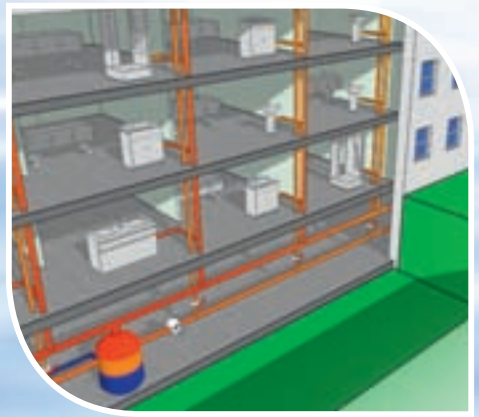
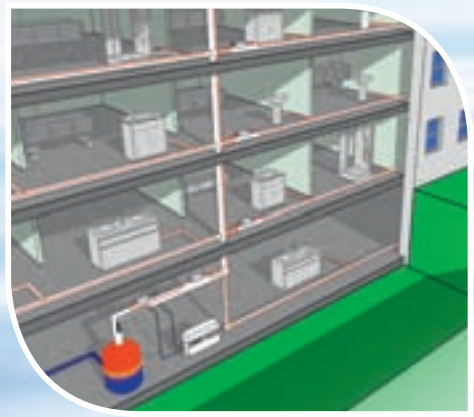
Raychem HWAT Hot Water Temperature Maintenance System



Recirculation system



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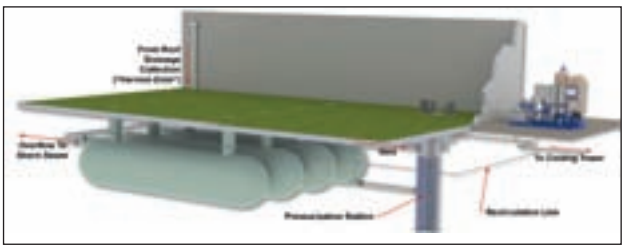

The disinfection and treatment station filters, disinfects, recirculates, colorizes and stores the water under pressure, ready for its intended use.

The station is designed to allow the aspiration units and pumps to be removed for maintenance, inspection and repair from grade elevation without the need to drain the reservoirs or station. This design eliminates the need for personnel to enter the confined space of the station's wet well for regular maintenance or repair situations.

One of the station's other unique features, which sets this design apart from other typical rainwater-harvesting system designs, is the integration of an adjoining "dry-well" chamber, adjacent to the wet well. This dry-well chamber is designed to encase the discharge piping of the station, as well as the isolation valves, silent check valves and pressure monitoring equipment. This chamber is much shallower than the wet well and is designed to allow personnel to safely enter.

Once the pressurized rainwater exits the pressurization station, the water travels below grade and enters a mechanical room inside the data center building, which houses an AquaHarvest Technologies factory-prefabricated rainwater disinfection and treatment station.

The rainwater disinfection and treatment station is a complex fabrication, which includes another unique feature designed to enhance aeration of the water in the underground storage reservoirs. It also controls and operates the pumps in the underground pressurization station, as well as performing all critical functions required to ensure the safe reuse of the harvested rainwater. The disinfection and treatment station filters, disinfects, recirculates, colorizes and stores the water under pressure, ready for its intended use.

The disinfection and treatment station includes a pre-programmed logic control center, pressure transducers, flow meter and variable frequency drives (VFDs), which operate in unison to control the flow and pressure of the water from the pressurization station. Once the rainwater enters the treatment station, the flow path first takes the water through a pair of dual-redundant cartridge filters, which further reduce the particulate matter down to the size of five microns, before allowing it to flow into the system's ultraviolet disinfection unit (UV chamber). This additional filtering is critical to the effectiveness of the UV treatment, as larger particle sizes may tend to allow "shadowing" of other particles, thus rendering the UV treatment less effective. The use of UV is critical to the elimination of some microorganisms and cysts such as Giardia and Cryptosporidium, which originate from animal and bird feces commonly present on roof surfaces.

Upon exiting the UV chamber, a precisely-measured portion of the water flow is allowed to flow through a recirculation port, which is routed to an aeration device in a predetermined point in the arrangement of underground storage reservoirs. This measured flow is critical in ensuring that the stored water does not become anaerobic.

Next, the water is injected with a metered quantity of calcium hypochlorite. Chlorination does not kill Giardia and Cryptosporidium. Therefore, chlorination is used in addition to UV treatment. Chlorination not only provides additional disinfection beyond the UV treatment but also allows residual disinfection of the water for extended periods of time.

Finally, prior to leaving the treatment system on the way to the intended service, the filtered and disinfected water is injected with blue, food-grade dye. The dye is added to provide instant identification of secondary water and to ensure that any cross connection with fresh water supplies within the facility is avoided.

AquaHarvest Technologies is a single-source supplier of pre-engineered packaged pressurization pump stations, integrated control systems, filtering systems, purification processing, storage reservoirs and ancillary equipment for the rainwater, graywater, and secondary-water harvesting industries. Metropolitan specializes in packaging pump systems such as housed pumping stations, valve/control stations, skid-mounted water booster systems, sanitary and stormwater lift-stations, PRV stations and hydronic boiler and domestic hot water systems. All AquaHarvest and Metropolitan systems come complete with UL-listed controls and are manufactured in house.

For more information about the design and manufacture of water harvesting pump systems, contact AquaHarvest Technologies Systems Brendan Bates at 800/323-1665, ext 257 or email brendan@aquaharvest-tech.com or bbates@metropolitanind.com. ■

Brendan Bates is currently a market-development manager/systems-engineer for AquaHarvest Technologies, of Romeoville, Illinois. Previously, Brendan held the position of commercial division manager for Metropolitan Industries for approximately 20 years. He has been involved in the design and manufacturing of equipment for the high-rise and commercial building marketplace for more than 36 years; over 27 of those have been with Metropolitan.

His career began at the Aurora Pump Division of the Pentair Group, where he held positions in the hydraulic test-lab, production, expediting and international-sales departments. Brendan served two terms as vice president of membership for the Chicago Chapter of the American Society of Plumbing Engineers (ASPE). He is also a member of the American Rainwater Catchment Systems Association (ARCSA), the American Society of Heating Refrigeration & Air-Conditioning Engineers (ASHRAE), and the Chief Engineers Association of Chicago (CEAC). Over the years, Brendan was able to involve two of his children and his son-in-law in the commercial building equipment business as well. Brendan and his wife Leslie reside in the western suburbs of the Chicago area.

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COMPUTATIONAL APPROACH to selecting control flow roof drains

By Kurt Monteiro, P.E., LEED AP BD+C, HFDP and Leo Su, LEED Green Associate

The control flow roof drain (CFRD) has been used since the 1950s. CFRDs retain rainwater on roofs following a storm by impeding drainage in a controlled manner. The storage created by CFRDs functions similarly to storm water management ponds; by releasing the stored water over an extended period, the peak flow drained into the municipal storm water system is decreased. CFRDs are increasingly being used as new greenfield developments deplete the limited capacity of existing municipal storm water management systems.

CFRDs typically consist of a slotted metal weir that sits on top of a traditional instantaneous-flow roof drain. The slot is shaped to allow a certain predefined flow rate based on the height of the water at the weir. The specific slot shape required can be determined using fluid dynamic principles in combination with experimental data. Additional slots may be added for greater flow at a given depth; conversely, adjustable cones can be used to partially block a slot to decrease the flow rate and provide multiple settings.

Manufacturers typically provide tables that give the flow rate of their CFRDs at various water depths and at each setting (See Table 1). In addition to the flow characteristics, the roof geometry and design rainfall must also be considered to properly select a CFRD. The roof geometry and structural roof support system determine how much water can be stored while the design rainfall determines how much water falls on the roof in a given time interval.

Additionally, roof manufacturers and insurance companies have concerns about water ponding on roofs.

The best tool for selecting CFRDs currently available to plumbing engineers is a location-specific rating table that documents the expected maximum water depth and peak flow rate based on roof area and roof slope. Unfortunately, these tables lack the flexibility to deal with the roof sizes and configurations that are not explicitly listed. For example, in practice, roofs often have adjacent vertical projections such as walls. For the purposes of sizing an instantaneous roof drain, some codes stipulate, and ASPE design guidelines recommend, that half of the area of the largest vertical surface be added to the roof area to account for the effects of driving rain. This approach is invalid for CFRD selection and can result in overflow.

Existing rating tables are also outdated. The most widely used manufacturer-supplied CFRD tables in the United States and Canada are derived from two rainfall data sets from 1961 and 1968 respectively: Technical Paper No. 40: Rainfall Frequency Atlas of the United States, D.M. Hershfield, U.S. Department of Agriculture and Climatological Studies Number 8: Atlas of rainfall intensity-duration frequency data for Canada, JP Bruce, Toronto, Department of Transport, Meteorological Branch. In these publications, much of the data reflected less than 15 years of records. This is problematic, because the rating tables derived from the data attempt to extrapolate to 50- and 100-year storms.

Table 1 Example of a CFRD flow characteristic table, giving the flow at various water buildup depths. CFRD flow rates are not dependent on pipe sizing as long as the pipe is large enough to handle the peak flow rate.

Flow Rate vs. Water Depth (one slot)						
Depth (inches)	1	2	3	4	5	6
Flow (gpm)	5.0	10.5	15.7	21.5	27.5	34.5

CFRDs are selected to minimize the peak flow rate. Intuitively, the fewer slots a CFRD contains, the lower its drain rate at any given height. At the same time, the fewer slots a CFRD contains, the greater the water buildup on the roof. Hence, one must also select the correct CFRD such that the roof does not overflow or collapse under design conditions. As it turns out, selecting for the maximum water depth that does not result in overflow necessarily results in minimum peak flow; the selection will correspond to storing the maximum amount of water possible on a given roof. There are also restrictions on draindown times. ASPE and most codes recommend roofs to be fully drained within 24 hours, due to concerns about freezing and the growth of algae and mosquitoes in untreated stagnant water.

Fortunately, modern computational methods can be used to select CFRDs in addition to using code-required design parameters such as storm return period and roof draindown time. This article briefly outlines a simulation-based implementation and then explores the effects of roof sizes and adjacent vertical projections on CFRD selection.

Simulation concept

The fundamental concept of the control flow roof drain problem is similar to the standard undergraduate-level fluid dynamics problem where a container of water is drained through an opening: the rate of drainage depends on the height of the water, which in turn

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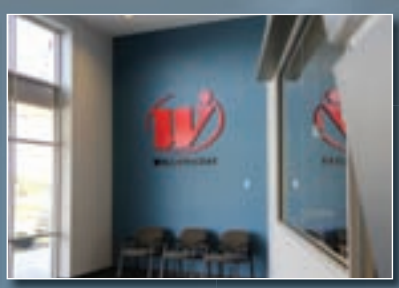

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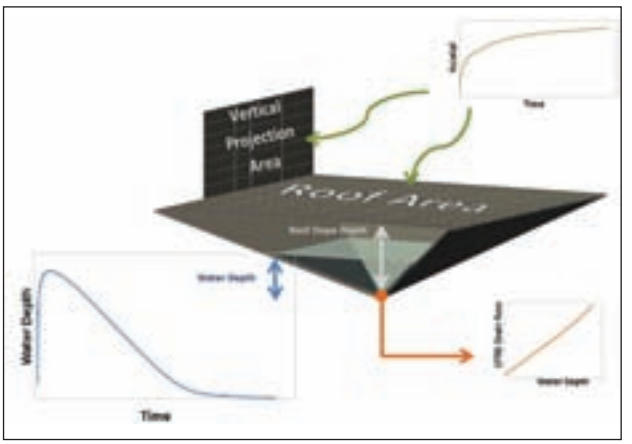

Figure 1 CFRD Dynamics: *Rainwater enters the roof simultaneously as water drains through the CFRD. The difference between water inflow and outflow results in a water depth that initially increases, peaks and then decreases as rainfall intensity weakens. Note that the roof slope depth has been exaggerated in this figure to illustrate the inverted rectangular pyramid structure of the roof.*

depends on the amount of water drained. However, the CFRD problem introduces complications.

First, rainwater falls on the roof simultaneously as the roof is drained. The cumulative amount of rain that falls on the roof varies with time and approximately resembles a logarithmic function; rainfall events tend to be most intense at the beginning, but the intensity gradually peters off over time (See Figure 1).

Second, the depth of the water at the CFRD depends on both the roof shape and the water volume. Generally, at the same depth of water and roof area, flat roofs hold more water than sloped roofs.

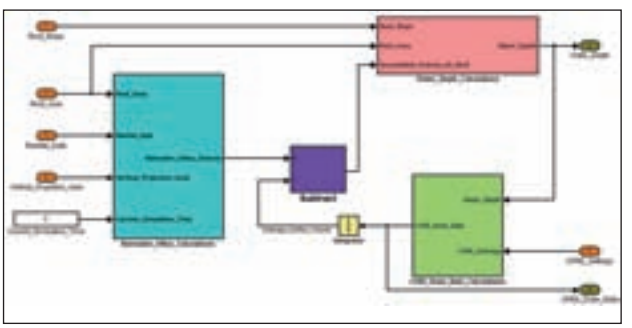

Figure 2 CFRD Simulation Model: *The volume of rain that has fallen on the roof since time zero is calculated (cyan) and then subtracted (purple) by the total volume of water that has drained through the CFRD. The difference is the volume currently accumulated on the roof. The accumulated volume is used to calculate the depth (pink) and the rate of CFRD drainage (light green) and integrated (yellow) to get the total volume drained, thus completing the loop. When the time is incremented from zero in small steps, the order in which the calculations are performed becomes irrelevant and the simulation converges. A typical simulation has a step size ranging from 0.01 s to 1 s, completing approximately 100,000 iterations. Other than the roof geometry and rainfall data, CFRD flow characteristics, such as shown in Table 1, are required for the simulation. Inputs are shown in orange, while outputs are shown in olive.*

Third, the rate of drainage depends on the CFRD weir configuration and is not always linear with respect to depth; a roof with four inches of water buildup will not necessarily drain twice as fast as a roof with two inches of water.

Analytically, the problem can be expressed as a nonlinear differential equation. In this cause, the particular equation has no analytical solution. Consequently, a numerical approach is preferred.

Figure 2 shows the model of the numerical simulation process. This particular model was constructed using SIMULINK software. The process can be summarized as follows. The simulation starts at time zero and increments in small time steps. At every step, the amount of rainwater that has fallen on the roof is calculated and then subtracted by the amount of water that has drained from the roof through the CFRD. The difference is the accumulated volume, which is in turn used to calculate the drain rate. As the time step size approaches zero, the order in which the calculations are performed becomes irrelevant, and the solution converges. The result of the simulation is the depth of water over the duration of the rainfall event, as shown in Figure 1.

Figure 3 presents simulation results for a roof located in Toronto under a 50-year return period storm and compares the results to the available CFRD ratings table. The simulation was conducted multiple times for a wider range of roof areas than the ratings table provided. In practice, many roofs are less than 2,000 square feet; while manufacturer tables do not given selection information in this range, the simulation allows for proper CFRD selection for these smaller roofs.

Alternate roof configurations

Without a simulation, vertical projections cannot be properly calculated. If you were to simply add half of the projection area onto the roof area and use a ratings table, you would find peak flow and maximum depth values that are erroneously low. This approach is invalid because having larger vertical projections cannot be equated to having a larger roof: Larger roofs store more water, but larger vertical projections only contribute to greater rainwater influx. Configurations where one roof is drained onto another through scuppers or instantaneous roof drains can be handled similarly and also increase peak flow and depth significantly. Hence, from the perspective of reducing peak flow, it is best to avoid vertical projections adjacent to roofs and avoid designing a roof that drains onto another. Table 2 illustrates the significance of properly calculating the impacts of vertical projections.

CFRD system calculations

Site drainage rate restrictions are placed at the point of entry into the municipal stormwater main. Hence, the plumbing engineer needs to consider the peak aggregate flow from all CFRDs. A simple method to estimate the peak aggregate flow is to sum all of the peak flows from

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Table 2 Effect of Adjacent Vertical Projections on CFRD Performance: Roofs have a slope of 6 inches; rainfall corresponds to a 50-year storm in Toronto. All roofs use a single slot CFRD, with characteristics given in Table 1. Note that Roof 2 exceeds 6 inches at peak depth and should be reselected to use a CFRD with multiple slots.

Roof	Roof Area (ft^2)	Vertical Projection Area (ft^2)	Peak Flow (gpm)	Peak Depth (inches)
1	2,000	0	27.2	5.0
2	2,000	3,000	34.5	6.3
3	2,000 + 1,500 = 3,500	0	29.5	5.3

each individual CFRD. This sum-of-peaks method is conservative: Dynamics imposed by the physical system will reduce the actual peak aggregate flow below the sum-of-peaks estimate. First, the flow through each CFRD peaks at a different time due to the diversity of the roof and CFRD configurations. Second, water drained from a CFRD does not arrive immediately at the municipal main; there will be additional interactions depending on how each drain is piped. Modeling these two effects together is an involved process that is very much system dependent. Furthermore, the system drain rate savings are not expected to be significant; investigative calculations to account for roof and CFRD diversity show reductions of less than 10 percent for reasonable configurations. In practice, the sum-of-peaks method can be used to confidently estimate the peak aggregate flow rate.

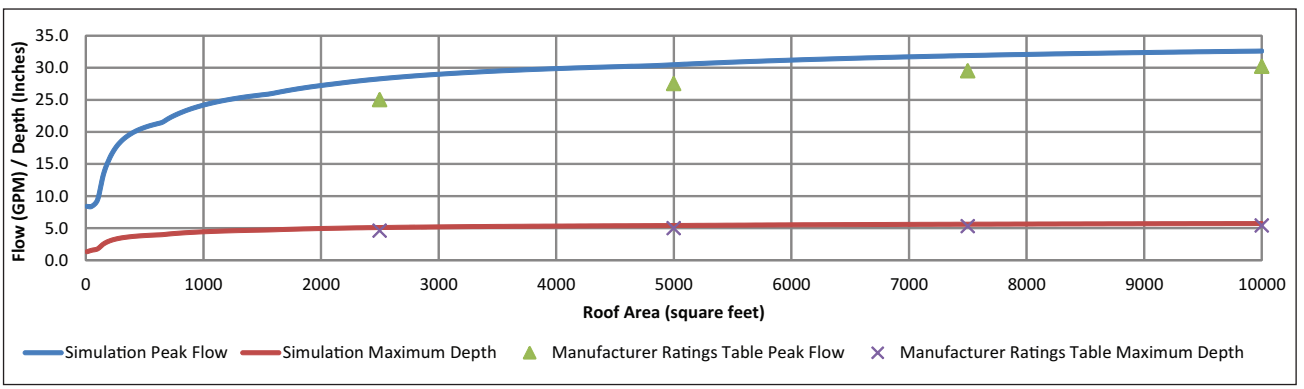

Figure 3 Comparison of Simulation Results and CFRD Ratings Table: *The peak flow/maximum depth curve for different roof areas was compiled assuming an inverted rectangular pyramid roof geometry with a slope depth of 6 inches. Rainfall data was a 50-year return period storm for Toronto. CFRD flow characteristics correspond to the example given in Table 1. The ratings table values were provided by the manufacturer for the same CFRD. Both the simulation and ratings table assumed no vertical projections adjacent to the roof. Note that the simulation provides results for roofs less than 2,000 square feet; it would be inaccurate to extrapolate for these smaller roofs using the ratings table.*

Practical implementation

Recent software developments have allowed the incorporation of simulations written in SIMULINK and MATLAB software directly into a standard Excel spreadsheet. By conducting the simulations via Excel and adding a simple automated routine, CFRD selection can be accomplished in a few seconds on a platform that is familiar to most designers. As there is not a predetermined set of tables, the simulation can account for configurations specific to each roof and use the most up-to-date meteorological data.

CFRD simulation concept versus manufacturer table selection

The following example demonstrates the concept of performing iterative calculations to select CFRDs compared to selection using manufacturer tables. As shown in Figure 4, we will be selecting the CFRD for a 2,000-square-foot roof adjacent to a 3,000-square-foot wall. This is the same roof configuration illustrated in Table 2.

Let's say the building is in Toronto, and the slope depth of the roof is 6 inches. We consult the manufacturer table (see Table 3).

With some extrapolation, we find that the peak depth would be 4.5 inches for a 2,000-square-foot roof. However, the table does not account for the vertical wall. To account for the wall, we might (erroneously)

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Table 3 Manufacturer CFRD Selection Table for Toronto

Location	Roof Slope (in.)	2,500 ft^2			5,000 ft^2			7,500 ft^2			10,000 ft^2		
		Flow Rate (gpm)	Water Depth (in.)	Draindown Time	Flow Rate (gpm)	Water Depth (in.)	Draindown Time	Flow Rate (gpm)	Water Depth (in.)	Draindown Time	Flow Rate (gpm)	Water Depth (in.)	Draindown Time
Toronto, Ontario	0	12.0	2.3	9.0	14.2	2.7	18.4	15.3	2.9	30.0	17.0	3.2	42.0
	2	15.7	3.0	6.5	18.0	3.4	14.5	19.3	3.6	23.0	20.3	3.8	31.0
	3	18.0	3.4	5.5	20.3	3.8	12.0	21.5	4.0	19.5	22.5	4.2	26.0
	4	20.3	3.8	5.0	23.2	4.3	10.5	24.3	4.5	17.0	25.0	4.6	23.0
	5	22.5	4.2	4.5	25.0	4.6	10.0	26.0	4.8	14.5	27.5	5.0	20.5
	6	25.0	4.6	4.0	27.5	5.0	8.0	29.5	5.3	13.0	30.2	5.4	19.0

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Table 4 Iterative CFRD Calculations

Time (min)	Rain (mm)	Volume Inflow (m^3)	Volume Outflow (m^3)	Accumulated Volume (m3)	Depth (inches)	Drain Rate (gpm)
0	0	0	0	0	0	0
5	20.2	6.57	0.52	6.57	5.05	27.5
10	25.9	1.85	0.57	7.90	5.37	30.0
15	33.6	2.50	0.62	9.84	5.77	32.9
20	37.0	1.11	0.64	10.32	5.87	33.6
25	40.4	1.11	0.65	10.79	5.96	34.5
30	**43.7**	**1.07**	**0.65**	**11.21**	**6.03**	**34.5**
35	45.0	0.42	0.65	10.98	5.99	34.5
40	46.3	0.42	0.65	10.75	5.95	34.5
45	47.5	0.39	0.64	10.49	5.90	33.8
50	48.8	0.42	0.63	10.28	5.86	33.5
55	50.1	0.42	0.63	10.07	5.82	33.2
60	51.4	0.42	0.62	9.86	5.78	33.0

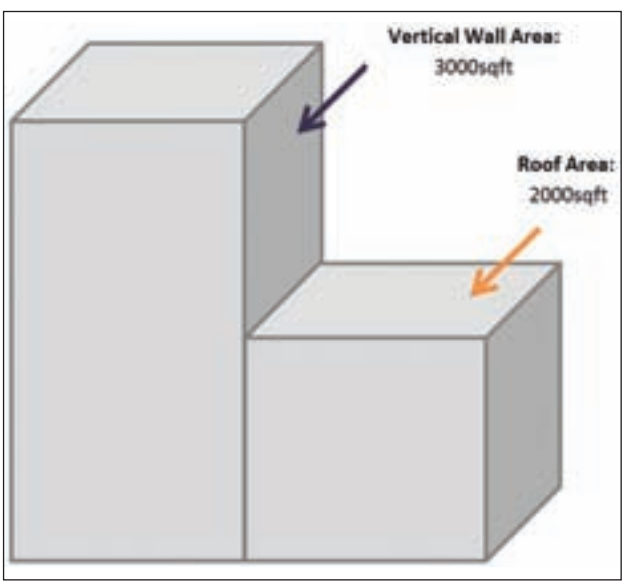
add half of the wall area, 1,500 square feet, and use the table for a 3,500-square-foot roof. We would (erroneously) conclude that the peak depth would be 4.8 inches and that a CFRD with one slot would be sufficient.

Now let's try performing some iterative calculations instead to select the CFRD. For our example, we will use a very large step size of five minutes to minimize the number of calculations. From the Environment Canada Database (Short Duration Rainfall Intensity-Duration-Frequency Data, Environment Canada, 2011), we find that for a 50-year storm, the accumulated rainfall for five minutes is 20.2 mm. To find the amount of rain that has fallen on the roof in the first five minutes, we calculate:

2,000 ft^2 (roof area) x 20.2 mm + 1,500 ft^2 (half-wall area) x 20.2 mm = 6.56 m^3

Since at time zero there was no water on the roof, we estimate that the amount of water built up during the first five minutes is 6.56 m^3. Using the roof geometry (2,000 square feet and 6-inch slope), we can calculate the depth of water at the CFRD to be 5.04 inches. We then refer to Table 1, which gave the flow characteristics of the CFRD, and find that the drain rate should be 27.5 gallons per minute.

Figure 4 Example Roof Configuration



During the time interval five minutes to 10 minutes, 5.7 mm more of rain has fallen on the roof, for a volume influx of 1.85 m^3. However, since the CFRD is draining at 27.5 gpm, we estimate that over the same time interval 0.57 m^3 has drained. The difference of 1.85 m^3 – 0.57 m^3 = 1.28 m^3 is added to the 6.56 m^3 already on the roof. We now estimate that the total accumulated amount of water on the roof is 7.84 m^3. Given this volume, we can again calculate the water depth and drain rate, which are 5.37 inches and 30 gpm respectively.

The process can be continued indefinitely. Table 4 summarizes the results.

We find that the peak flow rate and peak depth occurs at 30 minutes; afterwards, the outflow exceeds the inflow, and the roof begins to drain down. If we continued this process, we could also determine the draindown time.

In this simplified example, the peak depth was 6.03 inches. Since this just exceeds the maximum of 6 inches allowed by code, we would select a CFRD with two slots to increase the drain rate and decrease peak depth.

In practice, time intervals much less than five minutes should be used to obtain accurate results. Simulation software should be used to accommodate the computationally intensive procedure. For example, if the step size were reduced to one second, we will find for this particular configuration that the peak depth will be 6.26 inches with one slot and 5.64 inches with two slots. ■

Kurt Monteiro, P.E., LEED AP BD+C, HFDP, is a principal at Smith and Andersen Consulting Engineering in Toronto, where he is responsible for the design of HVAC, plumbing, and fire protection systems for healthcare, institutional, commercial and high-rise residential projects.

Leo Su, LEED Green Associate, was a designer at Smith and Andersen Consulting Engineers, where he worked on HVAC and plumbing systems in healthcare projects with Niagara Health Systems and Humber River Regional Hospital. He is currently in his last year at the University of Toronto, finishing a Bachelor of Science in Engineering Science with a specialization in Energy Systems.

By Jeff Carowitz, Strategic Force Inc

True Value

New Survey Finds That Value Engineering Is on the Rise Despite Negative Outcomes

The trend toward value engineering in building construction — the practice of replacing originally specified materials with alternate, and often cheaper, materials — has been underway for years. With a protracted construction downturn, the practice is becoming more widespread. My research firm, Strategic Force Inc., was retained by a client in the plumbing industry to learn just how pervasive the trend is and, more importantly, whether the practice was resulting in improved or positive outcomes for owners and developers and what engineers are doing to educate their clients on the issue.

To find out, more than 3,000 professionals affiliated with leading plumbing and mechanical engineering firms were asked to complete a brief web-based questionnaire on their experiences with value engineering of plumbing and drain, waste and vent (DWV) piping systems. The results paint an interesting picture of the current practice of value engineering.

Under our current economic conditions, it is no surprise to find that, compared to two years ago, 63 percent of engineers reported that the number of value engineering requests on their projects was increasing. When it comes to the materials most often being substituted, the survey revealed that cast iron soil pipe and fittings are frequently targeted in value engineering initiatives. A stunning 61 percent of respondents reported that it happens with more than 50 percent of their cast iron piping specifications. Only 12 percent say that it almost never or has never happened.

When asked what factors are driving value engineering of plumbing and DWV specifications, the most common answers were that owners were seeking to reduce overall project costs (77 percent) and that contractors wanted to substitute lower cost materials (76 percent). Only a few (15 percent) reported that contractors used the practice to suggest better or new products.

Digging deeper into some of the responses provides context to the issue. Estimating projects has been more challenging during the economic recession. In the opinion of some respondents, cost estimations issued by contractors are often inaccurate. Contractors hungry for work lock in projects with low bids, attempting to gain profitability later through cost reductions. Rather than adjust the project budgets to accurately reflect costs, "they burden the design team with 'value management' proposals that contain inferior products or installation methods." In other words, according to one engineer, "the term 'value engineering' is often substituted for what is actually 'cost cutting,' without any plumbing engineering expertise [involved] in the decision."

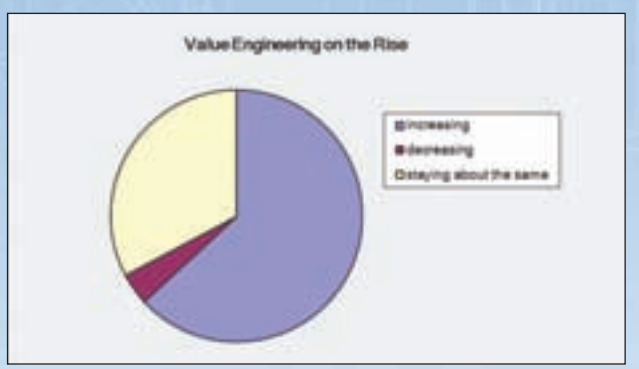
But engineers do try to provide input. According to the survey, 80 percent of engineers advise their clients on which value engineering changes make sense and which might lead to negative outcomes. Almost two-thirds of engineers reported that they are often asked to accept value engineering changes that don't agree with their recommendations. Some engineers expressed frustration that many requests are not in the best interest of their client and that they often don't have the time or the resources to build a case against value engineering options that might negatively impact a project.

In fact, the most jaw-dropping finding in the survey was that nearly three-quarters of all value engineering changes have a negative outcome. Only 27 percent of value engineering changes to plumbing and DWV systems contribute positively to the quality, longevity and function of the finished project, according to the survey. Not a very high success rate for such a common practice.

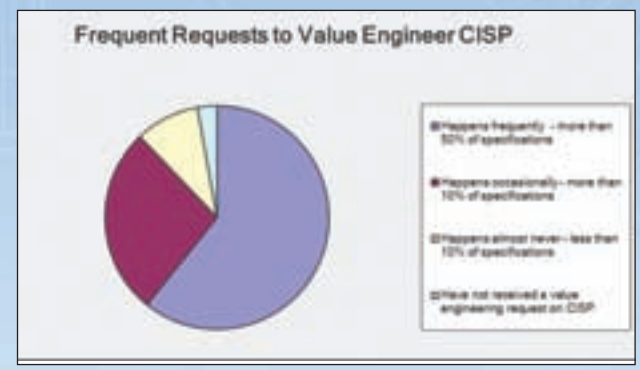
In fact, more than one-third of changes from cast iron soil pipe to plastic in plumbing piping systems resulted in failure, which costs owners, developers, contractors and even engineers time and money to fix and can often wipe out — or even exceed — the original cost savings estimates from the changes.

These changes are often made, according to engineers, despite cast iron's history of positive results, particularly

Continued on page 102



The majority of engineers report that value engineering requests on their projects is increasing.



Engineers often are asked to accept value engineering changes that don't agree with their recommendations.

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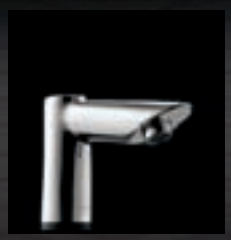

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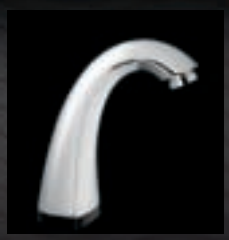
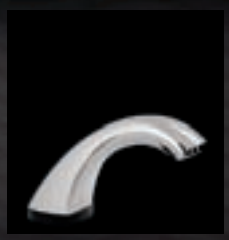


High-Rise



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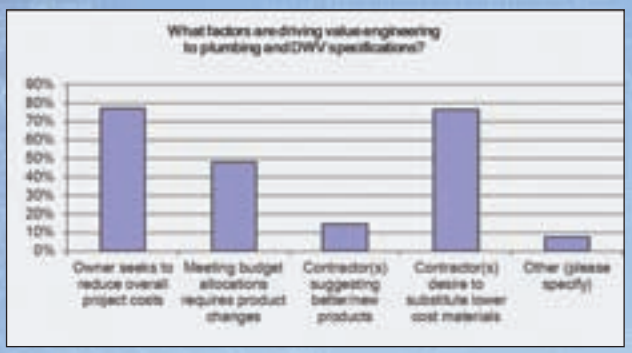
Value Engineering

continued from page 100



The most common factor driving value engineering is a desire to reduce overall project costs.

when it comes to sound attenuation, longevity, ability to withstand earth and live loads underground, thermal expansion characteristics and easier, more reliable, fire penetrations; all reasons that engineers reported when asked why they specify cast iron for plumbing piping systems in commercial construction. Even something as seemingly trivial as the potential for water in a system to exceed 140°F or not using enough properly spaced hangers can lead to a failure of a plastic DWV system.

In the course of conducting the survey, we came across a number of anecdotes of specific failures that occurred when substituting plastic for iron in DWV systems. In one project that involved kitchen waste pipe below slab, "high temperature waste, combined with poor trench backfill practice, caused the pipe to deform, which resulted in a blockage. The piping was destroyed the first time a large auger bit was used to attempt to clear the blockage."

In another system, the plastic storm piping trench was "run over with machinery, which collapsed it." In a laundry facility, a "temperature and pressure relief valve allowed excessively hot water into the underslab drain piping," causing a failure that had to be torn out and replaced with cast iron, a scenario that could occur in any building with a water heater drained to the DWV system.

The results of this survey indicate that all parties in the construction chain need to make the right considerations when evaluating whether to make changes to engineered designs and specifications. What is often intended as a good faith effort to save money can instead lead to failures, rework and lost money. It's typically not the quality of the substituted product that causes the failure; it is simply not using the right materials for the right applications. Taking that into consideration is truly adding value. ■

Jeff Carowitz is principal of Strategic Force Inc. and has more than two decades of experience in research in the building trades.

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Circle 67 on Reader Reply Form on page 129

By John P. Engineer

Recreational Restrooms

Take your cues from some of the best restrooms in the sporting world

What makes a recreational venue great? Is it the team, the fans, the facility? When visiting a new stadium, it's the overall experience that makes fans take notice. And, most often, a trip to the restroom is part of that experience.

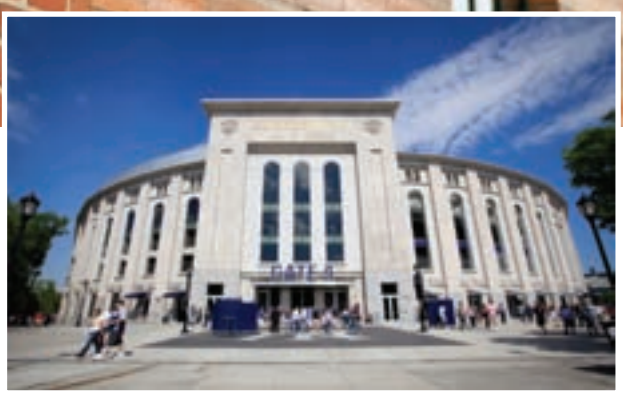
Find out how top stadiums and parks are enhancing visitors' restroom experience and how you can score points with a winning restroom in your own facility.

Simply speedy

MVPs: Thanks to a 2005 law requiring all new or significantly renovated places of public assembly in New York City to have two women's toilet fixtures for every one devoted to men, lines outside the ladies' room are now a rarity.

The overall restroom fixture-to-fan ratio has also changed significantly at the new Yankee Stadium, compared to the old stadium, going from one for every 89 fans to one for every 60. In addition, the use of family-style restrooms finally came into play. According to the American Restroom Association, having these types of unisex toilets is the best way to prevent so-called "potty parity," reducing the chance of lines for everyone.

Similarly, Shea Stadium's restrooms didn't hold a candle to the Mets' new home, Citi Field, where there is now one restroom (women's, men's and family facilities) for every 70 guests, which is a 31 percent increase versus Shea Stadium. Not only that but the new stadium features baby changing tables in all restrooms, so that every fan can have equal access to needed facilities.



The overall restroom fixture-to-fan ratio has also changed significantly at the new Yankee Stadium, compared to the old stadium, going from one for every 89 fans to one for every 60.

Game plan: To ensure that restrooms are queue-free, keep your restroom-to-guest ratio low. Consider the use of unisex bathrooms to decrease gender disparity when it comes to lavatory lines. And, when applicable, install changing tables across-the-board, not just in the ladies' room.

Sturdy and sustainable

MVPs: Nationals Park in Washington, D.C. is the first stadium in the country to achieve the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification. To help achieve LEED Silver certification, the ballpark installed water-conserving plumbing fixtures. LEED certification isn't the only benefit for Nationals

Continued on page 106

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Recreational Restrooms

continued from page 104

Park: The stadium estimates that water-saving restroom products reduce annual water usage by 3.6 million gallons, conserving resources and budgets.

Similarly, Montreal's Saputo Soccer Stadium, home of the Montreal Impact, installed electronic faucets and flush valves when it opened in 2008, for maximum water savings. The stadium also went for the most durable designs it could find, tasking contractors to use products that not only meet all design specs but are also heavy-duty and vandal-resistant.

If over-the-top luxury is not an option, a few lavish extras can still take your restroom to the next level. Give restroom users a taste of the good life...

Game plan: You don't have to build a new stadium to go green; start by converting your old flush valves to new water-saving electronic models through the use of a convenient retrofit kit. Hands-free models not only conserve resources; they also help keep restrooms clean and prevent the spread of germs. Next, take a look at your lavatory faucets. Are they showing signs of wear and tear? How much water are they (collectively) using? Consider installing faucets that not only offer lower flow rates but also a durable design that can stand up to constant use and the toughest industrial cleaners. Metering faucets are a great option, as they offer unparalleled water and energy cost savings.

Lavish lavs

MVPs: The most well-appointed lavatories in a sporting facility are often found in the luxury box. With fixtures, colors and materials that feel more like your own home than home to thousands of screaming fans, these are often the nicest recreational restrooms you'll see.

One recreational facility that has taken luxury to the masses is New York's Bryant Park. The public restrooms in Bryant Park were ranked Number One in the world by VirtualTourist.com, noted for cleanliness, with the added perks of music, fresh flowers and an attendant. So, whether you're visiting the park to play ping pong, try your hand at the French ball game of pétanque, ice skate … or simply to be a spectator of nature, you can rest assured that your restroom experience will be a winning one.

Game plan: If over-the-top luxury is not an option, a few lavish extras can still take your restroom to the next level. Give restroom users a taste of the good life with complimentary toiletries, super-soft toilet tissue and the cleanest restrooms in your league. ■

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Electric Heat Tracing

By Brian Larkin

The smart performance alternative to complex recirculation systems

As a result of the decrease in single-family home construction, an increase in high-rise residential building projects is underway. High-rise buildings present many critical design and performance challenges. One of these challenges is the limitations of a conventionally-installed hot water recirculation system and its limited ability to adjust for rapid changes in building occupancy. This article addresses design and performance of recirculation systems and an alternative approach using electrical heat tracing.

The primary goal of an efficient hot water distribution system is to reliably deliver hot water at the lowest installed cost, with minimal water waste and optimized energy usage. For purposes of discussion, we will use 24 stories as the definition of high-rise construction, where, typically, three multiple pressure zones would be required. There are two approaches to deliver hot water to the tap; recirculation systems and electrical heat tracing systems.

Recirculation systems

The challenge with recirculation systems in high-rise construction is the increased head pressure, friction losses and varied flow rates. To compensate for this, the building is divided into multiple pressure zones in groups of 8 to 12 stories, with pressure relief valves to limit the head pressure at each zone. There are two basic recirculation system designs, a multiple water heater system and a central water heater system.

The most common recirculation method is the multiple water heater approach in which pairs of heaters (for redundancy) are used for each pressure zone, in a mechanical space on the roof, in the cellar or both. This approach quickly becomes expensive, since each water heater must be vented and can take up significant floor space inside of the building.

Engineers have developed a more economical approach, using large, centrally-located water heaters to supply the entire building. Backup water heaters (for redundancy) and a storage tank are placed in a single location, typically on rooftops where venting is less costly. A single recirculation loop is run for the height of the building, with pressure relief valves compensating for the water pressure in each zone. The building is still divided into pressure zones, and each level has an associated recirculation system. These pressure zone recirculation loops are isolated from the full head pressure of the main recirculation loop by utilizing heat exchangers to heat the zone. (See Figure 1.)

The advantages of a central water heater design over the multiple heater design include eliminating the cost of the additional water heaters and venting. Also, in a central heater approach the size of the boiler can be reduced compared to the combined volume of the multiple boilers, again lowering installed cost.

Recirculation systems are frequently installed with the risers gathered into a single recirculation loop to save on pipe, installation cost and shaft space. Risers should be individually recirculated and balanced. Gathering the risers into a single recirculation loop makes balancing the recirculation system extremely difficult to achieve.

Electrical heat tracing systems

Many buildings in the largest cities in the U.S. (New York, Miami, Chicago, etc.) have turned to a more reliable method of providing code-compliant hot water distribution. A heat traced hot water system eliminates the complexity and unreliable performance associated with recirculation systems. The system includes an HWAT self-regulating heating cable and a control and monitoring system.

Most plumbing engineers have used electrical heat tracing for pipe freeze protection and other applications. Using heat tracing for hot water temperature maintenance is just another application where heat tracing can be successfully used. Installation and design is straightforward and reliable. The heating cable is taped to the pipe, covered with thermal insulation, and controlled by an advanced control and monitoring system (ACS-30).

Heat trace systems are installed on the outside of the pipe, so they are isolated from the water pressure; however, the building still has to

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What do all of these states have in common?

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Heat tracing

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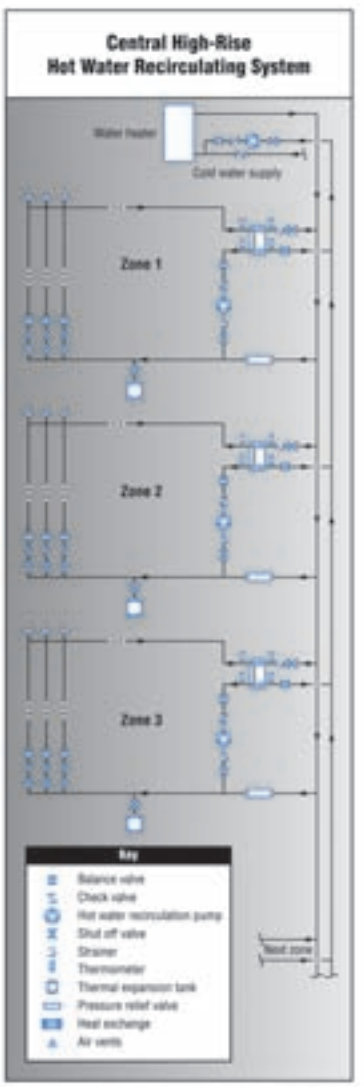
be divided into pressure zones, each with a dedicated pressure relief valve to regulate the pressure at the fixtures. The central water heater, which is typically located on the roof, feeds the main supply line. The supply line runs the height of the building, with the distribution piping feeding the different pressure zones. The heat tracing is installed on each riser, branch line and as close to each fixture as required to satisfy water delivery time code. (See Figure 2.)

With a heat tracing system there is no need for balancing valves or recirculation pumps, resulting in a lower cost, maintenance-free system. Since the hot water is not recirculated and balancing is not required, flow rates are not a factor in HWAT systems. Hot water is delivered to each residence regardless of whether the building occupancy changes. Since HWAT systems do not require heat exchangers, return lines or balancing valves, the owner and engineer can enjoy material reduction and improve space utilization.

HWAT heat traced hot water systems have many energy consumption advantages over recirculation:

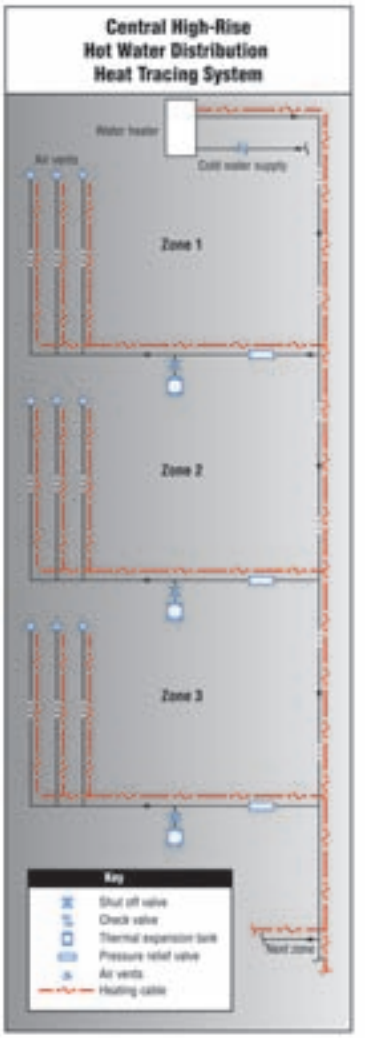
Figure 1



- HWAT systems maintain the hot water pipes at a uniform temperature range throughout the building. Recirculation systems typically need to heat the water above the designed delivery temperature to overcome natural cooling in the system and to ensure that the furthest fixture has the correct water temperature. This overheating of water increases energy usage in recirculation systems.
- HWAT systems only consume the amount of energy that is lost through the insulation on the supply pipe. Recirculation systems have to replace the heat lost through the supply and return pipes.
- HWAT systems do not require recirculation pumps, eliminating their draw of energy consumption.
- Recirculation systems return cooler water to the storage tank, which must be reheated, essentially heating the water twice.

In high-rise residential construction, customer satisfaction is critical. To satisfy ASPE-preferred requirements, hot water must be delivered in less than 10 seconds upon turning on the tap. Since HWAT systems can be installed all the way to the fixture, they can provide hot water nearly instantaneously. Recirculation systems are not easily, or cost effectively, recirculated all the way to the fixture or even to the branch line. These uncirculated lengths of pipe will cool down; this cool water must be discharged before hot water can reach the fixture. Table 1 shows the water delivery time for different pipe sizes and fixture flow rates. Assuming an average 25 feet from the fixture to the recirculation line and 0.5 gpm fixtures, the resident can wait 60 seconds or more for hot water to be delivered.

Figure 2



Water conservation is a growing concern. When users have to wait for hot water to get to the faucet, water is wasted. Many cities now require hot and cold water metering to help offset the building owner's cost. Recirculation systems flow the water through the water meter, which is reflected as hot water usage. An HWAT system does not have this issue, since water only flows when the fixture is opened.

Heat tracing systems provide integrated monitoring

Continued on page 112

Delivery time in seconds

Piping Type	Pipe Size	0.5 GPM		1.5 GPM		2.5 GPM		4.0 GPM	
		10 feet	25 feet	10 feet	25 feet	10 feet	25 feet	10 feet	25 feet
Copper	1/2"	25	63	9	21	5	13	3	8
Copper	3/4"	48	118	16	40	10	24	6	15
Steel Pipe Schedule 40	1/2"	63	157	21	52	13	31	8	20
Steel Pipe Schedule 40	3/4"	91	228	30	75	18	45	11	28
CPVC Schedule 40	1/2"	64	159	21	53	13	32	8	20
CPVC Schedule 40	3/4"	90	226	30	75	19	46	12	30

Acceptable Performance	1 - 10 seconds
Marginal Performance	11- 30 seconds
Unacceptable Performance	31+ seconds

Table 1

Think of it as a 50-story hose.

Get a convenient and reliable rooftop water source when you specify the Woodford RHY2-MS roof hydrant.

Engineered for quality and durability, the Woodford RHY2-MS is perfect for washing down cooling towers, cleaning condenser coils or providing water for window washers and other types of roof equipment. The hydrant support allows for installation flexibility, while its unique mounting system secures above and below the roof deck, providing exceptional strength and security. It also comes with a 2-degree shim for pitch adjustment. Featuring ASSE 1052 backflow prevention and Woodford's freezeless technology, the RHY2-MS makes getting water on the roof easier than ever before.

For more information, visit WoodfordMfg.com.

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Heat tracing

continued from page 110

through the ACS-30 controller, so that building facilities personnel gets an early warning of any problem. Monitoring the hot water system (risers, branch lines, water heater and mixing valves) provides feedback of proper system performance. Recirculation systems do not typically have this ability.

The ACS-30 controller is a distributed control system with a central user interface terminal. The user interface is connected via communication wiring to heating cable control panels, which can be placed throughout the installation at convenient power drop locations. The ACS-30 can be integrated into the Building Management System (BMS) through BacNet, Lonworks, Metasys or Modbus RTU protocols, allowing you to easily monitor and track energy consumption and system performance of the hot water delivery system.

So, why is an electric heat tracing system the smart performance alternative to a recirculation system?

• Material cost: Beyond the return piping, recirculation systems require balancing valves, recirculation pumps, heat exchangers or dedicated water heating plants per pressure zone.

• Balancing: Heat tracing systems do not require any balancing valves. In recirculation systems, every riser, in each of the pressure zones, requires balancing valves to ensure uniform flow to each residence. This is problematic, since the flow rate at each level and each riser is not uniform and changes as the building occupancy evolves. The different pressure zones increase the difficulties of balancing between zones.

• Less maintenance: Heat tracing systems are significantly less complex, with no pumps or balancing that require periodic maintenance.

• Lower installed cost: Since heat tracing systems require significantly fewer parts, the installed cost savings can be significant.

• Space utilization: Heat tracing systems take up less floor space.

• Energy savings: Without return lines, water overheating and reheating return water, heat tracing systems can save significant energy over recirculation.

• Water savings: Since heat trace systems can be installed up the fixture, there is virtually no water wasted while waiting for hot water.

• Building owner satisfaction: Since heat tracing systems do not require flow balancing, residents will consistently receive hot water regardless of building occupancy changes; thus, reducing callbacks and adjustments.

• Resident satisfaction: Heat tracing systems can deliver hot water to the fixture almost instantaneously, so residents do not have to wait. Also, as the trend increases in metered hot water, residents only have to pay for what they use. ■

Brian Larkin is product manager at Tyco Thermal Controls.

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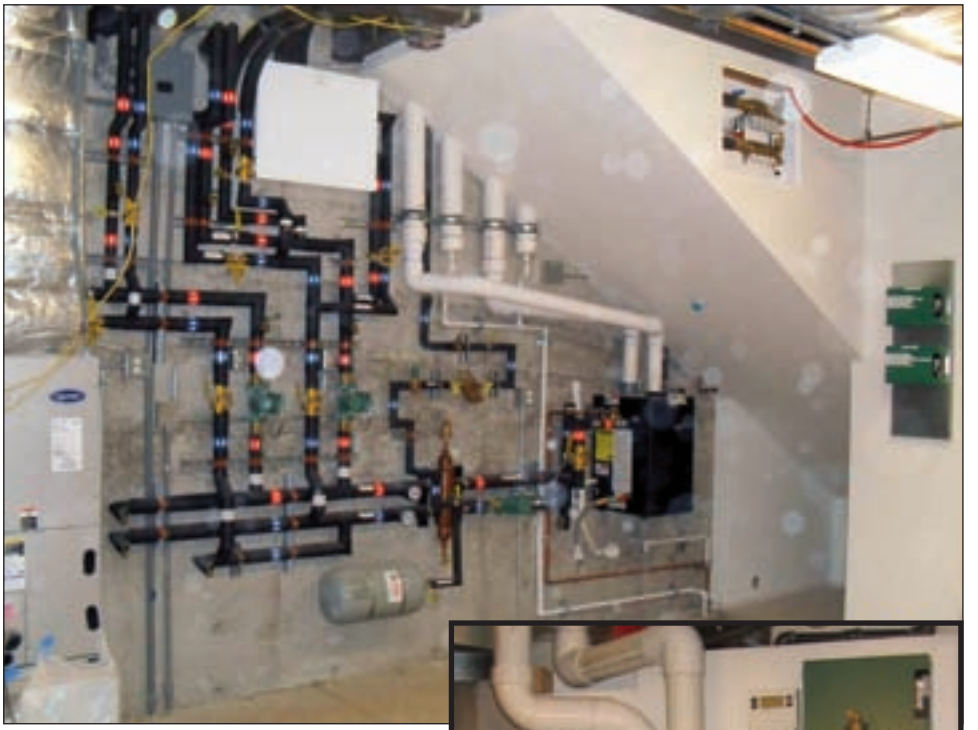
Function & FORM

Evolving a flexible organizational principle for hydronic mechanical rooms

By Hoyt Corbett



In this mechanical room (above), the PHP hydraulic separator centrally organizes the system, dividing it into primary and secondary loops. The separator serves as the connection point for the fill valve and expansion tank, and provides for air elimination and sediment removal. Says contactor Dave Mayo, "System air removal is more easily managed as well as service/maintenance, system fill/drain and the introduction of chemical/corrosion inhibiting additives." Photo courtesy Mayo Mechanical

Part of my early training was as an artist and I have always approached mechanical systems from a very visual organizational perspective. I first started installing hydronic heating in the early 1990s as a young mechanical contractor. I visualized the in-floor tubing of a radiant floor heating system as an inverse energy drawing, designed to offset the heat loss of a home. In my early days I relied on drawings from suppliers on how mechanical rooms should be installed and tried to replicate the sequence of components as a series of parts on a mechanical room wall: each part followed another in a linear sequence, like a flowing drawing, but made with pipe and hydronic components. So again, I conceived of them very visually.

My mechanical rooms of that era were relatively intimidating. They took up a lot of space and were often hard for a customer to understand. Boilers then were mostly freestanding, and we would pipe as fast as we could from them to a strut on the wall and begin mounting the components, in order, with pipe connecting the parts. These were always one-of-a-kind "artisan" mechanical rooms.

The Evolution Begins

Later I ran a company that was a major national brand of radiant heating, and we began experimenting with how to organize a mechanical room more consistently with pre-made mechanical modules. We began making modules that used primary and secondary piping, often with variable speed injection. But we always had problems with whether the customer was going to pump left or right or up or down or on which side of the boiler. It was hard to make enough variants to address all the variants a customer might want. So you would pick a few designs that cover as much ground as possible and call it a day. And as mechanical room space got more expensive, mechanical rooms became smaller and boilers began to be wall hung. This compounded the problem of limited or predictable wall space to mount components.

Hydraulic separators with integral secondary loop manifolding are great space savers in small to medium sized residential systems. These systems can be very compact. The patented PHP Allcan hydraulic separator has secondary loop manifolding and connections for DHW integrally built into the unit, and uses compact end suction pumps on the secondary side. In this case, the pumps have been swiveled backwards to directly exit the back mechanical room wall. This system has six heating zones, one of which is a mixing zone, with DHW off the primary loop. Photo courtesy Bend Heating, Inc.

Later I began designing compact primary/secondary near-boiler piping modules using closely spaced "Tees"

Continued on page 116

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The 2-inch Calleffi Hydraulic separator provides the central organization for this elegantly constructed mechanical space. This mechanical room can be easily understood and serviced. Photo courtesy Mayo Mechanical.

for Precision Hydronic Products. These were very compact for what they were, but lacked organizational flexibility. About this time, the now better publicized benefits of hydraulic separators began to be more widely understood; the uncoupling of the flow between the primary and secondary loops. But what was overlooked in the discussion of hydraulic separators was that they provided a simply fabulous and flexible organizing principle for a mechanical room. They are reversible in the sense that either side can be primary or secondary, and they can be mounted wherever it's convenient to centrally focus the organization of a mechanical room.

Multifunctional, like smart phones

Like our new multifunction cell phones, hydraulic separators can be built as multifunction devices: they can be designed to eliminate air, drain off sediment, they can be the attachment point for fill valves, expansion tanks and temperature sensors. As such, they become the heart of the hydronic system and a simplifiying elegant organizer of the mechanical room. I now visualize hydraulic separators as the center of the system and work outward from them to incorporate all aspects of the system. Since their placement is flexible, they are easily adaptable to the unique space of each mechanical room, allowing you to create a coherent layout in most any mechanical room.

Mechanical contractor David Mayo of Mayo Mechanical in Laguna, California now routinely uses hydraulic separators to organize his mechanical rooms. It has given him a competatve leg up, functionally and visually. Says Mayo, "We impress people with our knowledge of hydronics, and our systems work like magic."

Precision Hydronic Products, Taco, Caleffi and others now provide hydraulic separators with different configurations of components. While the hydraulic separators provide large organizational and technical advantages

> ...hydraulic separators provide a flexible organizing principle for a mechanical room...

for a hydronic system, their challenge — particularly in residential systems — is that they still can take up a lot of space. For more compact organization, at least two companies have solved this space problem by making the hydraulic separator even more multifunctional by building hydraulic separators that also internally incorporate secondary loop manifolding. Products that do this may have an unconventional look. that has slowed their adopron. But products such as the such as the Caleffi Hydrolink and the patented Precision Hydronic Product Allcan are highly functional. These products have the organizational advantages of conventional hydraulic separators, but they also save space, materials and cost when properly applied. They have a good future in residential systems, but will not likely be built in sizes to be used in larger mechanical rooms where the simple central organizing function and elegance of a hydraulic separator still make for disciplined, coherent and highly functional mechanical rooms. ■

Hoyt Corbett is an independent product development consultant. He can be reached at 206-369-1458 or inventivedevelopment@yahoo.com

Product Application

Prevent Hot Water Tank Failures With Seamless Cement Lining

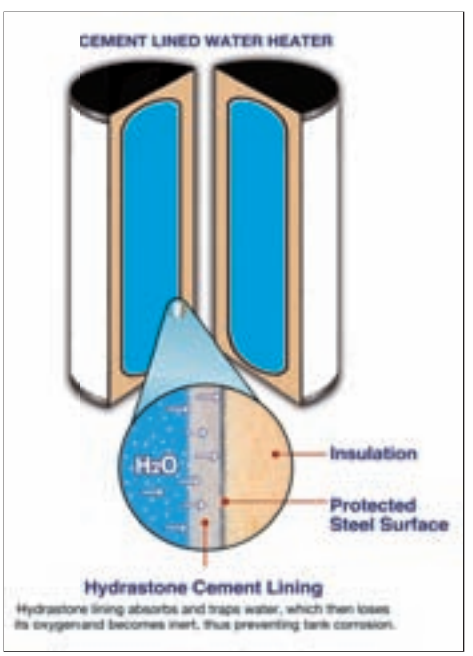
By Sean Clarke, National Sales Manager

How to store hot water for domestic use has been the bane of the plumbing professional and building owner since the invention of indoor plumbing. The challenge has always been how to provide a cost effective water heating product that is robust enough to last the life cycle of a commercial building. Many attempts have been made in the industry to solve these problems but the reality is they have been met with only limited success.

The most common cause of water heater tank failure is due to failure of the tank lining from corrosive elements found naturally in water. When a tank's protective lining allows water to come into direct contact with the steel tank the lining failure causes the tank to corrode, erode and inevitably leak, requiring costly repair or replacement. Therefore, the type of protective lining is the single most important feature when determining the quality of any water heater.

Although cement tank linings are nothing new to the water heater industry, they have long been a tried and true method of lining tanks and pipe since the early 1900s. Cement linings are known for creating an excellent corrosion resistant lining for many reasons. The main factor is that high-density cement linings have an extremely low absorption rate, there by preventing the constant flow of oxygenated water to the steel pressure vessel and preventing the tank from corroding. Cement linings also raise the pH at the steel surface bringing the steel into a state of passivation by creating a very thin and stable oxide layer on the steel substrate, which inhibits corrosion.

Cement linings are impervious to the corrosive effects of elevated hot water temps (190˚F), as well as varying water chemistry including high chlorides, softened and even brackish water which is devastating to other linings including stainless steel tanks.



There are unique benefits that are exclusive to cement lined vessels such as reparability, self-healing and expansion. Tanks that have been neglected and in extended service may be faced with costly repairs. With a cement lined tank a fault in the lining does not require costly removal of the tank but just a repair with simple tools, unlike other linings that require removal for repair or outright replacement.

Hubbell's New condensing hybrid tankless wa¬ter heater is the most technologically advanced gas heater on the market. With an operating efficiency above 94%, Energy Star® listing and Low Nox approval, the Hubbell heater is the choice for reliable and accurate hot water for any commercial application. Utilizing a floating all 316L SS heat exchanger, internal circulation system and revolutionary internal buffer vessel, the Hubbell heater ensures long operating life. Visit Booth 1273 for more info.

Cement also has self-healing properties known as "autogenous healing". Should small voids develop in the cement lining as time progresses the cement has the ability to calcify over these voids. When cement is exposed to moisture, cement extrudes calcium hydroxide into the void which is converted to calcium carbonate (limestone) to fill the crack. This fact is similar to how the human body repairs a broken bone. The repair is stronger than the original. The cement lining is actually a vessel within a vessel because there is no actual bond between the steel and the cement. Cement enjoys the same coefficient of expansion as the steel vessel that houses the cement lining. In simple terms, cement expands and contracts at the same rate as the steel vessel.

The sole purpose of the tank lining is to protect the steel pressure vessel from the aggressive and corrosive effects of potable water. With that said, at the heart of every Hubbell water heater is the Hydrastone cement lining, a specially formulated cement applied to a minimum of 5/8-inch thickness on all surfaces which protects the steel tank from the corrosive elements found in potable water. The cement lining covers 100 percent of all wetted surfaces and is 125 to 150 times thicker than commonly used linings. Equipped with non-ferrous tappings on all Hubbell vessels, water is never in direct contact with ferrous metal.

Full coverage is achieved by injecting the precise amount of Hydrastone cement into each tank and then centrifugally spinning it at 250 RPM to ensure complete and uniform coverage of the lining on all interior surfaces. This process can be performed on tanks as small as 6 gallons and as large as 1,000 gallons.

Due to the thickness and guaranteed coverage of cement lining there is no need for a sacrificial anode and as such a cement lined tank is maintenance free. Corrosion in a water heater has essentially two forms: Electrolysis (due to dissimilar metal) and Oxidation (or rusting, as when oxygen contacts a steel surface). The combination of our nonferrous plumbing connection and the seamless Hydrastone lining efficiently protects the inner tank from both forms of corrosion providing an extremely durable and long lasting lining suitable for hot and cold potable water storage in a variety of commercial and industrial applications.

For more information on the Hubbell cement lined products, please visit www.hubbellheaters.com. ■

2012 ASPE Convention & Exposition
Product Showcase

Piping system

Greenpipe®, a recyclable polypropylene-random (PP-R) piping system designed specifically for potable water applications, is available in sizes up to 18 inches in diameter and is ideal for water mains and high-rise buildings. 18-inch Greenpipe features an SDR 11 wall thickness, is capable of delivering 4,000–6,000 gpm, provides a balance of strength and flow rate and can be directly buried in soil, sand, concrete, rock and other materials. Natural R-value of 1 (or more, depending on pipe size and SDR) also delivers potential savings in terms of insulation and energy loss. All systems are connected via heat fusion. **Aquatherm, Booth 1939**

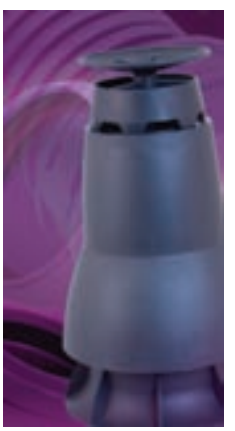
Hot water temperature maintenance system

Raychem HWAT systems meet demanding green plumbing codes for fast delivery of hot water to all fixtures and eliminates return pipes, balancing valves and pumps. The single pipe system reduces engineering time and simplifies piping layout. **Tyco Thermal Controls, Booth 1567**

Anti-ligature plumbing fixtures

Willoughby Industries is pleased to announce the addition of a new line of anti-ligature (anti-suicide) plumbing fixtures, showers, shower heads, valves, grab bars and accessories. Specifically designed to help prevent the possibility of a suicide attempt, these new products are perfectly suited for installation in behavioral healthcare facilities, psychiatric centers or adult and juvenile detention settings. All of these products are proudly made in the U.S., which makes them ideal for Veterans Administration hospital use. **Willoughby Industries, Booth 1555**

Vent system



PolyPro is a ULC S636 Listed chloride-free, environmentally safe vent system made of polypropylene for condensing gas appliances. It is available in rigid and flex. The flex is ideal for retrofit venting new, high-efficiency appliances. It is lightweight and easy to install, and no glues or solvents are required. Other features include gasketed male and female connections, and higher sustained operating temperatures than PVC/CPVC. There is no leakage or back pressure in rainy or windy conditions. The system is 100 percent recyclable and carries a 10-year warranty. **DuraVent, Booth 1736**

Heating system

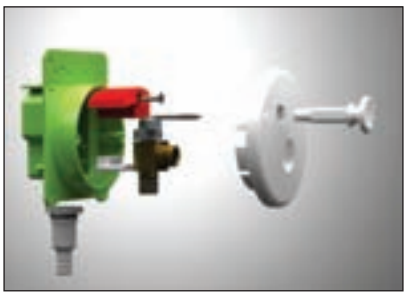
Solar Usage Now, LLC, will be showcasing their SUN Equinox Heating System during the 2012 ASPE Convention and Exposition. The system is a pre-engineered plug and play hot water and space heating system. It can be standalone or solar thermal and/or heat recovery can be added to provide greater efficiencies. The SUN Equinox ensures optimum inherent water-hygienic properties, eliminating deposits such as lime, sediment or rust. It is often referred to as the anti-Legionella storage tank. **Solar Usage Now, Booth 1778**

Condensing tankless water heater

The new Navien NPE Series premium gas condensing tankless water heater features advanced technology that reduces time and labor for a typical tankless retrofit by utilizing existing gas lines and existing flue chases. The new technology allows installation time to be reduced in half compared to other tankless water heaters. Features include 2-inch PVC venting up to 60 feet, ½-inch gas lines up to 24 feet, ComfortFlow technology, and field convertibility from natural gas to liquid propane gas. **Navien America, Booth 2053**

Super base

MIRO's 10-H Super Base has been designed and engineered to hold larger pipe and duct on the roof while allowing them to stay within the standards MIRO has set to keep weight under 2.0 psi. Its 19 x 23 inch dimensions are the largest in the industry. This new base has many new features including drainage grooves, more rounded sides, a bolt through hole designed to be placed from the bottom to the top and a universal racking system to accommodate strut to solar rail. **MIRO, Booth 1181**



Pull stop box

The new Pull Stop Box™ from LSP Products Group takes the hassle out of angle stop installation by eliminating the need to stub out. Moving the angle stop into the wall provides a sleek, sophisticated, finished look. The decorative knob controls the flow of water to the supply line by actuating the valve in a push/pull motion. It comes with a temporary protective cover to keep debris out of the box cavity during the construction process and is made of high-impact plastic. **LSP Products Group, Booth 1574**

Grinder system

The 915 Shark Series Grinder Package System is a preassembled grinder system. Complete with alarm and check valve , it is designed for new construction, retrofits and replacements. Utilizing Zoeller's new and unique Tri-Slice™ cutter, this small, yet extremely powerful, ½ hp, 115 V grinder system provides more than 250,000 cuts per minute and significantly eliminates the maintenance and clogging concerns associated with other grinder and sewage ejector systems. **Zoeller Pump Company, Booth 847**

Instrumentation products

Smith-Cooper has added a complete package of instrumentation products to their comprehensive line of industrial PVF and stainless products. The company's new SCI-Loc Double Ferrule Fittings, Ball and Poppet Check Valves and Tubing 1/8 -1 inch are in stock, fully traceable and trademarked with the SCI logo. **Smith-Cooper, Booth 1880**

Two-piece valve

KITZ Lead Free K-Press is designed for the water service industry. This two-piece, full port valve provides a fast and safe installation for commercial/residential applications. It is UL certified to NSF 61 Annex G and is available in sizes 1/2-2 inches. **KITZ Corporation of America, Booth 1750**

Product News

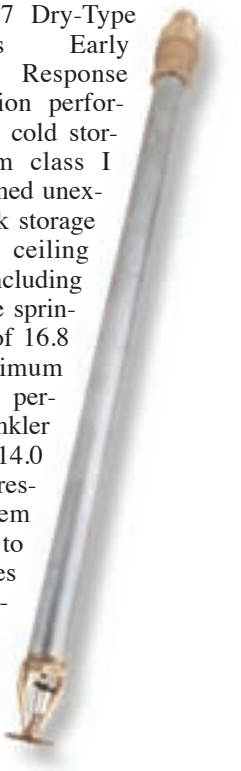
Plumbing Engineer's Product of the Month

Pressure cylinders

Worthington Cylinders is a global supplier of pressure cylinders and related products, including Sterling® Premium lead-free solder. Sterling has a lowest melting temperature of 410°F and a highest tensile strength of 7130 psi. It meets the highest product standards including NSF 61 Certification for safe use in potable water applications. And since it is completely free of antimony or nickel, Sterling is environmentally safe. **Worthington Cylinders**.

Circle 100 on Reader Reply Form on page 129

Pendent sprinkler



The Model ESFR-17 Dry-Type Sprinkler brings Early Suppression Fast Response (ESFR) fire protection performance to box-in-box cold storage, protecting from class I commodities to cartoned unexpanded plastic in rack storage arrangements with ceiling heights up to and including 40 feet (12.2 m). The sprinkler has a K-Factor of 16.8 (242) with a minimum required pressure 30 percent lower than a sprinkler with a K-Factor of 14.0 (200). The lower pressure allows system designers the ability to downsize the pipe sizes and fire pump, delivering more savings in material and labor compared to other ESFR dry pendent sprinklers on the market. **Tyco**.

Circle 101 on Reader Reply Form on page 129

Wall mount boiler

The WM97+ boiler, a 155,000 Btu input wall mount boiler joins the original lineup of 70,000 and 110,000 Btu input models. All offer a 97 percent AFUE rating. WM97+ is extremely easy to install and operate, saving time and money with built-in features that include a boiler circulator, primary/secondary piping, low water cutoff, three zone control, text display, pre-wired terminal strips and 5 to 1 turndown ratio capability. It offers flexibility, with multiple venting options and simple gas conversions and has a durable, unique stainless steel fire tube heat exchanger with a corrosion resistant condensate collector base. **Weil-McLain.**

Circle 102 on Reader Reply Form on page 129

Communicating touchscreen thermostat

The tekmarNet® Thermostat 557 can operate either a hydronic radiant floor with a two-stage heat pump (water-to-air or air-to-air) for heating and cooling and an emergency back-up heating system or two stages of heating and two stages of cooling. Three auxiliary sensor inputs can be used to measure room, floor, outdoor or duct temperature. Optional floor sensor allows precise heating of radiant floors. A new Humidity and Temperature Sensor 086 mounts flush to the wall and connects back to the thermostat to remotely measure relative humidity and temperature. Touchscreen display allows easy adjustment of seven-day programmable schedules and room temperatures. **tekmar Control Systems Ltd.**

Circle 103 on Reader Reply Form on page 129

Ball valves and fittings

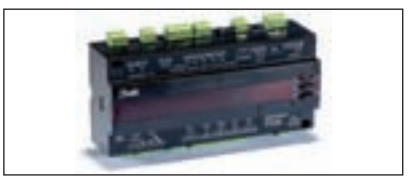
The Pro-Connect line of push-connect ball valves and fittings includes six new designs: reducing couplings, reducing tees, reducing elbows, along with straight and angle supply stops. Forged from lead free dezincification resistant brass and cUPC certified to meet the requirements of AB1953 and NSF/ANSI 61-G, Pro-Connect Push is ideal for use in potable water and hydronic heating systems. **Webstone**.

Circle 104 on Reader Reply Form on page 129

Expansion loop for potable water

The Metraloop® expansion loop has now achieved NSF 61, annex G certification for use with potable water. This means that the Metraloop complies with California's Health & Safety Code Section 116875 (commonly known as AB 1953). An extremely flexible and compact expansion joint, the Metraloop has none of the pressure thrust loads of conventional bellows-type joints and negligible spring rates. It needs no anchoring, thrust blocks or structural steel, and minimal guiding. **Metraflex**.

Circle 105 on Reader Reply Form on page 129



Refrigeration case and cold room controller

The new ADAP-KOOL® AK-CC 550 case/room controller makes it easy to set up and optimize energy for cold storage rooms and food cases. Eight applications include display cases or cold storage rooms with one valve, one evaporator and one refrigeration section. Other applications cover configurations for one valve, two refrigeration sections and one or two evaporators. An external display can be directly connected with a built-in plug. MODBUS® communications is standard. TCP/IP and LonWorks™ protocols are supported with optional communication cards. The compact controller weighs 0.9 pounds and can be DIN-rail or wall-mounted. **Danfoss**.

Circle 107 on Reader Reply Form on page 129

Plumbing Engineer's Product of the Month

Flush valves

The ZTR6200 sensor flush valve for water closets, the first product from the ZTR suite, is performance engineered with the dual technology of the Ecovantage® Pint sensor and HydroVantage® piston innovation. ZTR6200 answers the need for building owners and facility managers who aim to reduce costs and water consumption. State-of-the art chloramine resistant internal seals reduce maintenance costs and add to the longevity of the valve. **Zurn Industries.**

Circle 106 on Reader Reply Form on page 129

Pipe system

Transair is a fast, flexible and easy to modify aluminum pipe system for compressed air. Quick connections eliminate the need to thread or solder pipe. The lightweight aluminum pipe is easy to handle and safe to work with on elevated platforms. Transair significantly reduces installation time, maintenance and operating costs when compared to traditional pipe and is available in ½ to 6 inch sizes. **Parker Hannifin**.

Circle 108 on Reader Reply Form on page 129

Single-lever basin faucet

The AVA single-lever basin faucet with COOLFIX technology saves energy without sacrificing comfort or convenience. The six o'clock middle position is designed "full cold," so that no hot water is delivered in this setting. Incorporates Neoperl® Caché® aerator, reducing water flow to 1.5 gpm. Flat handle lifts and turns in a single movement, delivering a completely new and different feel to activating a faucet. **KWC.**

Circle 109 on Reader Reply Form on page 129

Safety station

Store first aid kits, bandages and supplies safely and efficiently in this deluxe safety station. Emergency eye wash attachment is standard in case of an eye emergency or injury. Features heavy-duty reinforced steel construction, includes a 36-inch wide sink, 24-inch wide storage cabinet and a 5-foot upper binder cabinet with gas spring shocks and task light. Standard accessories include mirror, soap dispenser, towel dispenser and waste receptacle. **Shure USA**.

Circle 110 on Reader Reply Form on page 129

Letters to the Editor

PVC Venting

Ron George:

I have followed your articles in *PE*. I am a R.I. Certified Plumbing & Mechanical Inspector (25 years) and am very concerned about this subject. The problem for me is, how do I allow a PVC sch 40 flue vent to be installed? I have attached some of our 2010 ICC, R.I. Mechanical Code sections. There are inconsistencies that are causing us problems. This is in the Mechanical Code; it is an ICC amendment.

801.20 Plastic vent joints. Plastic pipe and fittings used to I vent appliances shall be installed in accordance with the appliance manufacturer's installation instructions.

SECTION 802 VENTS

802.1 General. All vent systems shall be listed and labeled. Type L vents and pellet vents shall be tested in accordance with UL 641.

802.3 Installation. Vent systems shall be sized, installed and terminated in accordance with the vent and appliance manufacturer's installation instructions.

The following is in the Fuel Gas Code:

502.1 General. All vents, except as provided in Section 503.7, shall be listed and labeled. Type Band BW vents shall be tested in accordance with UL 441. Type L vents shall be tested in accordance with UL 641. Vents for Category II and III appliances shall be tested in accordance with UL 1738. 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 installation instructions.

503.4.1 Plastic piping. Plastic piping used for venting appliances listed for use with such venting materials shall be approved.

503.4.1.1 (IFGS) Plastic vent joints. Plastic pipe and Fittings used to vent appliances shall be installed in accordance with the appliance manufacturer's installation instructions. Where a primer is required, it shall be of a contrasting color.

503.4.2 Special gas vent. Special gas vent shall be listed and installed in accordance with the special gas vent manufacturer's installation instructions.

This is from the Residential Code Mechanical Section:

G2427.4 (503.4) Type of venting system to be used. The type of venting system to be used shall be in accordance with Table G2427.4.

G2427.4.1 (503.4.1) Plastic piping. Plastic piping used for venting appliances listed for use with such venting materials shall be approved.

G2427.4.1.1 (503.4.1.1) (IFGS) Plastic vent joints. Plastic pipe and fittings used to vent appliances shall be installed in accordance with the appliance manufacturer's installation instructions. Where a primer is required, it shall be of a contrasting color.

The problem that we see is letting manufacturers dictate code. None of the manufacturers of sch 40 PVC indicate that their product is listed and labeled for use as fuel gas vent piping. We inspectors are trying to figure out what to do. Should we follow the strict interpretation of code, which would be that no sch 40 PVC be allowed unless the manufacturer of the product will provide us with a letter approving the use of their product for flue gas venting? Your advice would be appreciated.

– Charlie Wright
Fair Winds

Charlie,

This is a safety issue. PVC pipe and fittings are not tested for real world conditions. Only one of the standard tests calls for pipe deflection at a temperature well above the PVC pipe manufacturers' maximum allowable temperature. It does not test joints or fittings. If the pipe and fittings are not listed, you should have every right to interpret on the side of safety. There are other plastic materials approved for venting flues; high temperature CPVC, Polypropylene, etc., are manufactured and tested for venting combustible gases. I am not aware of any PVC pipe manufacturers who have products tested and approved for venting combustible gases, because PVC pipe has a limit of 140°F and most flue gas temperatures can be well in excess of 180 – to 350°F in units with fouled heat exchangers.

– Ron George

Ron,

Today my copy of *Plumbing Engineer* arrived. Reading through it, I came upon your always-excellent "Code Classroom" column and read all of it.

I was somewhat confused by your statements in the second paragraph of discussion about Johns Hopkins. In that paragraph, you stated that, "The faucets are mandated to have 0.5 gpm per faucet, with a maximum total flow of 0.25 gallons of mixed water per cycle." I believe that you have mixed together two entirely different standards into this statement and, as it is stated, it is incorrect. If you read ASME A112.18.1 versions all the way back for at least 10-15 years, you will see that there is no such 0.5 gpm maximum on metering faucets. Non-metered faucets are subject to 0.5 in flow rate, but metered faucets are only regulated as to volume, not flow rate.

We are clear in all of our "green" presentations and our posted documents (on map-testing.com) that metered faucets have no maximum flow rate and that they represent the perfect alternative in many cases to mandates (such as CalGreen) that set the conventional faucet maximum flow at 0.4 gpm, which is not necessarily acceptable in some situations and facilities. CalGreen also sets a metering faucet maximum at 0.20 gallons. Solution: install a metering faucet at 1.0 gpm with a cyle time of 12 seconds, the result being a total consumption of 0.20 gallons, meeting the requirements of CalGreen, Federal law, and the green codes.

So, in conclusion, my point is that there are legal, code-compliant alternatives to unreasonably low flow rate maximums and those should be pointed out to design professionals (some of whom seem to be "locked in" to the "way we've always done it" and fail to explore other water-saving and performance options).

If I have misread your article, please forgive me.

– John Koeller, P.E., *Koeller & Company*
Yorba Linda, California

John,

I may be wrong on the 0.5 gpm flow rate mandate in the standard. I wrote that from my understanding of those flow rates. My understanding of that incident was the faucets in the facility having the Legionella problem had a 0.5 gpm flow rate with very short timing cycles. The point I was making was, the lower the flow or volume or time setting, the less water is drawn through the piping system. This coupled with lower usage from unoccupied areas of the building or lower occupancy rates increases the potential for stagnant water. Chlorine goes away over time.

It seem there should be a way of having electronic sensor faucets come on automatically a certain time after each use to maintain chlorine residuals in stagnant pipes. This still does not explain why Legionella was more prominent in the electronic faucets in that facility. That is why they were looking into it further. I just hope they know what to look for.

– Ron George

Ron,

I don't have any disagreement with what you stated here in this e-mail. However, the way the paragraph in the article was written made it seem as though you were not talking about a specific installation investigated in the Johns Hopkins report, but rather a hypothetical new installation. There was nothing in the paragraph that either mentioned Legionella, Johns Hopkins or bacteria (in fact, you mention "airports and hotels," so that took the discussion even further away from the Johns Hopkins situation). Hence, I saw the paragraph as "standing on its own," having no relation to the paragraph preceding it. That, at least, is the way I read it.

I also found the later paragraph beginning "This is yet another example...." as somewhat distressing, particularly because you paint a broad brush condemning "water conservation proponents" as not having done "proper research." I would agree that some of those people (a minority, in fact) are guilty, but not all! I would have preferred that you used the word "some" before the words "water conservation proponents." The fact is that there are hundreds of thousands of such "proponents" (manufacturers, government, design professionals, plumbing engineers, codes and standards people, builders, "greenies" and others), some of whom sit on the very same committees you do (where research is encouraged and conducted), yet you sort of paint them all with the same brush. This is not good.

Thanks, Ron. I always appreciate having dialog with you!

– John

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John,

Please accept my sincere apologies. Sometimes in the rush to get a column out I focus in on one issue and lose focus on the big picture. You are right. There are many good and well-intentioned people in the water conservation efforts and you are at the top of the list in my opinion.

Your examples are correct. I should not have said,"the faucets are mandated to have 0.5 gpm per faucet." It is based on each cycle as you noted.

In hindsight, I did use a broad brush and I'm truly sorry for the errant paint. I should have said "some" water conservation proponents. On a related subject, This caused me to think about the issue of flushing the lines. It seems to me there would be a benefit to flushing the plumbing lines periodically to assure proper chlorine levels. Maybe some research is needed on this?

I am aware of discussions where a similar type of effort is being done on cold water systems to assist with drain line transport using periodic flushes with some types of flush valves. Maybe the two could be combined so that some hot water is used to help with the drain line transport flush and maintaining residual chlorine levels. Just thinking aloud.

Thanks for your input, John. You always help me keep at least one foot on the ground.

– Ron George

Sprinkler Systems in Home

Mr. Dannaway:

Each month I look forward to your column. Thank you for taking the time to research and write it. Regarding your statement that "… sprinklers are now illegal in Hawaii, at least in one- and two-family dwellings...." This statement seems somewhat over the top. Will the local building official not issue an occupancy permit if one decides to install sprinklers in their new home? The wording of the law you quoted indicates only that a local jurisdiction cannot require the installation of a sprinkler system.

Regarding the various state laws prohibiting local jurisdictions from passing ordinances requiring sprinkler systems in one- and two-family homes; perhaps the fire protection industry should work toward code change proposals with wording such that lightweight construction will only be allowed if a sprinkler system is installed, instead of assuming a system will be installed.

Perhaps we should go somewhat further and require one-hour or even two-hour rated corridors and floor-ceiling assemblies for one- and two-family dwellings that do not have a sprinkler system installed. It is a safe bet that the National Association of Home Builders will find a sprinkler system less expensive than multiple layers of Type-X gypsum board on both sides of walls and ceilings.

– David L. Miller, P.E.
Engineered Fire Protection, LLC
Baton Rouge, Louisiana

Thank you very much for reading my columns I am glad you enjoy them. Yes, the title is over the top, but not "all the way over" in my view. It was meant as an attention grabber, but it was also meant to be a statement that is almost as ridiculous as a key justification for the law, i.e., that residential sprinklers "are not a proven life safety technology."

I do not think that our building officials will prohibit the voluntary installation of sprinklers, but, during the course of the testimony for the bill, it was clear that the Honolulu Fire Department was very concerned about losing the ability to resort to home sprinklers as an alternative for poor access or water supply. Technically, the building and fire officials will not be allowed to trade sprinklers for anything other than in those two cases.

I think you are on to something with fighting back with code provisions. One way to do that is make it clear in the IRC that you may not use cardboard beams if you are not sprinklered. In the end, I know that the truth will win out.

Hope you all over there were not hurt too badly by the hurricane.

– Sam Dannaway

Thank you for the quick reply. I really didn't expect it so quickly, especially considering the time difference. Unfortunately, tone-of-voice doesn't come through very well in an e-mail. The "over the top" really was meant with something of a smile, without the annoying emoticons.

I completely understand the intent of the attention grabber and agree with it. As usual, we have politicians meddling in things they do not understand and only listening to those with the most money. Does anyone really believe the average politician understands what happens inside a house on fire, much less the causes and results of the construction decisions? After 20 years in the industry, I don't understand it, because I am not a firefighter and have never been in a burning house.

The tradeoff issues are also very limiting on the ability of professional firefighters to protect the public and their own people, which, of course, is shameful. Fortunately, the law appears to have a sunset provision in five years.

I think the NAHB is of the "have their cake and eat it too" mentality. That is, they want the less expensive construction features of the "cardboard beams" but do not want to invest the money required to make them safe. After all, how many houses actually have a major fire, and why spend the money to make all houses safe when only a few are likely to burn and collapse? If we could just pick which ones were going to have a fire and install sprinklers in only those houses ….

I do think the IRC should specifically allow lightweight trusses with steel tooth truss-plates and cardboard beams only in homes with a sprinkler system. If that were the case, I firmly believe that members of the NAHB would actually install sprinklers in nearly every home.

We were very fortunate during the hurricane, but those to the south of us were not. Thanks for your concern; everyone in south Louisiana appreciates it. Keep plugging away with the accurate information and eventually everyone will again follow California and require sprinkler systems.

– David L. Miller, P.E.

Mr. Dannaway,

I believe your use of "…sprinklers are now illegal in Hawaii…" is incorrect in that it is illegal to REQUIRE fire sprinklers in the stated occupancies.

So what can be done? Well you mentioned that the homebuilders are using the wood "I" beams and other lightweight structural building components. I'm not sure if the local authorities in Hawaii can amend the building codes with more stringent requirements, but if they can then they should be requiring these lightweight structural components to be protected by "passive" protection, i.e. rated drywall, fire rated insulation, etc. Although I'm not an engineer and I cannot back up this claim, but after 40 years in the business (firefighting/fire prevention) I believe this may help protect the firefighters, or at least delay the structural failure.

The use of side-by-side fire demonstrations has provided a great boost too many areas in promoting sprinklers in residential occupancies. Maybe a modified version of this could be used to show the failures of the lightweight construction methods without some form of protection, be it drywall or sprinklers. The use of one or more moving rescue mannequins (200+ pounds) on a fire compromised lightweight structural components may show the dangers encountered by our firefighters. It would be a good idea to also show what the injury to a firefighter would cost the community over the long run. I think the Fire Chiefs could use this as an indirect way to counter Senate Bill 2387

The homebuilders have used the back door to get around the requirements, so maybe we need to use the side door and give the community the real options.

– Dave Baird, CFPE, FPO 1
Office of the State Fire Marshal, Chicago

Hello Mr. Baird,

That was done as an attention grabber. Your suggestions on what to do about this are good and in line with some discussion I had earlier. It would be a good idea to submit code change proposals to the IRC to prohibit certain lightweight construction unless sprinkler protection is provided.

We are working with the Honolulu Fire Department to do a side-by-side demo within a few months. Our chapter of the SFPE will be setting up the sprinkler system for the one compartment. Demonstrating the lack fire performance of lightweight construction in these demos would be a little tough. Again, thanks for reading the article.

– Sam Dannaway

Continued from page 18

APCOM earns award for energy conservation

COOKEVILLE, TENN. — APCOM Inc.'s Cookeville plant is proof that, by taking advantage of community resources, even a small facility can achieve big improvements — and big energy savings. Last year, the Cookeville plant identified opportunities to significantly reduce electricity consumption as well as natural gas and water usage in the 54,500-square-foot facility. As a result of its efforts to conserve energy and resources, the plant and its 75 employees received the A. O. Smith Chairman's Green Star Award.

Pictured are Paul Dana, president APCOM Inc.; Herb Pirkey, director-safety, health and the environment for A. O. Smith; Milton Collins, Phillip Wilson, Randy Stamps, all of the Cookeville plant; Paul Jones, chairman and chief executive officer, A. O. Smith; Wayne Key, operations manager, Cookeville plant and Mark Petrarca, senior vice president-human resources and public affairs, A. O. Smith.

A. O. Smith created the Chairman's Green Star Award in 2009 to encourage natural resource conservation efforts throughout the company. It is awarded to the plant that achieves the most year-over-year reductions in natural gas consumption, electricity usage and water consumption.

Cookeville took advantage of the Tennessee 3-Star Energy Initiatives for Manufacturing Program. The no-cost program provides small manufacturers with access to engineering resources that conduct extensive evaluations of the facility's use of energy and make recommendations for energy-saving improvements. The plant also took advantage of TVA's Enhanced Growth Credit program, a rebate program offered to facilities that install energy-saving equipment.

The 3-Star Assessment identified two major opportunities for energy savings: the plant's older, inefficient lighting system and a heating system that was installed in 1982. Cookeville operations manager Wayne Key and Randy Stamps, the plant's lead maintenance technician, elected to pursue upgrading the plant's lighting and heating immediately. They installed new, high-efficiency light fixtures throughout the production and office areas of the plant. The project has contributed to a nearly 50 percent reduction in the lighting portion of the Cookeville plant's electricity bill.

Similar savings were achieved by replacing Cookeville's old heating system with new, high-efficiency infrared heating equipment. The new units deliver the same amount of heat while requiring less than one-third the energy as the old equipment.

Other projects around the plant are contributing to additional energy savings. The Cookeville team replaced an older, natural gas-fired parts washer with a new, high-efficiency unit, reducing natural gas and water consumption. They are in the process of modifying hydraulic units inside the plant to vent heat outdoors, reducing strain on the plant's HVAC system.

The team's efforts include making employees aware of opportunities to save energy and conserve resources. "We are reminding employees to shut down the power to equipment that is not running," Key said. "Equipment that is in the idle mode still draws electricity and that can run into thousands of dollars of cost over a year's time."

ARCSA, IAPMO Sign MOU to Enhance Rainwater Harvesting, Plumbing Systems and Equipment

ONTARIO, CALIF. – The International Association of Plumbing and Mechanical Officials (IAPMO®) and the American Rainwater Catchment Systems Association (ARCSA) have entered into a Memorandum of Understanding (MOU) to enhance the well-being of people everywhere through the provision of safe, efficient and affordable rainwater harvesting and plumbing systems and equipment.

IAPMO and ARCSA signed the MOU during the ARCSA Annual Conference in Raleigh, N.C.

"Because water is fast becoming a rising urgency in the United States, we welcome the opportunity to partner with IAPMO to raise awareness of this issue and work to introduce rainwater catchment as an alternative water source into the code process," said outgoing ARCSA President Bob Boulware.

"I am very excited about the MOU between The IAPMO Group and ARCSA," incoming ARCSA President David Crawford said. "I know that as a team we can have a great impact on making sure we squire our water needs for the future of many generations to come."

IAPMO Group officials were equally as excited about the partnership.

"We look forward to working with ARCSA to ensure that both organizations' goals are met and that the public is fully protected as these systems become more prevalent," IAPMO President Dan Daniels said.

"With the need to conserve water becoming vitally important due to increasing populations and other factors, more and more businesses and residents are turning to conservation methods such as rainwater harvesting," said IAPMO CEO GP Russ Chaney. "This agreement will ensure that the codes, standards and training and certification services affiliated with rainwater harvest-

ing will be of the highest quality."

The MOU outlines several areas in which ARCSA and IAPMO will work together, including:

• Assigning technical representatives to support and actively participate in the development of each organization's respective codes and standards that are of mutual benefit.

• Collaborating and working jointly advocating sound policy on city, state and federal governmental levels for the adoption of code, legislation and regulations benefiting both organizations.

• Exploring opportunities for ARCSA to collaborate with IAPMO in World Plumbing Council projects.

ATS Announces Spec Competition

TORONTO – Allied Technical Services Inc. (ATS) has announced a contest challenging all engineers, architects and interior designers to be the fastest to build a plumbing specification. Entrants have a chance to win an Apple iPad and other prizes. Go online to www.thegreatspecrace.com to build a spec and enter.

RIDGID awards PHCC scholarships

ELYRIA, OHIO — RIDGID® has awarded four scholarships through the Educational Foundation of the Plumbing-Heating-Cooling Contractors – National Association (PHCC) to students enrolled in plumbing-heating-cooling apprentice programs. PHCC administers the scholarship program and is responsible for selecting the award winners. Scholarship recipients will receive up to $1,000 in tuition assistance and $1,500 in RIDGID tools.

The 2012 scholarship recipients are:

Tyler Arndt of Brooklyn, Wis., is working full-time at PHCC member company Arndt & Son Plumbing and is enrolled in the Madison Area Technical College Plumbing Apprenticeship Program.

Justin Gould of San Diego, Calif., is working full-time at PHCC member company Bill Howe Inc., and is enrolled in the San Diego PHCC Plumbing Apprentice Program.

Dana Parks of Imperial Beach, Calif., is working full-time at PHCC member company Bill Howe Inc., and is enrolled in the San Diego PHCC Plumbing Apprentice Program.

Matthew Saille of El Cajon, Calif., is working full-time at PHCC member company Bill Howe Inc., and is enrolled in the San Diego PHCC Plumbing Apprentice Program.

Viking receives enhanced UL listing for CPVC piping system

HASTINGS, MICH. — Viking Corporation has received a new, expanded UL listing for its BlazeMaster® line of CPVC piping products which allows for exposed piping installations in basements with composite wood joists, commonly called TJI® joists. These enhanced listings can provide significant cost savings for residential fire sprinkler systems.

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FLUSHOMETER STORY

"Tiger in the Tank" by Bruce Martin is the story of the flushometer-tank that revolutionized North American toilet design and water usage. It is available online at Amazon.com; Yahoo.com; InfinityPublishing.com; Barnes & Nobel.com or your local bookseller. Soft cover - $16.95 + S&H; e-Book [for Kindle, etc.] - $9.95.

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Industry News

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Previously, when sprinklers were installed in an unfinished basement with composite wood joists, a layer of drywall was required to cover the CPVC piping network. Alternatively, metallic pipe could be used in these applications. With this new UL listing, provided certain conditions are met, Viking's CPVC piping system can be installed exposed, without the need for additional drywall protection. The result is a lower total installed cost for residential sprinkler systems.

These new listings also allow for exposed CPVC riser installations in NFPA 13R and 13D residential systems. Viking has updated its Installation and Design Manual for BlazeMaster® CPVC systems with two special addendums that outline the specific construction and installation requirements that must be met, including requirements for ceiling heights, joist depths, sprinkler K factors and temperature ratings. The updated installation instructions can be found at online at vikinggroupinc.com/literature/viking_plastics. ■

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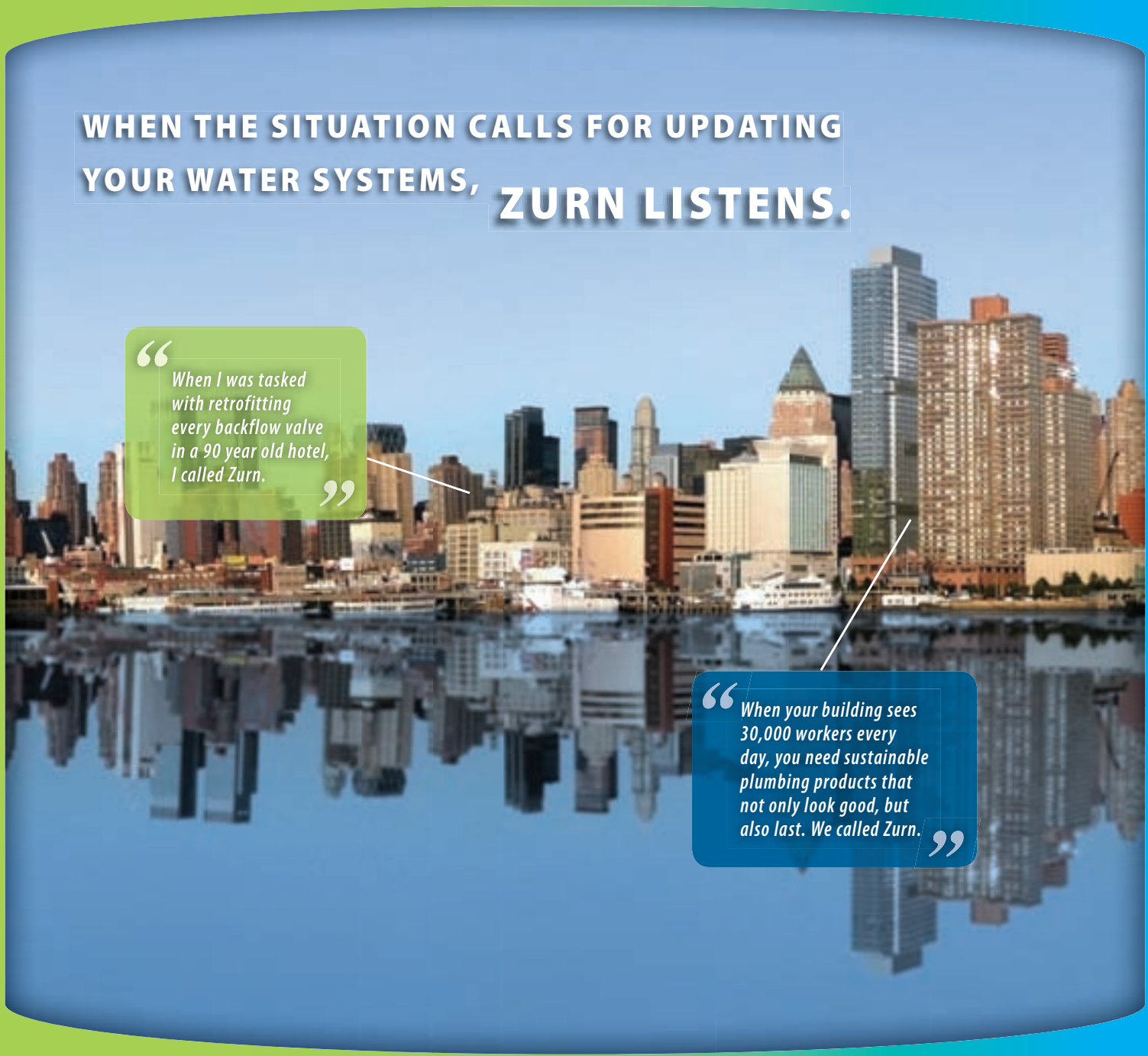

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