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Plumbing Engineer

A TMB Publication

THE OFFICIAL PUBLICATION OF THE AMERICAN SOCIETY OF PLUMBING ENGINEERS

March 2012

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- Fire Pump Sizing and Selection
- What's New in the 2012 IPC
- Designing and Specifying High-efficiency Heating Equipment

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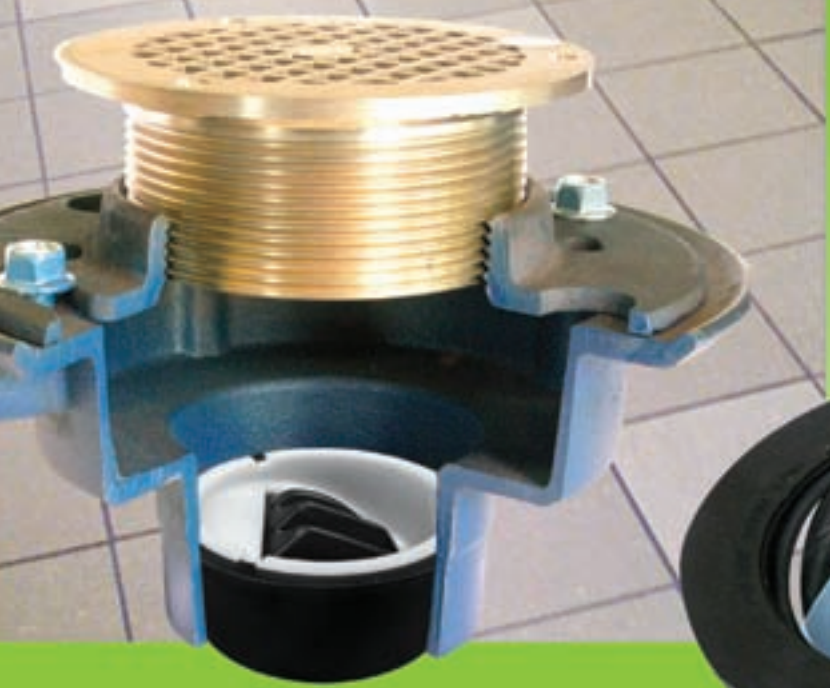

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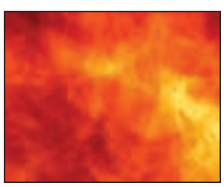

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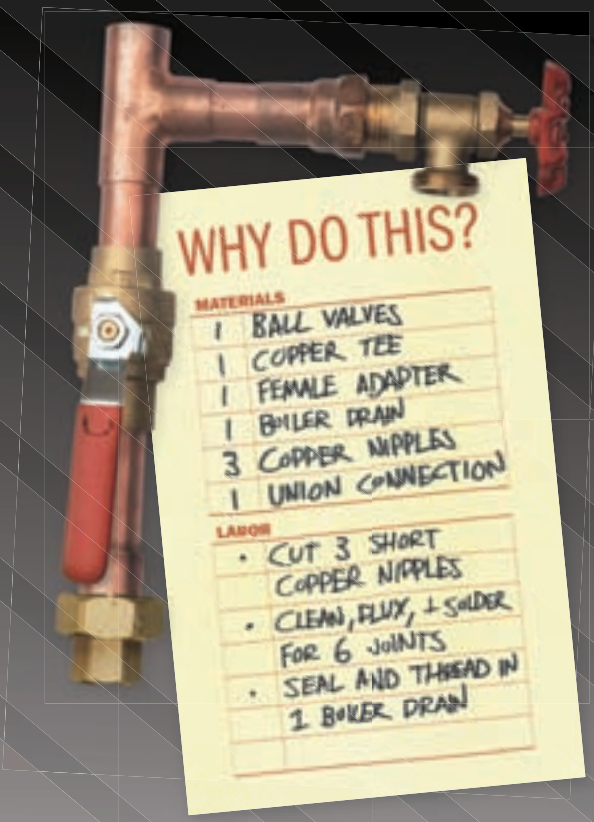

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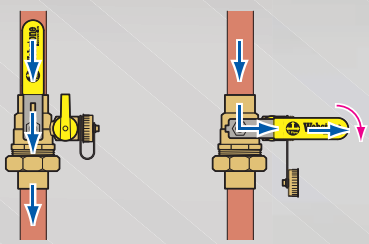
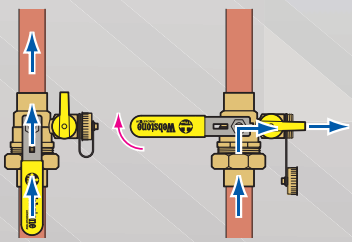


Normal Handle Open Position

Normal Handle Closed Position



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From the desk of Tom Brown

Tom Brown, owner, TMB Publishing Inc.

Looking toward the future

Welcome to the March issue of *Plumbing Engineer*! As you read through the pages of this issue, you may notice a change. *Plumbing Engineer* is now the official publication of the American Society of Plumbing Engineers (ASPE). This issue signifies the reunification of two venerable entities. *Plumbing Engineer* magazine has been the authoritative voice for the plumbing, hydronics, fire protection and PVF industries for more than 40 years and ASPE was founded in 1964 as an organization dedicated to the advancement of the plumbing engineering profession. ASPE is dedicated to the advancement of the science of plumbing engineering, to the professional growth and advancement of its members and the health, welfare and safety of the public.

What does this mean moving forward? *Plumbing Engineer*'s mission for the last four decades has been to provide its readership the best editorial, and to provide our supporters and advertisers with the best marketing value. This new partnership only emboldens our position as the leader in said editorial and value. ASPE's technical leadership throughout the plumbing engineering industry will be evident in the pages of the *Plumbing Engineer*. We are thrilled to again be partnering with ASPE to help publish quality technical articles for the plumbing engineering community, and *Plumbing Engineer* and its readers can only benefit from the wealth of knowledge and expertise ASPE and its members will bring to the publication.

According to ASPE's executive director/CEO Jim Kendzel, "TMB's leadership in the plumbing engineering market ensures that ASPE's technical content will reach a wider audience of plumbing engineers, designers, and specifiers, leading to greater exposure of the ASPE brand and, ultimately, increased value to subscribers."

We remain dedicated to the promotion of the ASPE brand and we encourage our readers who are not already ASPE members to consider membership.

As you turn the pages of this month's issue, you'll notice some welcome editorial additions to the magazine. Page 44 features future columnist contributor, Winston Huff, as he discusses sustainable design topics. Page 64 provides an in-depth look at "Fire Pump Sizing and Selection" by Greg Trombold, vice president, Membership ASPE Cleveland Chapter. So you can already see the ASPE influence within the pages of *Plumbing Engineer*. It's just another example of how TMB Publishing Inc. remains committed to its readers and to the advancement of the plumbing engineer industry. ■

PLUMBING ENGINEER
(USPS 567-950)
ISSN 0192-1711

PLUMBING ENGINEER (USPS 567-950) ISSN 0192-1711 is published monthly by TMB Publishing Inc., 2165 Shermer Rd., Suite A, Northbrook, IL 60062. Phone (847) 564-1127, Fax (847) 564-1264. Magazine is free to those who design and specify plumbing/piping systems in commercial, industrial, institutional and governmental buildings; as well as government officials and plumbing inspectors. Subscription rates for U.S. and Canada: $50 for one year, $90 for two years. Other countries: $300 per year. Periodical postage paid at Northbrook, IL, and additional mailing offices. POSTMASTER: Change of address should be sent to ***Plumbing Engineer***, 440 Quadrangle Dr., Suite E., Bolingbrook, IL 60440. Material and opinions contained in contributed articles are the responsibility of the authors, not of TMB Publishing Inc., *Plumbing Engineer* magazine or its Editorial Advisory Board. The publisher cannot assume responsibility for any claims made by advertisers.

Volume 40, Number 3. *Plumbing Engineer* is microfilmed by University Microfilms, Ann Arbor, MI, and indexed by Engineering Index Inc. Publications Mail Agreement No. 41499518. Return Undeliverable Canadian Addresses to PO Box 503, RPO West Beaver Creek, Richmond Hill ON L4B 4R6

Plumbing Engineer
A TMB Publication

THE OFFICIAL PUBLICATION OF THE AMERICAN SOCIETY OF PLUMBING ENGINEERS

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Industry News

2012 AHR Expo sets all-time attendance record

WESTPORT, CONN. — AHR Expo show management announced that the 2012 exposition and conference has established a new all-time attendance record with nearly 40,000 registered visitors for the recently concluded event at Chicago's McCormick Place. Together with exhibitor personnel and other attendees, more than 57,000 HVACR professionals participated in the world's largest HVACR event from January 23rd through January 25th.

Based on preliminary registration numbers, the 2012 Show will easily surpass the previous record of 38,534 visitors established at the 2008 Show in New York City. As reported earlier, this year's Show was also the largest AHR Expo in the illustrious 82-year history of the event at nearly 430,000 square feet, making it almost 5% bigger than the 2006 Chicago Show.

AHR Expo donates to Chicago charity

In other AHR news, nearly $12,000 in entry fees from the 2012 AHR Expo Innovation Awards competition has been donated to an organization that provides services and counseling for families in need in the Chicago area. Metropolitan Family Services will use the donation to upgrade the HVAC systems for their Midway Head Start facility, resulting in thousands of dollars in energy savings a year.

For more than 154 years, Metropolitan Family Services has been helping thousands of families cope with various challenges through a variety of human services. Metropolitan's Midway Center and Midway Head Start Center serve communities on Chicago's Southwest side, near Midway Airport. They provide area residents with Head Start programming, child care, youth center, domestic violence and parenting programs, as well as a number of other programs and services designed to improve the lives of the area's residents.

Metropolitan spends approximately $50,000 a year on energy costs for its Midway Head Start facility. Almost half of that money is used to operate both of their rooftop HVAC units and the boiler. With the new HVAC system controls upgrade, purchased with the donation from AHR Expo, both systems will now be able to work in tandem more efficiently and provide consistently comfortable room temperatures for the facility year-round. The new system nearly triples the square footage of the area covered.

Allied Technical Services announces partnership with BLÜCHER

TORONTO — Allied Technical Services (ATS) has announced that BLÜCHER Stainless Steel Drainage Systems can now be specified on the ATS Spec U.S. website, www.atsspec.net.

BLÜCHER, a Watts Water Technologies Company, is dedicated to designing and manufacturing stainless steel drainage systems including floor drains, trench drains, shower drains and piping. BLÜCHER's exclusive push-fit piping and fitting system can be used above as well as below ground. BLÜCHER floor drains are designed to cover any commercial or industrial application and BLÜCHER's wide range of trench drain and kitchen channel products can be customized to just about any specification. BLÜCHER also offers a collection of designer shower and bath drains for housing or commercial construction.

Code council's PMG executive director honored at World Toilet Summit in China

WASHINGTON, D.C. — Jay Peters, Plumbing, Mechanical and Fuel Gas (PMG) group executive director for the International Code Council is one of three 2011 honorees inducted into the World Toilet Organization (WTO) Hall of Fame. The recipients are chosen based on their extensive efforts and contributions to solve the global sanitation crisis that claims the lives of thousands of people every day, most of whom are children.

Peters was selected particularly in recognition of his and the Code Council's consistent contributions to the global sanitation movement, especially in pioneering and initiating the official launch of the United Nations International Year of Sanitation in 2008. During that year's World Toilet Summit & Expo (WTSE), he conducted an education track on global sanitation policies and standards.

The Code Council sponsored the track, in addition to the first-ever ICC USA Pavilion at WTSE, which offered U.S. companies a cost-effective way to reach Southeast Asian prospects.

Danfoss to sponsor 5th Annual EE Global Forum

BALTIMORE — Danfoss, a manufacturer of high efficiency electronic and mechanical components and controls for air-conditioning, heating, refrigeration and motion systems, announced it will again sponsor the Alliance to Save Energy's EE Global Forum for the fifth consecutive year. The 2012 Energy Efficiency Global Forum (EE Global) will be held March 27-29 at the Peabody Resort in Orlando, Fla. Danfoss North America President John Galyen will participate in one of the Forum's executive dialogue sessions.

NCPMA elects first board of directors

RALEIGH. N.C. — The North Carolina Plumbing and Mechanical Association recently elected its first board of directors, signaling another milestone in this new organization's history. Elections and a general business session

More Industry News on page 10

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took place at NCPMA's Launch Party celebration on Saturday, January 14.

The new trade association was created from a merger between Mechanical Contractors of North Carolina (MC of NC) and Plumbing Heating Cooling Contractors of North Carolina (PHCC-NC). The outgoing presidents of the former associations, Charlie Oxford and Rodney Pressley, conducted the meetings and commended the members of both associations for their dedication during the merger process.

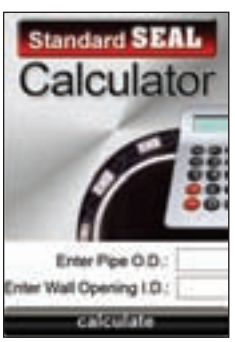
Joel Long of GSM Services in Gastonia was elected president of the new association, David Hinson of Hinson Mechanical was elected vice president and Jamie Robinson of Brothers Heating and Air was elected treasurer. All will serve a one-year term. Charlie Oxford of Hickory Plumbing and Heating was appointed secretary and John Hicks of Griffin Heating and Air Conditioning was appointed assistant secretary/treasurer.

After the elections, board members and officers were installed by Dale Dawson, executive director of the North Carolina State Board of Examiners of Plumbing, Heating and Fire Sprinkler Contractors.

New MetraSeal app wall penetration seal calculator available for smartphones

CHICAGO — The new Metraflex MetraSeal app for iPhone and Android helps contractors and engineers quickly calculate the links required to fill a pipe gap in a wall penetration. Once installed on their smartphone or tablet, the app works without a cell signal, so calculations can be made anywhere, at any time, even where reception is non-existent.

Simple to use, the user needs only to input the wall penetration inside diameter (I.D.) and the round pipe outside diameter (O.D.) The proper MetraSeal mechanical link Model Number and number of links to properly fill the gap are displayed immediately. In just minutes the contractor can move from penetration to penetration and quickly calculate every MetraSeal needed to fill every gap. They then contact their local rep or Metraflex with their information and quickly complete their project.



Bell & Gossett® announces second quarter training at Little Red Schoolhouse®

MORTON GROVE, ILL. — Bell & Gossett, a leader in education for the hydronic heating and plumbing industries, has announced its training course schedule for the second quarter of 2012. The free training seminars are offered at the Bell & Gossett Little Red Schoolhouse Education Center in Morton Grove, Illinois, a suburb of Chicago, and are open to engineers, contractors and facility maintenance professionals.

New this quarter, the Little Red Schoolhouse is now a certified provider of continuing education for LEED professionals as approved by the Green Building Certification Institute (GBCITM). The Schoolhouse's Large Chilled Water Design Seminar and Modern Hydronic System Design Basic Seminar are the pump industry's first courses to be approved by GBCI to provide credit toward the credential maintenance requirements of the LEED Green Associate and LEED AP certifications.

The content provided in the two seminars (*) meets GBCI's goals of facilitating access to high-quality professional development for those in the green building industry. The courses focus on the application of pumps and related products to enable water and energy conservation and improve building system efficiency.

Modern Hydronic Heating Systems - Basic Seminar *	Mar 26-28
Modern Hydronic Heating Systems - Advanced Seminar	Apr 2-4
Steam System Design & Application Seminar	Apr 23-25
Design & Application of Water Based HVAC Systems Seminar	Apr 30 – May 2
Large Chilled Water System Design Seminar *	May 7-9
Service & Maintenance of Water Based HVAC Systems Seminar	May 14-16
Modern Hydronic Heating Systems - Basic Seminar *	Jun 11-13
Design & Application of Water Based HVAC Systems Seminar	Jun 18-20

"The Little Red Schoolhouse is an industry leader in training and we are excited to add increased opportunities for engineers, contractors and facility maintenance professionals to earn LEED continuing education credits," said Mark Handzel, director of building services marketing for Xylem.

The seminars are tailored to various job functions and areas of expertise and cover a wide range of important topics. The lead seminar instructors are LEED-Accredited Professionals. Upon completion of the three-day seminars, 1.7 CEU credits are awarded to graduates.

The Second Quarter 2012 Little Red Schoolhouse seminars and dates include:

* Seminar approved by GBCI to provide credit toward the credential maintenance requirements of the LEED Green Associate and LEED AP certifications.

Little Red Schoolhouse a certified LEED education provider

In other news, Xylem Inc. announced that its Bell & Gossett brand has, through its Little Red Schoolhouse®, been approved by the Green Building Certification Institute (GBCI) as a provider of continuing education for LEED professionals.

Xylem made the announcement in conjunction with Bell & Gossett's sponsorship of the ASHRAE (American Association of Heating, Refrigerating and Air-Conditioning Engineers) winter technical conference and AHR Expo in Chicago.

The Schoolhouse's Large Chilled Water Design seminar and Modern Hydronic System Design Basic seminar are the pump industry's first courses to be approved by GBCI to provide credit toward the credential maintenance

More industry news on page 12

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Industry News

Continued from page 10

requirements of the LEED Green Associate and LEED AP certifications. The content provided in the seminars meets GBCI's goals of facilitating access to high-quality professional development for those in the green building industry. The courses focus on the application of pumps and related products to enable water and energy conservation and improve building system efficiency.

Davis & Warshow honored by USGBC

NEW YORK — The Urban Green Council, New York's chapter of the USGBC, honored Davis & Warshow, one of the region's largest suppliers of kitchen and bath fixtures and plumbing materials, at the organization's recent annual Urban Green Gala. In presenting the award to D&W's president and COO David Finkel, Russell Unger, president of the Council, credited him for leading his company's sustainability initiative, an aggressive yet pragmatic series of steps scaled to the modest size (300 employees, eight sales showrooms and four distribution centers) of the 87-year-old wholesaler.

Unger noted that Davis & Warshow has set a great example and become a role model for other smaller businesses that want to do their share in "going green." This included installing a solar array at its Maspeth, Queens, headquarters that qualifies as one of the largest private-sector installations in New York City.

Little Giant adds mobile training facility

BLUFFTON, IND. — Franklin Electric is pleased to announce the addition of a Little Giant Mobile Training Facility (MTF) to its technical toolbox of service and training options, dedicated specifically to the plumbing and HVAC industry.

This new MTF is the latest tool added to Franklin's already extensive training portfolio, which includes FranklinTECH factory training, on-the-road seminars, Field Service support and a technical service hotline. The Little Giant MTF focuses training and hands-on experience for sump, sewage, and effluent products, allowing Franklin to take products and training directly to the distributor, contractor or installer.

Leonard Valve launches new website

CRANSTON, R.I. — Leonard Valve has launched its new website located at leonardvalve.com. The dramatically redesigned website embodies Leonard's forward-thinking vision and commitment to the growing needs of its customers.

The website's homepage welcomes visitors with the latest news and events. Access to product information and Leonard experts are one click away through the use of scrolling menus. The new website also provides access to

More Industry News on page 14

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informational resources such as Leonard's exclusive CAS-PAK® sizing software where personalized project details can be saved and updated after creating an account. This personal portal on the Leonard Valve website can be used to store a list of favorite products, as well as request a quote from any saved product or project.

Hurst Boiler launches new website

COOLIDGE, GA. — Hurst Boiler & Welding Co., Inc., a leading manufacturer of energy-efficient boilers and boiler room solutions, announces the launch of its newly enhanced corporate website at www.hurstboiler.com. HurstBoiler.com has always served as a destination for comprehensive information related to boilers, boiler systems, integrated controls, manufacturing, renewable energy and energy efficiency. The new site includes richer product pages that can be easily accessed by application or need.

"Our new website reflects the company's leadership position in the boiler room marketplace," said Jeff Hurst, vice president of sales and marketing, Hurst Boiler. "We have raised our own bar by providing interactive tools and information for our customers, prospects and representatives. As technology is ever changing, we wanted to keep ahead of the curve by enhancing functionality and content."

A. O. Smith launches mobile application

ASHLAND CITY, TENN. — A. O. Smith has launched the A. O. Smith Warranty Check app, a unique mobile phone application for the Apple iPhone® and Google Android™ phone developed exclusively for A. O. Smith brand water heaters.

Designed specifically for contractors and plumbers, the app will allow plumbing professionals to easily check water heaters in the field for warranty information and product details on both residential and commercial products.

CertainTeed responds to growing trenchless industry

VALLEY FORGE, PA. — Responding to the needs of contractors, engineers and municipalities with growing recognition for the economic and environmental advantages of

More industry news on page 16

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trenchless pipe installation and replacement, CertainTeed Corporation is expanding its Certa-Lok™ C900 restrained-joint PVC pipe product line to include an integral bell design option. The company is also adding a 14-inch diameter option to its line of Certa-Lok C905 RJ restrained-joint pipe to meet the growing industry demand for larger size water and sewer pipe system applications.

Available in 4-, 6- and 8-inch diameters, Certa-Lok C900 RJIB (Restrained Joint Integral Bell) features CertainTeed's time- and field-proven mechanical pipe joining system, which utilizes a combination of precision-machined grooves and a nylon spline to provide exceptional tensile strength in pulling or pushing operations. Rounding out the design, a flexible elastomeric gasket within the integral bell provides a solid pressure-certified hydraulic seal.

TYCO releases Revit-compatible files

LANSDALE, PA. —Tyco Fire Protection Products (TYCO) has released the most comprehensive line of Revit®-compatible 3-D file downloads in the fire sprinkler industry, as well as an easy-to-follow guide for designing with TYCO Revit-compatible files.

The files are available at www.Tyco-Fire.com to fire protection engineers, sprinkler system designers and contractors for integration with projects utilizing building information modeling (BIM).

Bootz Industries celebrates 75th anniversary

EVANSVILLE, IND. — Bootz Industries is rich in history and tradition "From Bombs To Bathtubs." In 1937, William R. Bootz and associates purchased the assets of Crescent Stove Works, and one year later began fabricating steel products for the United States Army and Navy, earning Army/Navy Excellence Awards during World War II. From 1945 through 1951 production grew to include Whirlpool, Coleman Company, Hunter Fan and the U.S. Government.

Beginning in 1960, Bootz began a long-term relationship with General Electric, earning numerous production citations and quality awards lasting through 2003. During the 1970s, Bootz produced stamped steel lavatories and sink shapes that expanded into bathtubs. In 1979, Bootz purchased the Peerless Pottery facility in Evansville and converted it to produce "porcelain-on-steel" bathtubs, lavatories and kitchen sinks under the Bootz Industries label.

In 1998, Bootz "patented" and introduced SYNIRON an engineered composite with the structural integrity of cast iron. Bootzcast was introduced at the 2005 Kitchen and Bath Show, and in 2006 selected as 1st place Platinum winner of the ADEX Award for design excellence. In 2010 the Maui and Mauicast 15" Deep Soaker became available.

From 2001-2012, with the purchase and installation of new equipment and a new distribution center (BDC), Bootz has grown production capabilities to meet the need of the entire "porcelain-on-steel" market. Bootz remains small enough for customers to work directly with the top management. Bootz strives to provide superb service with the most competitive level of on time deliveries, a 100 percent fill rate that makes back orders non-existent.

Bosch expands hot water storage tank line

LONDONDERRY, N.H. — Bosch Thermotechnology North America now offers the WST line of enameled steel indirect storage tanks and the SST stainless steel line of indirect storage tanks. The product line offers plumbing and HVAC professionals simplified installation and superior durability that ensure fewer callbacks, while providing end users years of reliable operation.

"Bosch's two new lines of indirect storage tanks have greater installation versatility with durability that ranks among the best in the industry," said John Confrey, vice president of hot water for Bosch Thermotechnology. "When developing the new SST and WST tank lines, we really listened to our wholesalers, dealers and installers to make sure we offered a product that meets the demands of our marketplace and displays the hallmark of our advanced engineering."

Sloan faucet receive award

FRANKLIN PARK, ILL. — Sloan's BASYS™ faucet platform has been named as an honoree for *Interior Design* magazine's 2011 Best of Year (BoY) Product Design Awards in the Kitchen and Bath: Bath/Fittings category. Interior designers and architects submitted more than 65,000 online votes for the sixth annual awards, and a jury of leading architects and designers determined the winners.

The BoY Awards is the pre-eminent design competition recognizing superior interior design products. More than 900 people from the design community gathered on December 1 at the IAC Building in New York City, designed by renowned architect Frank Gehry, to celebrate the best projects and products of 2011.

D.C. Mayor announces plan to introduce new construction codes

WASHINGTON, D.C. — Mayor Vincent C. Gray announced that the District of Columbia will be introducing new Construction Codes by March 1, 2013. The updated Construction Codes will keep the District at the national forefront of sustainable building practices for all new and renovated residential and commercial buildings.

More Industry News on page 18

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The District's Construction Codes incorporate most of the model codes issued every three years by the International Code Council (ICC). The District currently uses the 2006 ICC Codes, but will now leapfrog over the 2009 ICC Codes to review and adopt the 2012 ICC Codes.

"By adopting the most recent ICC Codes, the District will be a national leader in requiring the most modern and sustainable building practices," said mayor Gray. "The adoption of new construction codes, in conjunction with implementation of the Green Building Act, will ensure that the District remains on the cutting edge of 'green' building practices."

VGS launches mobile website

HASTINGS, MICH. — Viking Group has extended its leading mobile web platform to include a new site dedicated to its VGS® brand of grooved piping products. The new VGS mobile website provides access to detailed product information via mobile devices, such as smart phones and tablet computers. This access is particularly important to contractors who need critical technical information at the jobsite, where accessing information from a standard desktop computer can be challenging.

Viking's mobile platform also includes websites for CPVC piping products as well as for the complete Viking line of fire protection valves and systems.

Webstone announces 'Rep of the Year'

WORCESTER, MASS. — Webstone is pleased to announce that Mechanical Sales has been named as its 2012 Manufacturer's Rep of the Year. Steve Markee (Proprietor) has been representing Webstone in Michigan since 2004 and has consistently produced new opportunities, ideas and growth for the territory despite facing some of the most challenging economic conditions in the country.

Raypak updates website

OXNARD, CALIF. — Raypak's all new, modernized and updated website is now online. This is more than just a face makeover. The key goal was to maximize the website's ease of use. For example, the new site includes all documents pertinent to each product line on that same page.

Check the new site at www.raypak.com.

Industry Movers

Uponor North America names president

APPLE VALLEY, MINN. — Uponor has named **Bill Gray** president of Uponor North America, effective Feb. 15, 2012. He is also a member of the Uponor Group executive committee. Gray has served as the vice president for UNA Sales since June 2011, where he was responsible for the leadership of all Uponor North American sales efforts in the U.S. and Canada. Previously, he was general manager for Uponor Ltd. in Canada for three years where he oversaw all Canadian operations, including sales, marketing, demand management and technical and customer service.

Bradley Corp. promotes Dommisse

MENOMONEE FALLS, WIS. — Bradley Corp. announced the appointment of **Jon Dommisse** to director of global marketing & strategic development for the Menomonee Falls-based manufacturer of plumbing fixtures, restroom accessories and emergency equipment.

Richelsen joins EYP

WASHINGTON — **Desmond A. Richelsen**, CPD, joined EYP Architecture & Engineering as a senior plumbing engineer, to oversee the plumbing studio in the firm's Washington office. An expert in plumbing and fire protection design, Richelsen's extensive leadership experience involves managing entire plumbing departments, as well as serving as lead engineer on numerous high-level projects. Along with his significant management responsibilities, his new role involves completing all aspects of plumbing and process piping for EYP's major higher education and government clients.

Moen announces promotion

NORTH OLMSTEAD, OHIO — Moen Incorporated promoted **Tim Bitterman** to director of marketing and new product development, Creative Specialties International, effective immediately. Bitterman will lead and direct the marketing, new product development and U.S. quality teams for the Moen accessory business.

For more information, www.moen.com.

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

I'd like to introduce myself to the readers of *Plumbing Engineer* magazine. I am the current president of the American Society of Plumbing Engineers, William F. Hughes Jr. On behalf of the ASPE board of directors and the membership of ASPE, I would like to say welcome to all of the readers of *Plumbing Engineer*.

On Friday, January 20, the ASPE board of directors entered into an agreement with TMB Publishing in which *Plumbing Engineer* would become the official magazine of ASPE starting with this March 2012 issue. Both organizations are looking forward to many years of making this partnership grow and leading the industry in providing up-to-date and quality technical information to all interested parties within the plumbing industry and beyond.

In the next several issues of the magazine I am looking forward to presenting to the readers of *Plumbing Engineer* what ASPE has to offer, not only to the readers of the magazine but also to the entire plumbing industry.

The partnership with TMB Publishing is only part of what has been happening with ASPE over the past year and what we are calling the beginning of a new chapter in ASPE history.

The decision to cease publication of ASPE's *Plumbing Systems & Design* magazine and join with TMB Publishing was the result of a deliberate and carefully thought-out process that took more than one year to complete by the ASPE board of directors.

This new partnership will provide ASPE with the opportunity to promote who and what we are all about to plumbing engineers, designers, specifiers, and others within the industry who are not currently members of the Society. This new partnership also will provide greater exposure of our organization and our quality technical content to other individuals and organizations within the industry.

Since its inception, *Plumbing Systems & Design* (*PS&D*) magazine received high praise from ASPE members and subscribers for the quality of technical content presented. For readers of *Plumbing Systems & Design* and the current readers of *Plumbing Engineer*, this same quality of technical information will be continued. This agreement will not affect the quality of articles to which readers of *PS&D* magazine were accustomed. ASPE will provide the same high-quality and technical content to *Plumbing Engineer*.

Another feature of *PS&D* magazine that many ASPE members have asked about since the announcement to partner with TMB Publishing is the continuing education exams that were published in each issue. The answer to that question is yes, the program will continue online at ASPE.org. Look for more information in this "ASPE Report." For those readers who are not familiar with the continuing education program, you can earn CEUs each month by simply reading an article taken from an ASPE publication and answering the 12-question exam. ASPE CEUs are approved by all states that require continuing education for relicensing—even those states that require prior approval such as Florida and New York. This program will now be available to all readers of *Plumbing Engineer* as another opportunity to get CEUs.

As I mentioned, in the next several issues of *Plumbing Engineer* I will be providing to readers insight as to what ASPE is all about, along with what ASPE has been doing and our involvement within the industry. In case you have not heard, in the past few months ASPE has signed memorandums of understanding with several key organizations in the plumbing industry: International Code

Council, International Association of Plumbing and Mechanical Officials, and the American Backflow Prevention Association.

Along with the memorandums of understanding, ASPE has been collaborating with several other organizations such as the Plumbing Efficiency Research Coalition, Plastic Pipe and Fittings Association, American Rainwater Catchment Systems Association, Plumbing Manufacturers International, American Society of Sanitary Engineering, and World Plumbing Council. Collaborating with these and other groups allows ASPE to be involved in various projects within the industry.

For instance, ASPE is currently working with ASSE to produce a joint plumbing dictionary that combines each organization's current publication. The final title is yet to be established, but it should be available in late 2012 or early 2013. ASPE also is working with IAPMO to develop a Green Plumbing Design certification program. We are collaborating with ARCSA to issue a design standard for rainwater catchment systems in addition to other ASPE standards currently under development.

ASPE is partnering with these organizations to become more involved in the industry and create many new opportunities for ASPE and our members. It is through these opportunities that ASPE will grow and help develop programs and affiliations that will benefit the industry.

Another key player within the industry is the ASPE Research Foundation, which also has been very busy. The current Research Foundation roof drain testing project was initially presented at the 2011 ASPE Technical Symposium, and the Research Foundation will soon be issuing a report documenting their findings.

As you can see, plenty of new things are happening within ASPE, and they will continue throughout the year. This new partnership with TMB Publishing is just another step in the process. The ASPE board of directors is looking forward to seeing this partnership grow and develop for the betterment of both organizations.

I hope that you will enjoy what ASPE and TMB Publishing will be presenting to you, the readers, in future issues of *Plumbing Engineer*. **ASPE**

New ASPE Members

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Joshua Robert McCarty

Baltimore Chapter
Neal Dennis Cluck, LEED AP
Michael Notarange, GE, PE
Adam Thomas Rickey, PE

Boston Chapter
Peter E. Gobis III

Central Florida Chapter
Christopher Cabotaje, GE

Central Texas Chapter
Michael Metcalf, GE

Charlotte Chapter
Douglas William Murr, PE
Andrea G. Thompson, GE

Chicago Chapter
Robert Baxter
Luis F. Garza
Donald R. Hartdegen Jr., PE
Mariusz Piotr Klimek
Michelle Norgard

Connecticut Chapter
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Joseph John Ibets, PE

Denver Chapter
Daniel Harper, PE
Ryan Kindsfather
Darren Dale Mansur
Archie Warthen, GE

Eastern Michigan Chapter
Aleksandar Inov
Jason Alan Mackay
Jeff Alan Turner, GE

Houston Chapter
Samuel McKinlay
Zachary Wolf

Kansas City Chapter
Ethan James Shull

Long Island Chapter
Scott Richard Pennello

Los Angeles Chapter
Armand Henry Estrada, GE, EIT

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Christopher Monroe
Ryan Joseph Petersen
Stirling Walkes, P.Eng

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Chantal Boisson

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Jessica Baldwin
Richard John Chiaradio
Michael John Cuozzi
Joseph DeGrazio, PE
Mark Girgenti
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West Coast Florida Chapter
Eric Daniel Eldridge, PE, LEED AP

Western Michigan Chapter
Joey Simon Chapman

Wisconsin Chapter
Paul Lippitt, PE
Joseph Anthony Tenuta

From the Executive's Desk

Jim Kendzel, CAE, MPH
ASPE EXECUTIVE DIRECTOR
jkendzel@aspe.org

I am so excited to be writing my first column for *Plumbing Engineer,* the new official publication of ASPE. Thanks go to all who provided support and encouragement for the partnership; the responses received were overwhelmingly positive. From my initial introductory meeting with Tom Brown through the negotiations and implementation planning stages, I quickly gained respect for Tom and the entire TMB team. The bringing together of the ASPE team and the TMB team provides a true win-win for our two organizations and, more importantly, the plumbing industry.

Research—Key Strategic Objective

Providing research that offers guidance to the plumbing industry for the design of plumbing systems that are efficient and protect the public's health and safety is a key strategic objective for ASPE. I am pleased to bring you up to date on our key research initiatives.

The ASPE Research Foundation (ASPE RF) is in the process of finalizing the report on its research project on roof drain system design. This project was completed through sponsorship and testing support from IAPMO, support from manufacturers in providing systems for testing, and most importantly through financial support from ASPE members and chapters. Preliminary review of the data shows that the final report will provide high-quality and important recommendations that will result in potential changes to model code requirements and, ultimately, improved roof drainage system designs. Look for the final report to be issued later this spring.

The ASPE RF also has developed a research protocol in cooperation with NSF International designed to evaluate the impact of residential fire sprinkler systems on drinking water supplies. We are actively seeking funding sources at this time, so please let me know if you are interested in participating. In addition, the ASPE RF has begun the initial stages of developing a research protocol to evaluate biofilm growth in faucet systems and its impact on water quality.

I recently reached out to the ASPE membership to help support the research project to evaluate low-flow fixtures on downstream drainage systems initiated by the Plumbing Efficiency Research Coalition (PERC), of which ASPE is a member. I could not be prouder of our membership and the response received, especially in these economically difficult times. A special thanks goes to the following three ASPE chapters and their members who contributed the top amounts of money for the project: San Diego (top provider), Long Island, and Boston. A special recognition goes to the Long Island Chapter, which, in addition to providing the second highest contribution, also was the top chapter when their financial contribution was compared to the total number of members in the chapter—not bad for a relatively new chapter! Thanks go to all who contributed to such an important project. Stay tuned for the results. ***ASPE***

Read, Learn, Earn

Do you find it difficult to obtain continuing education units (CEUs)? Through this special series, ASPE can help you accumulate the CEUs required for maintaining your Certified in Plumbing Design (CPD) designation or numerous regulatory agency CE programs.

The process is simple: Each month, just go to **ASPE.org/ReadLearnEarn**, where you will find a PDF containing an article followed by a 12-question multiple-choice quiz and an application form. Read the article, answer the questions based on the article, and submit the form to the ASPE office. If you earn a grade of 90 percent or higher on the test, you will be notified that you have logged 0.1 CEU, which can be applied toward CPD renewal or numerous regulatory agency CE programs.

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.

Forms may be e-mailed to aspeeducation@aspe.org or faxed to 847-296-2963.

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Circle 14 on Reader Reply Form on page 81

Nominating Committee Seeks Members to Run for the ASPE Board of Directors

In October, at the 2012 Convention in Charlotte, North Carolina, chapter delegates will elect the 2012–2014 ASPE board of directors. The Nominating Committee currently is seeking multiple candidates for each of the elected positions: president; vice president, technical; vice president, education; vice president, legislative; vice president, membership; vice president, affiliate; secretary; treasurer; region 1 director; region 2 director; region 3 director; region 4 director; and region 5 director.

How to Run for Office

Following are the eligibility requirements for the various positions:

- For president, VPT, VPE, VPM, VPL, secretary, and treasurer, a candidate must be a full member in good standing and have a PE and/or CPD designation.
- Region Director candidates need to be full members in good standing of a chapter within their region and have held a chapter officer position for not less than four years.
- The vice president, affiliate position requires candidates to be a full member or an affiliate member in good standing for not less than four years.

If you are interested in running for office, visit the members-only section of ASPE.org (aspe.org/MembersOnly) to find a guide to the nomination process and the application.

Members seeking to become a Society officer must build up a level of visibility and credibility with all delegates and region and chapter officers. The application helps the delegates and chapter officers become familiar with those seeking office. Also, during the business meeting in October all candidates will have the opportunity to present themselves to the delegates.

What to Expect

ASPE members thinking about running for office often wonder if they need to raise money for a campaign fund and how much time they will need to devote to the position.

The answer to the first question is that it doesn't require any money to run for a Society office. You just need to have a strong desire to help ASPE and the plumbing engineering industry grow and prosper.

The answer to the second question is more complicated. One prerequisite for becoming a candidate for board office is to have both your family's and your employer's approval. The amount of work time any officer spends often is subject to the position. A minimum of four two-day board meetings per year typically are held in January, April, July, and October. Monthly board conference calls also are held.

Officers also have committees to oversee (e.g., the vice president, technical oversees the Technical & Research Committee) and other specific duties. For example, the vice president, technical is involved in every publication that ASPE produces, and the vice president, membership is responsible for reviewing every membership application.

If you have questions about the positions or the time involved, please feel free to contact any current board member. Their contact information can be found at aspe.org/BoardOfDirectors.

Are You Ready to Serve?

Sixty days prior to the business meeting at the ASPE Convention, the Nominating Committee is required to inform the members of the slate of candidates. To meet this bylaw requirement, candidates must submit their application to the Nominating Committee no later than June 30, 2012.

Very dedicated people have held ASPE board of directors' positions over the years. Through their enthusiasm and commitment the Society has continued to prosper. Now it is time to renew current board members or find new individuals who have the best interests of the Society at heart and want to keep the tradition of strong leadership at the forefront of our guidance.

For more information about the process, contact a member of the Nominating Committee:

- Chair: Julius Ballanco, PE, CPD, FASPE: jbengineer@aol.com
- Region 1: Paul Freeman, PE: aspeliorg@gmail.com
- Region 2: Mark Simpson, CPD: msimpson@klhengrs.com
- Region 3: Steve Mastley, CPD, FASPE: steve@mathesonball.com
- Region 4: Rod Koepke, CPD: rkoepke@syska.com
- Region 5: Cyril Unger, CPD, FASPE: cunger@pspaec.com
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Circle 15 on Reader Reply Form on page 81

Designer's Guide

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

Duality of personality: A day in the life of a purchasing manager

I would like to start this month's column with hearty congratulations to Tom Brown, all the folks at TMB Publications, Jim Kendzel, the ASPE board and the entire ASPE staff for reuniting ASPE and *Plumbing Engineer* magazine. I have seen several announcements from ASPE and TMB that very graciously broadcast this new partnership, and I think it's fantastic. Although this isn't really a new partnership, it's a renewed partnership, and, based on the combined strengths of the two, *Plumbing Engineer* and ASPE can build toward the future.

Back in 2004, when I started working at Murray Company, I was struck by the bold personality of one of our staff, purchasing manager Mark Piliavin. Mark is a pit bull of a man in both appearance and persona, at least when you overhear him talking on the phone in his office. What I learned over time was that this boisterous fellow, who spends his days beating the crap out of salesmen on the phone all day long, while purchasing upwards of $100 million annually of plumbing equipment and supplies, is actually one of the kindest and most generous people one might ever have the fortune of knowing. He literally has two personalities, his office bravado and his real, warmhearted self. Mark made me feel at home because he was one of the few people I had met since moving to California — a granola farm of fruits, flakes and nuts — who reminded me of my former peers in NYC.

He literally has two personalities, his office bravado and his real, warmhearted self.

As a consulting engineer, I had never worked with a purchasing agent before. Most of you probably don't either, so I thought I would dedicate this article to sharing with you this interview with Mark and the important role he plays for our design-build subcontracting firm.

Tim: Most of us in this industry don't spend our youth telling others, "I want to be a plumbing engineer when I grow up." The vast majority of us fall into this field in one way or another. How did you come to do what you do?

Mark: Have you ever seen the movie, "A Series of Unfortunate Events?" Well, it was kind of like that, except the events weren't all unfortunate. I had just finished my junior year at Cal Berkeley in 1975. I decided to go to Los Angeles and work at a large plumbing supply house for the summer, since it was the best work I could find. I had switched my major several times and wasn't on course to graduate, so I decided to stay in L.A. I got married several years after I arrived, had three kids and have been here ever since. I worked at the supply house, Hamilton Supply, for four years. I then went to work for Hamilton's largest customer, Apartment Plumbers, and stayed with them for 11 years. After the owner passed away, I applied for and was hired by Murray Company in 1990.

Tim: What does an average day look like for you at Murray Company?

Mark: My day starts at 5 a.m. and ends around 5 p.m. I oversee two other people in our department. We write, process and key into our computer system over 120 purchase orders (POs) per day. I also review all the PO acknowledgments to confirm pricing. In between, I review all problem invoices that don't match the PO I wrote. These problems can be a mixture of incorrect pricing, double shipments, wrong materials shipped, etc. In between that, I'm answering questions, solving problems, expediting orders and studying the market for commodity prices of copper, cast iron and so on. It makes for a long day. It's critical to catch any purchasing errors before the materials make it to the jobsite; that can really screw up a fast-track project.

Tim: What advice would you give engineers to help them improve their specifications or equipment selections from a purchasing perspective?

Mark: My primary concerns are satisfying cost and time constraints, and time constraints often outweigh cost. It seems to me that engineers could do a little more due diligence in making sure that what they spec is available without a great deal of lead time and that parts and service are readily available. I can't tell you how often I have to spend a small fortune on red label delivery because of lead times associated with certain equipment.

Tim: What is the most egregious problem you can remember having to deal with?

Mark: In 23 years of being the purchasing manager, the worst situation was having 65 yards of slurry ordered for a project to be on site at 7 a.m. We had a crew of eight waiting to backfill our ditches. The slurry didn't show up until 11 a.m. In the meantime, it started to rain like crazy, and the pipes started to float out of the trenches. Fortunately, we anticipated rain and had several 2" discharge sump pumps ready to roll to pump out the trenches. We barely made it.

A big part of my job is to remove any and all obstacles that a field person might have so that we can have a successful project. Knowing that someone can be reached at 5 a.m. to have a delivery by 7 a.m. to resolve a screw-up really soothes the soul.

Tim: That's not the kind of thing that engineers ever need to worry about. In a sense, we are quite sheltered from many of the realities of construction. What's the good side, the greatest deed anyone has ever done for you professionally?

Continued on page 28

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Continued from page 26

Mark: In 36 years of being in this industry, I've maintained great relationships with quite a few people. In doing so, if I'm ever in a real jam, I can count on them to work with me to resolve any issue. If I had to pick one person, it would be the current president of Murray Company, John Odom. He hired me in 1990, despite the fact that the head of the purchasing department didn't think I was qualified, even though I'd been in the industry 15 years. Six months after I was hired, the entire industry went into the tank. Layoffs were coming, and the head of purchasing wanted me out. John had him lay off another person instead. The head of the department was so upset he walked out, vowing to quit. He didn't; he just left for a much needed vacation. Eventually, he did leave. Over the years, various things happened to me, both personally and professionally, and John was always there in his "special way" to encourage me and back me up. He's not only been my boss for 23 years but has also become a good friend.

Tim: A lot has changed in this industry since you started. How have those changes affected your work?

Now we have BIM, CAD, email, Excel and a host of other software to do things in a fraction of the time that it used to take.

Mark: When I first got here, everything was done by hand. Orders were placed over the phone, computations and spread sheets were done by hand with a calculator, and communication was getting out of your chair, walking to the other end of the building and speaking with whomever you needed to. Detailing (shop drawing) was done by hand and calculations with a fractometer. Now we have BIM, CAD, email, Excel and a host of other software to do things in a fraction of the time that it used to take.

Tim: How do you think the pending election might affect our industry?

Mark: I value my friendships with my coworkers, so when it comes to political matters I keep my mouth shut, which is unusual for me. Speaking of which, I gotta run; there's work to be done.

Tim: Thanks, Mark. ■

Timothy Allinson *is a senior professional engineer 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.*

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Code Classroom

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

Warning! Anti-scald shower valves can scald you! (Part I)

Every year, thousands of people suffer serious thermal shock and/or scalding injuries in showers or combination tub/shower fixtures. Tens of millions of currently installed code compliant shower valves, referred to as anti-scald or safety shower valves, can potentially scald people.

The terms *anti-scald* and *safety* are misleading, because, if the valves are not adjusted properly, they are neither "anti-scald" nor "safe." The correct terminology is *compensating type shower valve*, so named because the valves compensate for changes in the incoming pressure or temperature. Changes in the supply system pressure or temperature can affect the mixed water temperature. These valves must meet the industry standards required by the codes.

A lot of scald injuries occur in both non-code compliant and code compliant fixtures. An incident can happen when the water heater temperature is adjusted or if the temperature limit stop on a shower valve is not readjusted when a water heater is replaced. Many people in the plumbing industry do not realize that they need to check the limit stops when they make these system alterations.

The thermostat dial on the water heater cannot be relied on to control the hot water system temperature. The thermostat is located at the *bottom* of the heater to sense the incoming cold water. It controls the "on-off" function of the heating element or burner in the water heater; it does not sense the hot water temperature at the *top* of the water heater.

In many scald cases, a water heater had been replaced but the shower valve was not code compliant. Replacing a water heater changes the temperature in the hot water system. The limit stop should be readjusted on a compensating type shower valve and a non- compensating valve should be replaced with an ASSE 1016 code compliant shower valve. If the non-compensating valve is not replaced, some other form of temperature controls should be added to the system. Temperature control and/or pressure-balancing devices or a combination of devices conforming to ASSE 1017, ASSE 1070, ASSE 1066, or ASSE 1062 can be used.

The Model codes have the following language addressing safety and hazards related to existing installations, maintenance and alterations:

The 2009 International Plumbing Code.

IPC 102.2 Existing installations. *Plumbing systems lawfully in existence at the time of the adoption of this code shall be permitted to have their use and maintenance continued if the use, maintenance or repair is in accordance with the original design and no hazard to life, health or property is created by such plumbing system.*

IPC 102.3 Maintenance. *All plumbing systems, materials and appurtenances, both existing and new, and all parts thereof, shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. All devices or safeguards required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner's designated agent shall be responsible for maintenance of plumbing systems.*

IPC 102.4 Additions, alterations or repairs. *Additions, alterations, renovations or repairs to any plumbing system shall conform to that required for a new plumbing system without requiring the existing plumbing system to comply with all the requirements of this code. Additions, alterations or repairs shall not cause an existing system to become unsafe, insanitary or overloaded.*

Minor additions, alterations, renovations and repairs to existing plumbing systems shall meet the provisions for new construction, unless such work is done in the same manner and arrangement as was in the existing system, is not hazardous and is approved.

Hot water in excess of 120 F is a scald hazard and a thermal shock hazard. Altering a plumbing system by replacing components such as a faucet, mixing valve, water heater or piping changes the hydraulic and temperature performance of the system. Pressure imbalances from altered flow rates can cause thermal shock and scald hazards.

The Uniform Plumbing code has similar language:

The 2009 Uniform Plumbing code

UPC 101.4.1.1 Repairs and Alterations.

UPC 101.4.1.2 Maintenance. *The plumbing and drainage system of any premises under the Authority Having Jurisdiction shall be maintained in a sanitary and safe operating condition by the owner or the owner's agent.*

UPC 101.4.1.3 Existing Construction. *No provision of this code shall be deemed to require a change in any portion of a plumbing or drainage system or any other work regulated by this code in or on an existing building or lot when such work was installed and is maintained in accordance with law in effect prior to the effective date of this code, except when any such plumbing or drainage system or other work regulated by this code is determined by the Authority having jurisdiction to be in fact dangerous, unsafe, insanitary, or a nuisance and a menace to life, health, or property.*

During an addition or remodel, a code compliant valve should be installed or some other approved temperature and pressure control device should be utilized to mini-

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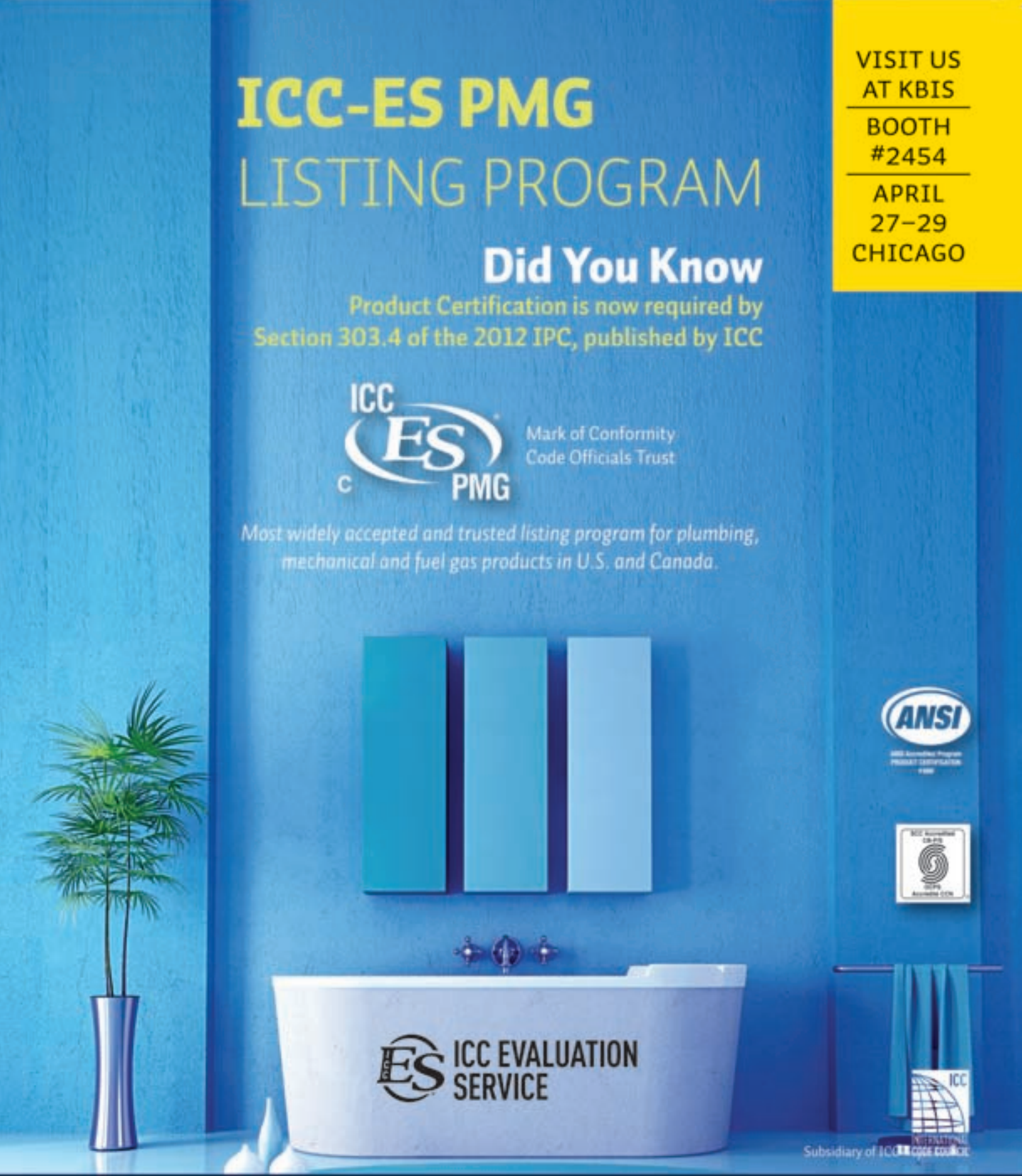

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mize the hazard. A lot of scalds occur when unlicensed and untrained sewer and drain cleaning companies expand into the water heater replacement business. Most of the time they do not know what a temperature limit stop is, and they are not aware of any kind of available temperature control. They say, "We were just hired to replace the water heater."

Often, either the installation does not meet the current code or the manufacturer's installation instructions were not followed. A significant number of scald incidents involve two-handle, non-compensating type shower valves. It has been estimated that well in excess of 50 percent of all tub/shower valves in existence today were installed prior to the early 80s and are this type.

The Plumbing Codes are quite clear on the maximum temperature limits for showers and combination bathtub/showers; that does not mean that the water heater must be set to low storage temperatures.

Thermal shock

Pressure-balancing, thermostatic or combination pressure-balancing/thermostatic valves conforming to ASSE 1016 or CSA B125.1 are designed for controlling thermal shock and scalding in showers and tub/shower combination units. ASSE, ASME and CSA recently published a harmonized standard for shower valves, which should be adopted in the model codes within the next few years.

Thermal shock is a bather's reaction to a sudden change in temperature. Thermal shock injuries are often caused by slips and falls in reaction to a sudden increase or decrease in water temperature. Many injuries occur when a bather steps into a tub of very hot water, slips and falls. Pressure-balancing valves address thermal shock by sensing the supply pressure of the cold or hot water; if either one drops, the water flow to the opposite temperature is reduced proportionally to maintain a constant outlet temperature. The balancing of pressure between the hot and cold water is accomplished with either a piston or diaphragm that reacts to changes in water pressure.

Time and Temperature Relationship to Severe Burns

Water temperature	*Time for a third degree burn to occur*
155° F	1 second
148° F	2 seconds
140° F	5 seconds
133° F	15 seconds
127° F	1 minute
124° F	3 minutes
120° F	5 minutes
100° - 109° F	safe temperature for bathing

Source: American Burn Association/Moritz & Henriquez
See www.scaldprevention.org for more information.

Scalding

Scalding is a burn injury caused by exposure to hot water and can occur anywhere that a hot water system is not designed, installed or maintained in a safe condition. The degree of the scald burn injury is dependent on the temperature of the water, the amount of time the skin is exposed to the water and the thickness of the skin. Scald burn studies were conducted at Harvard Medical College in the 1940s by doctors Moritz & Henriquez.

Because the Moritz & Henriquez studies showed that it would take approximately five to eight minutes to get a serious second or third degree burn resulting in irreversible skin damage, the model codes and industry standards have standardized 120 F as the maximum safe temperature for showering and bathing activities. Thermostatic temperature limiting valves conforming to ASSE 1070 are designed for reducing the hot water supply temperature delivered to bathtubs or whirlpool tubs to a maximum of 120 F. There is an effort currently underway to harmonize the ASSE 1070 standard with a Canadian Standard Association (CSA) standard.

Domestic hot water (DHW) system design

There is a delicate balance between providing water that is hot enough to prevent the growth of Legionella bacteria and other organic pathogens, yet is below 120 F at showers and bathtubs and below 110 F at bidets. This can be accomplished by storing hot water at temperatures above 135 F, although I prefer to store hot water between 140 and 160 F (a thermostat setting of 150 F), using a master mixing valve to distribute the water at about 125 F and using compensating type shower valves with the maximum temperature limit stop adjusted to reduce the maximum temperature to about 110 to 115 F or the maximum temperature required by the local code

The Legionella bacteria issue

Legionella bacteria grow and multiply between 68 and 122 F; they reproduce rapidly and thrive between 95 and 115 F. Below 68 degrees the bacteria survives, but it does not multiply. From 115 degrees to about 122 degrees, the bacteria grow slowly. From 123 to 131 F, the bacteria survive but do not multiply. At 131 F, it takes about five to six hours for the bacteria to die. At 140 F, the bacteria dies in 32 minutes. At 151 F, it dies in two minutes. At 158 F and higher, the bacteria dies instantly. One of the most widely accepted and preferred methods of controlling Legionella bacteria is to maintain the hot water system storage tank temperature at or above 135 – 140F. Unfortunately, the elevated temperature necessary to minimize the growth of and kill Legionella bacteria has

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the potential to cause serious scalding injuries. (For more information on Legionella growth temperatures go to www.legionellaprevention.org.)

CSPC warning

The Consumer Product Safety Commission (CSPC) and manufacturers of shower valves joined together several years ago to warn the public of the potential scalding hazard associated with code compliant shower valves that were not properly installed and adjusted. Many manufacturers decided to ship the products without the limit stop adjusted to fully limit the hot water. It is possible to buy a code compliant temperature and/or pressure compensating type shower valve and still be in danger of scalding if it is installed without adjusting the temperature limit stop.

Pressure-balancing or thermostatic shower valves or a combination of the two are code compliant. Compensating type shower valves are used in all building types. These types of valves have been on the market since before the late 1940s, but they were not mandated in the codes until after the ASSE 1016 standard for shower valves was developed in 1976. Soon after that, the model codes adopted the language mandating that valves meet that standard.

Many manufacturers welcomed this as a great safety improvement toward scald prevention. Several manufacturers, wanting to be proactive, started shipping their shower valves with the limit stop adjusted to restrict or limit the valve rotation toward the hot water outlet of the shower valve. The problem was that the plumbing industry and the public were not educated on the existence of limit stops and on how the devices were to be adjusted. Manufacturers' installation instructions included directions on how to set the limit stop, but guess what? Many installers and homeowners didn't read the instructions. Manufacturers' technical support phone lines were jammed with people calling and complaining about these "valves that don't work."

Shipping the valves with the limit stop adjusted so that they did not allow hot water created a lot of headaches. Water flowed when the valves were briefly turned on, but they were not properly commissioned or adjusted to set the maximum temperature limit stop to a safe temperature, so no hot water came out. Often, the installing plumber would not flow water long enough to check the temperature. If he did take the time to test the valve and no hot water came from the shower valve, he would just turn up the water heater temperature and leave. This increased the opportunity for scalds at other fixtures and did not solve the problem at the shower valve. Many plumbers felt that they did not have time or the money in

their bids to check every shower to make sure the limit stops were adjusted properly.

Manufacturers' tech support lines were inundated with calls. The solution was to ship the valves with the limit stop fully open and to include instructions and illustrations on how to properly adjust the limit stop. The limit stop is slightly different on each manufacturer's shower valve. Some have a set screw that limits the distance the valve can open, other models have a rotational limit stop with a set screw and a key and still others have a tooth and spline gear arrangement with a limit stop protruding.

Setting the limit stop should be part of the commissioning of a building. To set the limit stop on a shower or tub/shower valve, follow these steps:

1. Let the water run long enough until both hot and cold water temperatures stabilize.
2. Rotate the handle fully to the hottest position.
3. Place a thermometer in a plastic container and hold the container in the water stream.

If the water temperature is above the maximum temperature allowed by the local plumbing code, remove the handle and adjust the limit stop to reduce the maximum water temperature to a safe temperature.

Plumbing inspector's responsibility

I recently spoke to a group of about 80 at a code inspectors' conference. I asked by a show of hands how many inspectors carried a temperature gauge or thermometer with them on a final inspection to check for the maximum temperature at a shower or tub/shower. Only a couple raised their hands. When I asked why, one person said that his municipality would not pay for expensive testing equipment. I explained that you can a food thermometer (available at the grocery store for about ten bucks) can be used. Another said he never thought to use a thermometer and that he tested the water temperature by feeling it; as long as it did not get too hot, he considered it all right. Most attendees said they had not given the problem much thought. Several said they were going to purchase thermometers. ■

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.*

Part 2 of this code column can be found in the April 2012 issue of *Plumbing Engineer*.

FPE Corner

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

Elevators and sprinklers Part 2

Congratulations to *Plumbing Engineer* magazine on becoming the official magazine of the American Society of Plumbing Engineers!

Last month I went through the provisions in NFPA 13 and ASME A17.1 regarding sprinklers in elevator hoistways and machine rooms. This month I will present two approaches to providing sprinklers in these areas. The approaches are based on requirements of two jurisdictions with which I am familiar, the City and County of Honolulu and the U.S. Department of Defense (DOD).

The key difference with requirements for elevator sprinkler protection between jurisdictions is what events must occur both prior to and in order to initiate automatic disconnection of elevator power. Remember, ASME A17.1, Safety Code for Elevators and Escalators, paragraph 2.8.3.3.2, states:

"2.8.3.3.2 In jurisdictions not enforcing the NBCC (National Building Code of Canada), where elevator equipment is located or its enclosure is configured such that application of water from sprinklers could cause unsafe elevator operation, means shall be provided to automatically disconnect the main line power supply to the affected elevator and any other power supplies used to move the elevator upon or prior to the application of water. (a) This means shall be independent of the elevator control and shall not be self-resetting. (b) Heat detectors and sprinkler flow switches used to initiate main line elevator power shutdown shall comply with the requirements of NFPA 72. (c) The activation of sprinklers outside of such locations shall not disconnect the main line elevator power supply. See also 2.27.3.3.6."

Our AHJ friend from Frostbite Falls may say, "What, no preaction system? Doesn't ASME A17.1 prohibit water in the piping under normal circumstances? How do you shut down power before water is discharged?" No, ASME A17.1 does not prohibit wet sprinkler systems.

We follow a policy that is acceptable to both the City and County of Honolulu, who issue the building permits, and the State of Hawaii Boiler and Elevator Inspection Branch. A "preaction" sprinkler system (of sorts) is required to supply sprinklers located in the elevator machine room and at the top of hoistways. The sprinklers located in the pit may be wet pipe. All sprinklers must have a minimum operating temperature of 250 F. All control valves must be located outside the protected area and each machine room, top of hoistway and bottom of hoistway (pit) must have its own control valve.

The elevator machine room preaction valve is activated by a fixed temperature or rate compensated heat detector with a temperature rating of 200 F. These same detectors also initiate the shutdown of main power to all elevators served by the machine room. Each separate elevator hoistway has a preaction valve activated by a 200 F heat detector that also initiates the shutdown of main power to all elevators in the hoistway. Sprinklers located in the elevator pit have a separate control valve and water flow alarm switch. This flow switch, in addition to providing an alarm signal, causes shutdown of elevator power to all elevators in the hoistway.

I used the term *preaction valve* loosely, as some jurisdictions permit the use of a simple solenoid valve. We like to use solenoid operated flow-control valves. There is also the option to use one of the modular preaction valve packages provided by some major sprinkler manufacturers. These packages include the preaction valve, trim and a control panel. This is costly but convenient.

The DOD outlines their requirements for elevator sprinkler protection in Section 6-30 of UFC 3-600-01 Fire Protection Engineering for Facilities, 26 September 2006, Change 1, 14 July 2009. Section 6-30 provides relatively straightforward requirements for electric traction, direct plunger hydraulic and hole-less hydraulic elevators. For starters, it is all done with wet pipe sprinklers.

Our AHJ friend from Frostbite Falls may say, "What, no preaction system? Doesn't ASME A17.1 prohibit water in the piping under normal circumstances? How do you shut down power *before* water is discharged?" No, ASME A17.1 does not prohibit wet sprinkler systems. The following passage from ASME A17.1 paragraph 2.8.3.3.2 "*…means shall be provided to automatically disconnect the main line power supply to the affected elevator and any other power supplies used to move the elevator upon or prior to the application of water.*" clearly indicates that shutdown of power may occur upon water discharge, not just prior to discharge. Of course, when the discharge occurs, the type of sprinkler system required (preaction or wet pipe) is a decision best left to the AHJ.

UFC 3-600-01 requires electric traction elevators to have sprinklers in the machine room and hoistway pit but not at the top of the hoistway. Smoke detection is required in the machine room but not at the top of the hoistway. Main power to the elevator is shut down upon activation of the water flow alarm switch serving the sprinklers in the machine room. The flow switch must

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FPE Corner

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have no time delay. No heat detectors are involved.

For direct plunger hydraulic elevators, sprinklers are required in the machine room and elevator hoistway pit only. Smoke detection is required in the machine room but not at the top of the hoistway. For holeless hydraulic or roped-hydraulic elevators, sprinklers are required in the machine room, the pit and at the top of the hoistway, and smoke detection is required both in the elevator machine room and at the top of the hoistway. Power shutdown occurs on activation of the flow switch monitoring either the machine room sprinklers or the top of hoistway sprinklers.

Note that UFC 3-600-01 does not specify the sprinkler temperature rating and does not require power shutdown upon operation of pit sprinklers.

In both the Honolulu and DOD methods all sprinkler control valves are supervised with valve tamper switches. All sprinkler pipe must be installed to permit draining. Also, as required by ASME A17.1, whenever sprinklers are located in hoistways, automatic smoke detection must be provided at the top of the hoistway and must be arranged to initiate Phase I Emergency Recall Operation. Note that ASME A17.1 prohibits smoke detectors from activating sprinkler preaction valves or shutting down elevator power.

There is always a concern with trapping someone in the elevator in the event of sprinkler operation that causes elevator power shutdown. It is noted, that in the case of the two approaches to sprinklering elevators I described, the presence of smoke detection in the machine rooms and at the top of hoistways is not directly related to operation of sprinklers or shutdown of elevator power. We are counting on the smoke detectors to activate soon enough before activation of a sprinkler flow switch or heat detector to allow elevators to be recalled to a safe floor and the doors to be opened so no one becomes trapped in the elevator when power shuts down (We hope).

In the early days, when design approaches to sprinklering these areas were first being developed, some engineers tried to implement controls to guarantee the elevator was returned to the recall floor before the preaction valve was opened. In one case, activation of a heat detector in the machine room or hoistway would initiate elevator recall. Upon reaching the recall floor, with the door open, the elevator controller would then signal the "all safe" to the preaction system control panel that the door was open. The preaction panel would then signal the preaction valve to open, allowing water to flow to the sprinkler.

Some approaches tried to use a time delay to give the elevator time to recall. Others attempted to minimize the time needed by causing the elevator to travel to the closest safe floor and open the door. This all got way too complicated, especially when considering alternate recall floors or what is a safe floor, so it appears we finally settled on the hoping-the-smoke-detector-activates-very-early method.

A fellow fire protection engineer working for a prominent FPE firm in LA recently sent me a copy of the F*inal Express Terms for Proposed Building Standards of the Office of the State Fire Marshal, Regarding The 2010 California Building Code California Code of Regulations, Title 24, Part 2 2010 Interim Rulemaking Cycle*. Section 3006.4.1 of this proposed rule change *exempts* sprinkler protection from elevator machine rooms and hoistways if several relatively easy requirements are met. You can find this at document at http://osfm.fire.ca.gov/codedevelopment/pdf/2010interimcodeadoption/Part-2.5_ISOR_20110324(addendum).pdf.

To quote my LA colleague, "It looks like California actually got something right." I agree! Now if we can only get Frostbite Falls to agree. ■

Aloha, Sam

SFPE Notes

2012 SFPE Annual Meeting: Professional Development Conference and Exposition, October 14—19, 2012 at the Hyatt Regency Savannah, Savannah, Ga. SFPE is now accepting abstracts for the educational presentations for its two-day Engineering Technology Conference on October 15—16, 2012.

2012 keynote presenters are: Peter Johnson, FSFPE, Arup, Australia; George Hadjisophocleous, Carleton University, Canada; Michael Larranaga, Oklahoma State University, USA; Michael Stromgren, SP Technical Research Institute of Sweden, Sweden (Invited); John M. Cholin, P.E., FSFPE, J.M. Cholin Consultants Inc., USA.

Deadline for submission is March 30, 2012.

Suggested references for the 2012 Fire Protection PE Exam now available.

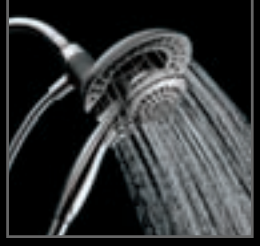
The suggested list of references for the 2012 Principles and Practice of Engineering (PE) Exam in Fire Protection is now available. The following are the suggested references:

The SFPE Handbook of Fire Protection Engineering (4th Edition)

NFPA Fire Protection Handbook (20th Edition)

NFPA 11 – 2010, NFPA 13 – 2010, NFPA 15 – 2012, NFPA 20 – 2010, NFPA 25 – 2011, NFPA 30 – 2012, NFPA 92 – 2012, NFPA 101 – 2012. This listing can also be found on the Licensure Page on the SFPE website at http://www.sfpe.org/SharpenYourExpertise/LicensurePEExam.aspx.

***Samuel S. Dannaway**, PE, is a registered fire protection engineer and mechanical engineer with bachelor's and master's degrees from the University of Maryland Department of Fire Protection Engineering. He is past president and a Fellow of the Society of Fire Protection Engineers. He is president of S. S. Dannaway Associates Inc., a 15-person fire protection engineering firm with offices in Honolulu and Guam. He can be reached via email at SDannaway@ssdafire.com.*



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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

Retrofit example: Overheat-cooling thermosyphon loop

I have recently received a number of inquiries about the control of overheating in solar collectors. This is especially important when using large groups of solar heat collectors connected with closed-loop glycol piping. The objective for a glycol cooling system is to keep the propylene glycol from boiling during collector stagnation under full sun and to keep the fluid below the high-limit temperature recommended by the manufacturer. The critical high-limit temperature can vary widely with the brand and type of glycol used. A good target is to keep the fluid well below 230 F; a temperature range of 180 F to 210 F is sufficient for any solar glycol mixture. (For a review of solar overheating concerns, control options and examples, please refer to past episodes of Solar Solutions: June 2009, November 2009, April 2011 and August 2011.)

In an ideal installation, we would like to design the glycol system to be fail-safe during electric power failures, circulator pump failures and maintenance shutdowns (accidental or intentional). So, by definition, this would prohibit the use of electric power or circulator pumps to achieve "emergency" cooling, since electrical failure and pump failure are, in fact, the most likely causes of such an emergency. In an ideal fail-safe installation, the solar thermal energy itself is the most reliable energy source available, and it is this energy that should be used to drive the cooling system. A properly installed thermosyphon cooling loop will perform this function with remarkable reliability. To illustrate this approach, I will show you the details from a retrofit thermosyphon cooling installation that was completed last summer. This retrofit was installed by Jeff Stampfer with Eldorado Solar in Santa Fe.

The example installation

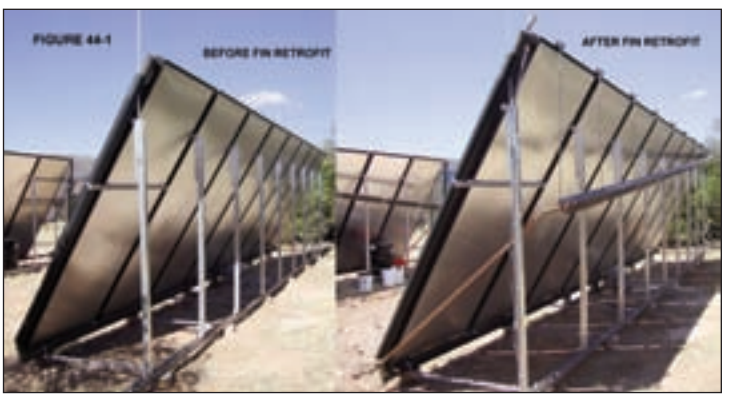
The solar heating system in this example is a large solar combisystem installed on a custom home, originally built in 2007. There were three banks of solar heat collectors, ground-mounted about 200 feet from the house. Each bank contained eight solar collectors, Heliodyne 4' 10' panels. The combisystem was designed to deliver the solar heat to 18 warm floor zones in the house, to the domestic hot water (DHW) tank and to an outdoor heated swimming pool. The radiant masonry floors in the basement and garage were available to absorb some extra solar heat if needed, but the swimming pool was originally intended to take most or all of the "extra" solar heat whenever it was available throughout the year.

In recent years, the swimming pool has been drained for maintenance for extended periods of time. Without the pool to absorb the solar heat in summer and fall, the collectors are often in danger of overheating. A thermosyphon cooling fin retrofit seemed like the most reliable, permanent and trouble-free way of dealing with the occasional loss of the swimming pool "heat dump" zone.

Thermosyphon cooling with fin-tubes

Thermosyphoning can be defined as the movement of fluid around a plumbing loop driven only by a temperature difference across the loop (fluid "pumped" only by heat). Hot fluid is less dense than cool fluid so, when it is contained in a loop, the cool fluid tends to "fall downhill," and the hot fluid tends to "float uphill." This principle can be used to dissipate solar heat by including cooling fins in the plumbing loop.

See Figure 44-1 for photos of the cooling fin loop installed on this job (before and after photos are seen side by side). On a sunny day, if the pumped circulation in the collector stops, the hot fluid in the collector tends to rise to the top header. A top connection at the outlet pipe (Fig. 44-2, upper left) connects to cooling fins mounted on the back of the collector (Fig. 44-1, right) that contain cool antifreeze, which is heavier than the hot antifreeze and tends to "fall" downhill. A bottom connection at the collector inlet allows the cold fluid to slide downhill into the bottom of the collector as hot fluid rises up and out the connection at the top. This thermosyphoning continues as long as the sun provides heat or until the circulation pump



turns back on. When the pump is on, the cooling loop snaps shut, using a passive swing-check valve (located near the bottom pipe connection) that closes in response to the relatively high flow and pressure provided by the glycol circulator pump.

The 1" wye swing-check valve shown in the photo (Fig. 44-2, lower right) is mounted tilted downward toward the bottom connection. This brass check valve has an internally hinged flap that is held shut only by gravity. When tilted in this position (shown in the photo), very little fluid pressure is required to overcome gravity and open the flap to allow cooling flow. When hot fluid is present at the top of the collector, the density difference between it and the cool fluid in the fin-tubes provides enough pressure to open the flap. We have found (in other installations) that

Continued on page 42

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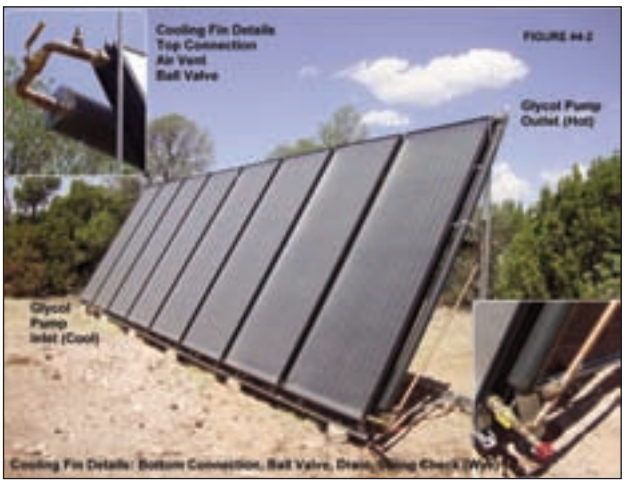

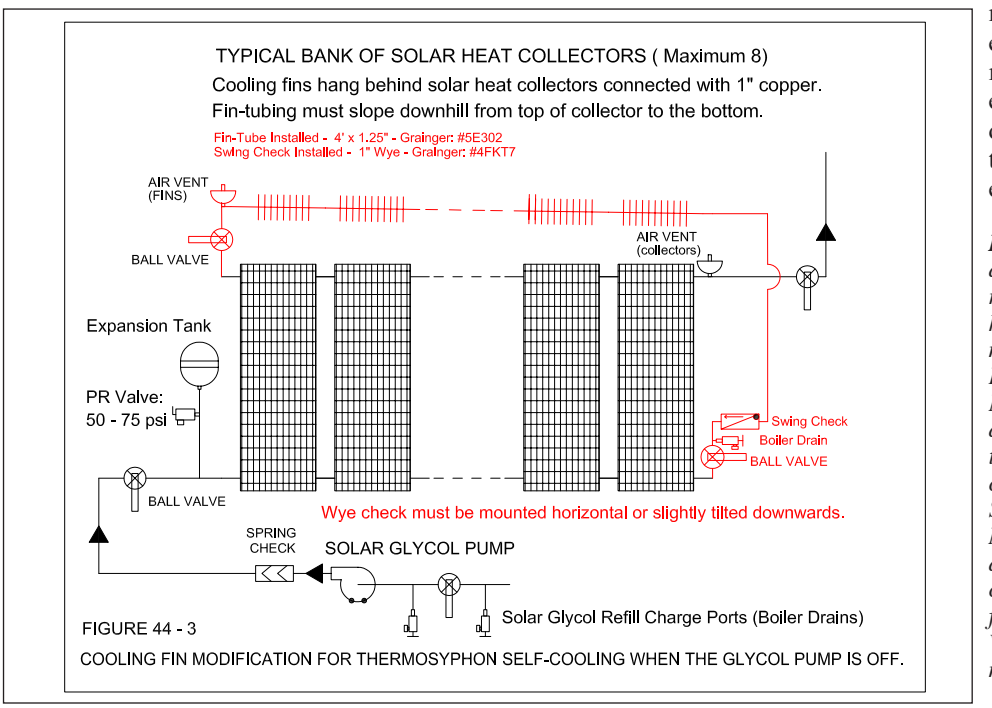

FIGURE 44 - 3
COOLING FIN MODIFICATION FOR THERMOSYPHON SELF-COOLING WHEN THE GLYCOL PUMP IS OFF.

the flap valve works perfectly well even when mounted in a horizontal orientation so, as it turns out, the precise tilt of the swing check valve is not critical as long as the flap valve is positively shut by gravity when initially installed.

Details and results

The cooling loop installed here uses 1.25 inch fin tubes with 1" tubing and 1" valves and fittings. The connective piping and fin tubes are sloped downhill, like a drain pipe from the highest point on the collector, across the back of the collector bank, all the way down to the bottom connection point. Internally, the flow path in the collectors slopes uphill from the bottom header to the top header, through straight and parallel vertical risers. (Serpentine risers or horizontal risers may not provide proper flow for thermosyphoning and are not recommended for use with this type of cooling system.)

Flow through the collector is "diagonally opposite" for both cooling and heat circulation, which assures even heat flow across the entire surface of all the panels (in at the bottom corner, out at the opposite top corner). See the diagram in Figure 44-3 for more specific piping details used in this installation.

Results: The temperature during cooling episodes was observed to hover around 170 F throughout the afternoon, with no circulator pumps running under clear sunny conditions. Without cooling fins, we have seen collector temperatures in excess of 240 F occur in a matter of minutes under the same conditions.

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.*

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, roughly in order of their importance.

1. Reliability
2. Effectiveness
3. Compatibility
4. Elegance
5. Serviceability
6. Efficiency

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Sustainable Design

By Winston Huff, CPD, LEED AP BD+C

Retrofitting plumbing fixtures in existing buildings for water efficiency

As reported by the U.S. Green Building Council (USGBC) last December, for the first time "LEED-certified existing buildings are outpacing their newly built counterparts … square footage of LEED-certified existing buildings surpassed LEED-certified new construction by 15 million square feet on a cumulative basis."

Water efficiency is an important part of upgrading existing buildings. The question for many plumbing designers is this: How much water is saved when old plumbing fixtures are replaced with new water-efficient fixtures?

Recent data shows that, in many cases, changing the fixtures can reduce water usage, yet it is important to remember that water usage varies in different locations, populations, types of installations and cultures. This data is helpful in choosing fixture types, but it is not a guarantee that your building will have the same results.

Case study: Sonoma County Water Agency

"High-Efficiency Plumbing Fixture Direct Install Water Savings Analysis" by Koeller and Company for the Sonoma County Water Agency offers some interesting data on the effect of replacing fixtures with water-efficient versions.

In 2009 – 2010, the Sonoma County Water Agency in Northern California created and managed a water conservation program encompassing the replacement of older water-using fixtures and fixture fittings with new high-efficiency products in both domestic (residential) and nonresidential applications. Qualified, licensed plumbers were used to install all items, which included toilet fixtures, urinals, showerheads and faucet aerators.

- Aerators: One of the easiest upgrades is to change out the faucet aerators. In fact, they should be changed every few years. Faucets in public toilet rooms should be 0.5 gallon per minute (gpm) or less. Kitchen and janitor sinks that are used to fill containers should be more.
- Showerheads: Reducing water flow in a showerhead can reduce water and energy use. 2.5-gpm showerheads are standard, but some older showerheads flow at 3, or even 5, gpm. Changing showerheads to those that flow 2 gpm or less is simple and relatively inexpensive.
- Urinals: Fixtures that use 1 gallon per flush (gpf) are standard, but fixtures installed prior to 1991 often use 2 gpf or more. While upgrading to low-flow fixtures requires removing the fixture and flushometer, which can be expensive, newer fixtures that use 0.5 gpf or even ⅛ of a gallon are common. Waterless urinals also are available and are a good alternative for the owner who understands the implications of their use.
- Water closets: Fixtures that use 1.6 gpf are the standard; newer models use 1.28 gpf. Pressure-assist fixtures that use the municipal water pressure to aid in the flush can be as low as 1.1 gpf. Dual-flush fixtures allow the user to choose to use a full 1.6 gpf to flush solids or less water to flush liquid waste.

The study analyzed water use data when toilets, urinals, showerheads and aerators were replaced. The results are shown in Table 1. Notice that the study was not based on the number of people; rather, it was based on the number of toilets that were changed. (In this test, the term toilets is used for the fixture also known as a water closet.)

Table 1 Savings from all toilet fixture and fixture fitting replacements*

	Residential	Commercial	Total
Number of Properties	294	70	364
Number of Toilets	1,140	633	1,773
Daily Water Savings per Toilet, gallons	54.7	58.9	56.2

*Represents a mixture of aging toilets replaced: 1.6 gpf, 3.5 gpf and higher. Replacement toilets all qualified as HETs. Some properties and toilet installations are left out of this summary, due to lack of water use data or data inconsistencies.
Source: "High-Efficiency Plumbing Fixture Direct Install Water Savings Analysis"

This table is important because it shows that considerable water savings can be achieved by changing out fixtures. For both residential and commercial properties, approximately 56 gallons of water were saved per day per toilet fixture.

Residential water savings

Data is also available regarding water savings combining toilets and other fixtures in single-family and multifamily facilities. Table 2 shows the impact of changing the plumbing fixtures along with the toilets. This table shows that roughly 10 gallons a day can be saved from fixtures other than toilets. Thus, replacing both toilets and other water-using fixtures can have a large impact on residential installations.

Table 2 Water savings, residential installations

	Number of Toilets	Water Savings, gallons per day	
		Single-family	Multifamily
Toilets "Alone"*	813	27.6	59.4
Toilets Combined with Other Devices	327	36	70.8

*Toilets "alone" category excludes those instances where toilets were installed along with urinals, showerheads or aerators. However, the category includes instances where 3.5 gpf and 1.6 gpf toilets were installed together in the same property.
Source: "High-Efficiency Plumbing Fixture Direct Install Water Savings Analysis"

Commercial water savings

For commercial facilities, the data is broken down by the type of building, because employees in different types of buildings use the plumbing fixtures differently, which results in different water savings when toilets are replaced. Table 3 shows the data from the different types of commercial buildings. The data helps show general trends in the use of water when one type of building is compared to another. It should not be used to determine

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exact water usage in these types of buildings in different regions. It is meant to be used as a guide to help understand the magnitude of water savings by changing out plumbing fixtures and toilets.

In this study the office building was accompanied by aerator installations along with the toilets. The retail and service installations were not accompanied by other fixture replacements. Half of the hospitality (lodging and restaurants) installations and half of the religious installations were accompanied by aerator installs. The health club/spa installation of 12 toilets was accompanied by the installation of three high-efficiency urinals. The sample size for the health club/spa and mobile home park categories is such that the savings data may not be representative of these facilities and cannot be applied with confidence to other similar end uses.

Table 3 Water savings by commercial-institutional category

Nonresidential Category	Number of Properties	Number of Toilets Replaced	Average Water Savings per Toilet, gallons per day
Office (including medical office)	21	96	34.6
Retail & Services	20	57	194.3
Hospitality (lodging & restaurants)	7	366	45
Warehouse	4	29	35.9
Light Manufacturing	4	92	7.6
Religious Institutions	4	19	150.8
Mobile Home Park	3	2	197.3
Health Club/Spa	1	12	443.8
Combined	64	633	64.6

Source: "High-Efficiency Plumbing Fixture Direct Install Water Savings Analysis"

Table 4 Water savings by replaced toilet

Category	Number of Properties	Number of Toilets Replaced	Average Water Savings per Toilet, gallons per day
Residential			
Replace 1.6 gpf	17	19	27.1
Replace 3.5 gpf	185	504	41.8
Commercial			
Replace 1.6 gpf	8	335	25.8
Replace 3.5 gpf	45	235	102.8
Combined			
Replace 1.6 gpf	25	354	25.9
Replace 3.5 gpf	210	739	61.2
Total	235	1,093	49.8

Source: "High-Efficiency Plumbing Fixture Direct Install Water Savings Analysis"

Water savings from toilets

In this study, some of the toilets that were removed were 3.5 gpf fixtures, while others were 1.6 gpf. This is a hot topic with some in the industry. Can you achieve enough water savings to justify replacing 1.6 gpf fixtures with 1.28 gpf fixtures?

Table 4 shows that replacing 3.5 gpf fixtures does make a difference as expected. It also shows that replacing 1.6 gpf fixtures with 1.28 gpf versions can save almost 26 gallons per toilet in residential facilities.

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Will Female Urinals Ever Gain Acceptance?

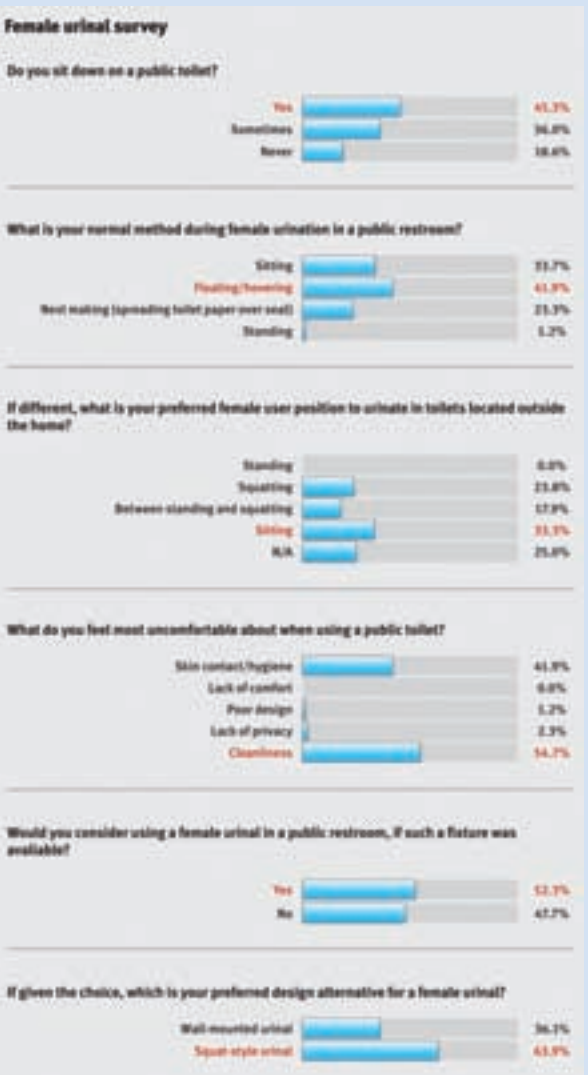
Female urinals have been discussed for years, and several fixtures have been on the market at varying times. Last year, the magazine Plumbing Connection surveyed women in Australia to find out their thoughts on introducing female urinals in public restrooms and published the results in the article "We Know Squat About Female Urinals."

According to the article, women have some concerns about public restrooms in general. One is the long lines that can form, resulting in long waits. Even more than the long lines, women are concerned about the cleanliness of public restrooms, and the thought of touching any fixture causes women to cringe.

While urinals may be the answer to these concerns, will women actually use them? Two types of female urinals are available: a stand-up type and a squatting type. Both of these fixtures receive mixed reviews from women who are not accustomed to standing while urinating.

An average male takes approximately 30 seconds to use a urinal, while women on average take approximately 60 seconds, so the issue for long lines at the women's toilet may be solved with urinals. (Water closets in women's toilets are used for urination approximately 90 percent of the time.) However, women have to remove some of their clothing when using either a urinal or a toilet, so the time reduction may not be significant.

In conclusion, the idea of a women's urinal maybe well intended, but it may not find wide acceptance.



Source: *"We Know Squat About Female Urinals," Plumbing Connection, Autumn 2011. You can read the article at www.worldplumbinginfo.com/article/we-know-squat-about-female-urinals.*

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Baxi Luna wallhung boilers are only available through Baxi-Certified Plumbing and Heating Contractors who are supplied by authorized regional Baxi Distributors. The manufacturer is committed to quality and safety and, therefore, does not authorize the sale of Baxi units directly to consumers or over the Internet.

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Sustainable Design

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When an owner is considering reducing the water usage of an existing building, this study shows that it is important to consider changing the toilet fixtures, even if they are already 1.6 gpf. Existing building retrofits will continue to be an important market in the next few years, and owners will look at ways to save energy and water. When these renovations are done, changing the facility's toilets is an important option.

You can view the entire report at www.map-testing.com/view/reports.html. ■

***Winston Huff**, CPD, LEED AP BD+C is a project manager, plumbing fire protection designer and sustainable coordinator with Smith Seckman Reid Consulting Engineers in Nashville, Tennessee. 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. 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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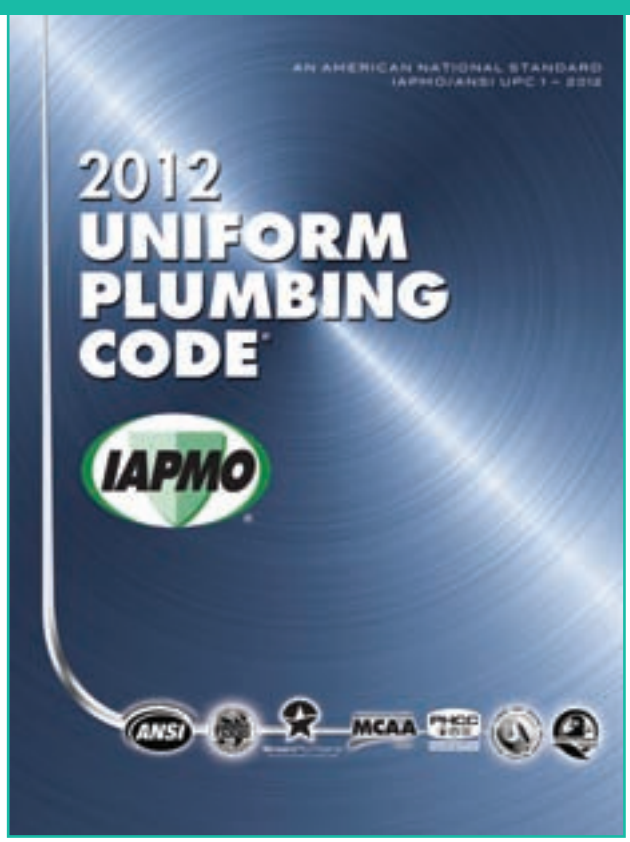
The 2012 Uniform Plumbing Code

By Lynne Simnick

The newly released 2012 Uniform Plumbing Code aids the user with improved layout design features and the incorporation of our manual of style and innovative efficiency standards and sustainable practices. This edition includes significant changes, with new provisions for alternative water sources for nonpotable applications, rainwater catchment systems, plumbing facilities and joining methods for water supply and drainage piping.

Chapter 4 has been significantly improved through reorganization in the area dealing with plumbing fixtures by expanding their use and application, water consumption and installation requirements. For example, a recommendation for approval as modified for showers that incorporated their application to referenced standards includes water consumption requirements for a maximum flow rate in accordance with ASME A112.18.1/CSA B125.1. An added provision reduces the risk of scalding by requiring individual and tub-shower control valves to provide that such protection based on the flow rate of the showerhead be installed at the point of use. The addition of required waste outlet sizing, referencing material and sizing provisions and the removal of the requirement for a finished dam curb or threshold to aid the aging population are among changes aimed at providing ease of use for the end user.

Required plumbing fixtures are revised based on research conducted by ASPE, the Stevens Institute of Technology, the American Restroom Association and the School of Architecture with the Gender and Women's studies program at the University of Illinois (*Potty Parity in Perspective: Gender and Family Issues in Planning and Designing Public Restrooms*).



When designing satisfactory restroom facilities, factors that are considered in deciding the minimum number of plumbing fixtures for a preferred service include occupancy, waiting times during peak demand, fixture use and the likelihood of finding a vacant fixture. Potty parity does not always mean there will be the same number of toilets for women and men; parity is measured by the wait time to obtain a fixture. Where we see the most inconsistency occurring is in the number of required plumbing fixtures for women and men in mercantile and assembly occupancies that use the same ratio for both sexes. The 2012 UPC recognizes that women need more time, and the minimum required fixtures should accurately represent the population served based on design method.

Chapters 6 and 7 now offer various joining methods and connections to aid the end user in identifying correct methods based on the piping material. The material covered for water supply and water distribution joining methods includes asbestos cement, brass, copper, CPVC, ductile-iron, PE, PE-AL-PE, PE-RT, PEX-AL-PEX, PP, PVC and stainless steel. The material covered for drain, waste and vent piping joining methods includes ABS, asbestos-cement, cast-iron, co-extruded ABS, co-extruded PVC, copper, PE, PVC, stainless steel 304, stainless steel 316L

Continued on page 52

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The results of the 2010 CLEAReport*, an independent water heater study by Clear Seas Research, revealed that product quality, service, technical support, and the fact that Bradford White is not sold in retail stores were the most important factors to contractors when selecting a brand of tank type water heater.

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*Ranking is based on the 2006, 2007, 2008, 2009 and 2010 CLEAReports by Clear Seas Research. Please visit www.clearseasresearch.com for additional information.

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and vitrified clay. Step-by-step guidance provides the user with clarification on acceptable methods of connection to piping materials.

Significant changes apply to Chapter 16 ("Alternate Water Sources for NonPotable Applications") by expanding the scope of water sources and developing code provisions that are specific to each source. The three sources addressed in Chapter 16 are graywater, reclaimed (recycled) water sources and on-site treated nonpotable water systems.

The new water sources include three types of water disposal: subsurface irrigation, subsoil irrigation and mulch basin systems. Subsoil water irrigation provides a means to disperse shallow drip irrigation lines and mulch basins that collect and spread water in single- and multi-family dwelling applications. The reclaimed water provisions for on-site nonpotable water systems include graywater and other nonpotable water sources that are used for on-site applications. They are unique by installation through prepackaged or engineered systems that are listed and labeled for the intended application.

Two new appendices cover potable rainwater catchment systems that include operation and maintenance requirements, minimum water quality, material compatibility, controls, backflow prevention, design and installation requirements and sustainable construction practices for plumbing systems as a resource for the Authority Having Jurisdiction.

Chapter 17 is a new chapter dedicated to nonpotable rainwater catchment systems and includes input from the American Rainwater Catchment System Association. This chapter covers irrigation, toilet and urinal flushing with proper treatment, provisions where permits are required, maintenance of alternate water sources and minimum water quality.

Two new appendices cover potable rainwater catchment systems that include operation and maintenance requirements, minimum water quality, material compatibility, controls, backflow prevention, design and installation requirements and sustainable construction practices for plumbing systems as a resource for the Authority Having Jurisdiction.

2012 Uniform Mechanical Code

The newly released 2012 Uniform Mechanical Code assists the end user with enhanced layout design features through the incorporation of our manual of style and includes innovative efficiency standards and sustainable practices by allowing for a wide array of design alternatives to achieve the minimum performance requirements in mechanical systems. The 2012 UMC underwent significant changes, with new provisions for piping, tubing, balancing, louvers, ductwork, safety requirements for refrigeration machinery rooms and an alternative method of calculating ventilation efficiency.

Significant improvements in Chapter 3 include provisions for a heating or cooling air system that provides specific requirements with return air, outside air or both, which are designed to replace required ventilation arranged to discharge into a conditioned space not less than the outside air specified in Chapter 4. Standards are referenced for louvers and their locations where installed in hurricane prone regions by providing minimum performance ratings for water rejection abilities and high-velocity wind conditions.

Provisions added in Chapter 4 offer an alternative for calculating ventilation efficiency through ASHRAE Standard 62.1 and updating minimum ventilation rates in breathing zones based on occupancy.

Safety requirements are updated and revised for refrigeration machinery rooms on vapor alarms, emergency control over the ventilation systems, control of ventilation systems and emergency controls. In addition, machinery room ventilation is addressed through the central control over the ventilation system and by adding safety provisions for the emergency control through an identified switch.

Detector location is critical to early leakage warning in refrigeration machinery rooms. Because machinery rooms are unattended most of the time, once the refrigerant gas is detected at the levels noted in Chapter 11, a local alarm must be initiated. The alarm is intended to alert occupants inside the area of detection and in the immediate vicinity to prevent any refrigerant gases that might escape from causing harm to those outside the area of release. The required detectors have the added important role of activating the emergency ventilation/exhaust systems in the machinery rooms. The intent of this section is to provide a safe environment for emergency response personnel when responding to an incident in a refrigeration room.

The emergency control switch is a tamper-resistant type that requires more than one action to actuate it. To prevent an accidental start-up, the switch must be capable only of stopping the controlled machinery, not of restarting it. The switch must not affect the operation of such life-safety systems as detectors and exhaust equipment. In addition to the manual switch, the required refrigerant room detector must also shut down the same equipment when the vapor concentration exceeds the lesser of the detector's upper detection limit or 25 percent of the refrigerant's lower explosive limit.

Refrigeration port protection in the form of a locking-type, tamper-resistant cap is added to address illegal venting of refrigerant service ports by unauthorized individuals. This inhalant sometimes poses a serious threat to human life and safety. The typical condensing unit is located outdoors and is equipped with access ports on the vapor and liquid refrigerant lines. These access ports allow for the connection of diagnostic gauges so the refrigerant may be added to or taken from the unit during servicing. The purpose of this section is to prevent exposure to the refrigerant by illegal venting of refrigerant or the intentional inhalation of refrigerant and refrigerant

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leaks that contribute to the greenhouse gases in our atmosphere.

A new appendix provides a comprehensive set of technically sound provisions for sustainable practices and works toward enhancing the design and construction of mechanical systems that result in a positive long-term environmental impact. Practices include: water efficiency in systems through the use of a submeter to monitor large water usage, including make-up water to cooling towers, evaporative condensers and boilers; establishing efficiency measures for cooling towers evaporative coolers; increased air quality provisions to reduce air contaminants; and establishing minimum equipment efficiencies, system balancing, duct leakage, system sizing and systems controls add to the overall design and construction practices.

A key feature is system commissioning that ensures such systems are designed, installed and maintained to function as intended over their life cycle to provide the most cost-effective strategy for reducing energy usage.

Members of the plumbing and mechanical industry are looking at these systems as part of the whole building as it relates to designers, owners, installers, operators, users and the community outside the building.

Members of the plumbing and mechanical industry are looking at these systems as part of the whole building as it relates to designers, owners, installers, operators, users and the community outside the building. Design options utilizing water reuse systems collect the water and reuse it for irrigation, process water systems and flushing fixtures by using less water and energy.

The future of plumbing and mechanical systems lies in the ability to design systems with the "whole building" in mind by using, preserving and respecting the natural biospheric earth systems of recycling air, waste and water. The 2012 UPC and UMC offer sustainable construction practices for both plumbing and mechanical systems, including up-to-date technical advances in the industry. ■

***Lynne Simnick** is director of Code Development, IAPMO. For more info on IAPMO, visit www.iapmo.org.*

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KEEPING UP THE FLOW

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Geothermal forecast

Douglas A. Dougherty, GEO president and CEO

A new year for GEO success

In 2011, the Geothermal Exchange Organization (GEO) established itself as the voice of the geothermal heat pump industry. We now have a full-time spokesperson, and we've renewed and intensified work with our Washington, D.C. advocacy team. Most importantly, we have begun the work of establishing GEO with numerous contacts at the state level.

We had an outstanding year at the federal level. GEO-inspired language in an appropriations bill that passed the Senate and House directs the U.S. Department of Energy (DOE) to develop a plan for research and development — and promotion — of geothermal heat pumps (GHPs). Given that 40% of all energy used in this country is for buildings, this new mandate is a huge success. It sends a very strong message from Congress that DOE must promote our technology to reduce thermal loads of buildings.

In the same bill, Congress restored funding to a cash-strapped Energy Information Administration (EIA). Restoring funding for EIA activities is a necessary win for our industry. We must have credible technical data on GHPs going forward, data the EIA collected until its funding was cut last year. Restoration of those funds should prompt EIA to continue their data collection and analysis of GHPs.

Perhaps most important for the industry during 2011 was that Congress essentially ignored tax rebates in its quest to slash the federal budget. I think we're good for this year but, with a new Congress, 2013 may be a different story. Retaining the rebate is an issue that we must watch closely.

Also important for GEO was finding a champion for GHPs on Capitol Hill in Bernie Sanders (I-Vt.). He amended a bill that was passed and signed into law, directing the Economic Development Agency (EDA) to develop a pilot program for electric utility on-bill financing directed at GHP installations by small business. On-bill financing can go a long way towards reducing the sting of high upfront cost with reasonable terms and convenient installment payments.

We continue to work with congressional staff to include GHPs in a clean energy standard (CES) that Sen. Jeff Bingaman intends to introduce in 2012 as one of his final public policy initiatives before he retires from the Senate and chairmanship of the Senate Committee on Energy and Natural Resources. GEO chairman Dan Ellis and our Washington team met with the senator's senior staff in early January to convince them that GHPs should be included in the CES as a renewable energy source, alongside solar, wind and other renewable power technologies.

Though election-year politics will likely preclude the CES gaining any momentum in 2012, the key is for GHPs to be included in CES definitions. That's what we are working on for this year, a "placeholder" for future congresses, putting GHPs in any such legislation from the get-go.

A key GEO function for its members is forming partnerships for the good of the industry. I believe our natural partnerships are with fellow national trade associations that have helped "carry the water" for our industry. The National Ground Water Association; the American Society for Heating, Refrigeration and Air-Conditioning Engineers; Air Conditioning, Heating and Refrigeration Institute; American Council on Renewable Energy and the American Council for an Energy-Efficient Economy all have served as advocates for GHPs. Now that GEO is established, we are working to strengthen our relationships with those organizations and others, including the National Wildlife Federation and the Sierra Club.

For the future, I can't stress enough the importance of electric utility support for our technology. GEO believes that the utility industry can be a tremendous asset to us, as we can for them. The strategy is "carrot and stick." The carrot is GHPs as an accepted renewable energy source. The stick is regulation at the state level for utilities to promote our technology to their ratepayers from an efficiency standpoint, while quietly reaping its baseload-building attributes.

More than 30 states have adopted either a renewable energy portfolio standard (REPS), an energy efficiency portfolio standard (EEPS), or both. These standards direct electric utilities to seek renewable sources of electric generation and/or to implement energy efficiency programs at the retail level. Unfortunately, no state has included GHPs in a REPS, and only six states specifically identify GHPs in an EEPS.

GEO has a lot of work to do at the state level. We must convince state officials that GHPS have a positive, dual purpose. Electric utilities can promote GHPs as highly energy efficient appliances, and they can take credit for the renewable energy that GHPs recover naturally from the earth. GEO has achieved success already. We've engaged the Maryland Energy Administration; they are very close to changing their state REPS to include GHPs.

We've established contact with the National Association of Regulatory Utility Commissioners, and we are working with a number of state GHP associations, not only to look at renewable energy standards but also to convince utilities that on-bill financing is a good thing for GHPs. Our work at the federal level will help pave the way. A number of states have on-bill financing, but it's for appliances. So there's a lot of opportunity for GEO at the state level to influence utilities to provide on-bill financing for GHPs and ground loops.

Before the recession, GHPs had a market penetration of only five percent for new home construction. I firmly believe that, when economic growth comes back in the latter part of 2012 and during 2013, our industry can easily capture up to 25 percent of the market. That's because we haven't stood still. We've focused on retrofits, built greater commercial acceptance, fostered awareness and knowledge about GHPs and built a more robust dealer network, with better trained installers and more drillers to install ground loops.

In addition, federal policy is starting to ensure that the energy efficiency of homes will make a monetary difference for mortgage and investments. This will also help thrust GHPs into the marketplace for new homes. When builders of new homes are installing geothermal, other builders take notice. It's a snowball effect that is very exciting for the future of our industry.

GEO had a tremendous year in 2011, and I have high hopes for a better 2012. But if we are to have an even more prominent voice, we must grow. The bigger we are the stronger voice we will have at the national and state levels. Considering our competition — the fossil fuels industry and big renewables such as wind and solar — it's pretty clear that, for GEO to make a difference, we need "buy-in" from everyone with businesses related to GHP technologies. That includes manufacturers, distributors, dealers, architects, engineers, drillers, electric utilities and cooperatives. Together, we will succeed. ■

The views and opinions expressed in this article are those of the contributor and do not necessarily reflect a position of ASPE.

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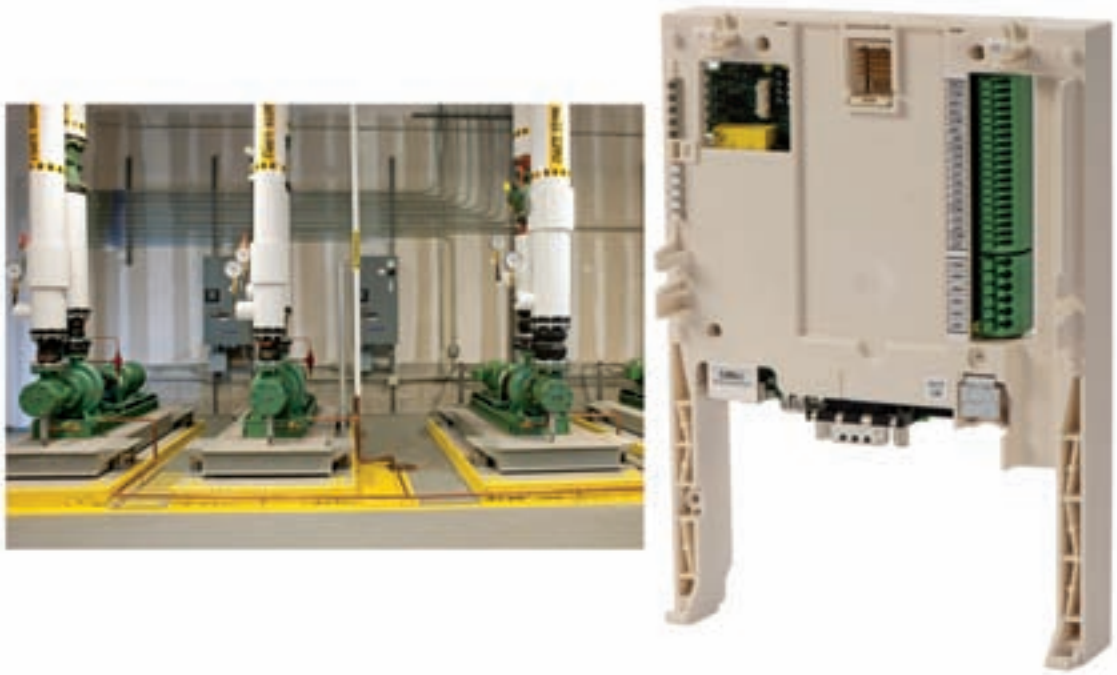

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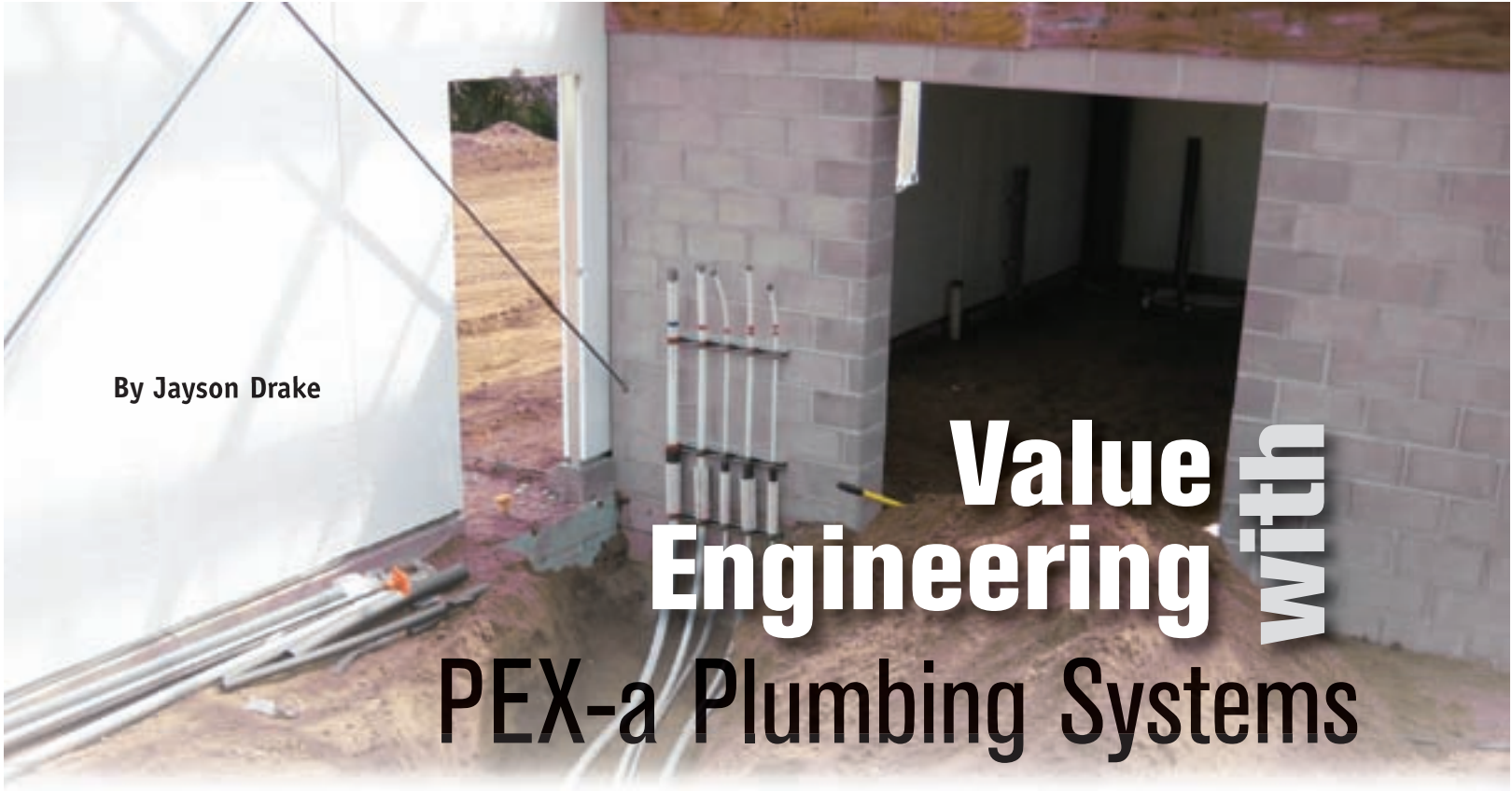

By Jayson Drake

Value Engineering with PEX-a Plumbing Systems

We live in challenging economic times for the commercial construction industry, where good projects are tough to win and being profitable can be even tougher. In this competitive environment, landing attractive jobs requires a fresh look at your value engineering options.

One of the most effective solutions for managing project costs is the use of PEX-a pipe for your commercial, domestic-water plumbing systems. PEX-a, or crosslinked polyethylene, has been used in the construction industry for decades and has now displaced most of the copper and CPVC plumbing being installed in the residential market. The benefits provided by PEX-a in new residential construction produce even greater value in commercial domestic water applications.

Plumbing pipe options

Copper and CPVC are traditional products that have been used in the plumbing industry for years. But just as the inherent characteristics of those products allowed them to replace old-fashioned galvanized steel and cast iron, flexible PEX-a has significant advantages over copper and CPVC that are fast making it the preferred choice over these rigid pipe systems.

Produced in sizes 3/8-inch to 3 inches in straight "sticks" and coils up to 1,000 feet long, PEX-a plumbing pipe is conveniently available in white, red and blue colors. Using the "Engel" manufacturing method, which results in a very high degree of molecular crosslinking, provides PEX-a with exceptional durability and flexibility. That flexibility, combined with the availability of PEX-a in long coils, eliminates many of the fittings and connections required in rigid copper and CPVC plumbing systems. Eliminating fittings means less material, less installation labor and fewer potential leak points, all of which results in more efficient installs and lower costs.

PEX-a's flexibility and durability also provide added protection against the damage and leaks caused by freezing and stress cracking. Since PEX-a naturally expands up to three times its original size without cracking or splitting, frozen water and impacts won't create the expensive leaks that can occur in rigid copper and CPVC plumbing systems.

If you're using copper for your plumbing jobs, you know how much your pipe costs continue to increase and how quickly those increases can fluctuate. Unlike copper, PEX-a pricing is relatively consistent and affordable. This means that you can quote and win a plumbing job with the confidence that your pipe price is going to remain stable. And you'll no longer have to worry about jobsite theft of expensive copper.

Fittings

In addition to using fewer fittings than rigid pipe systems, PEX-a plumbing systems allow the use of efficient and affordable fittings made from durable engineered polymers. These "EP" fittings are molded into a wide variety of multiport configurations with varying numbers of inlets and outlets in assorted diameters. These "multiport tees" eliminate additional connections and the labor needed to make them, resulting in even more efficient installations and lower costs.

Connection methods

The natural ability of PEX-a to expand and contract permits the use of an "ASTM F1960 cold-expansion connection," one of the simplest, strongest and most reliable connections in the industry. Making a PEX-a F1960 connection requires just four easy steps:

1. Cutting the pipe with a plastic tubing cutter.
2. Placing a PEX-a expansion ring on the end of the pipe.
3. Expanding the pipe and the ring with a Milwaukee® ProPEX® expansion tool.
4. Inserting the larger-diameter fitting.

The pipe and ring will then immediately and naturally

Continued on page 60

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Commercial PEX

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Overhead hot- (red tubing) and cold-water supply lines: Using the "Engel" manufacturing method, which results in a very high degree of molecular crosslinking, provides PEX-a tubing like this with exceptional durability and flexibility, minimizing the number of connections needed and speeding installation.

begin contracting back to their original shape, compressing tightly against the primary and secondary fitting barbs with up to 7,800 pounds of radial force. It's just that easy: no deburring, no torches, no flux, no solder, no cements and no curing or cooling time.

The resulting permanent connection holds tight in tests up to 1,000 pounds of pull force. In addition, since the pipe is expanded before the fitting is inserted, it's impossible to dry-fit the connection, eliminating the possibility of incomplete fittings and the resulting blow-off leaks.

Case study: Coborn's Grocery

Let's see how these various advantages of PEX-a over rigid piping systems played out on an actual commercial project, the construction of a grocery store in Minnesota.

When Rice Building Systems of Sauk Rapids, Minn., set out to construct a new concept store for St. Cloud, Minn.-based Coborn's Inc., the company had strict orders to capitalize on innovative materials and efficient design, while maintaining the 90-year-old Midwest grocery chain's high standards for quality and customer service.

When plumbing bids went out, pricing for the copper systems that were typical for other Coborn's stores came back way too high. So Rice sent out rebids, opening the doors to alternative plumbing materials, including PEX-a and CPVC.

"The owners wanted value engineering," says Chris Rice, president of Rice Building Systems. "We knew any bid that came back had to incorporate suitable cost savings in addition to intelligent design and efficient installation methods to effectively meet our budget and tight construction schedule."

Scott and Ben Kiffmeyer, owners of Kiffmeyer Plumbing Inc. in Sauk Rapids, 19-year veterans in the plumbing industry, had used PEX-a pipe in several previous installs. They offered a unique idea that would provide the value engineering that Coborn's was seeking, while also conforming to the stringent construction schedule.

"Rice came back asking for ideas, and we went to them with the concept of running PEX-a underground," said Scott Kiffmeyer. "That's how we got the job."

The underground PEX-a concept came from a presentation Kiffmeyer Plumbing received from Dean Corrigan of FourMation Sales and Casey Swanson, commercial sales representative from Uponor, a PEX-a manufacturer located in Apple Valley, Minn. Uponor also offers design and technical support for plumbing, fire sprinkler and radiant floor heating and cooling systems.

"They needed to get the plumbing system in quickly, so this was a great approach to speed up their construction schedule," says Swanson. "It was also much more cost-effective than doing copper overhead."

The plumbing system, which used ½ inch through two-inch Uponor AquaPEX® pipe for the 36,330-square-foot store, ran the PEX-a pipe underground instead of overhead, like a typical copper plumbing system application. The underground PEX-a system also

Continued on page 62

COSTS	COPPER	PEX-A	DELTA	
			$	%
LABOR	$22,800	$14,400	-$8,400	- 37%
PIPE AND FITTINGS	$11,839	$6,104	-$5,735	-48%
INSULATION	$8,480	$1,200	-$6,311	-74%
INSULATION (UNDERGROUND)	$0	$969		
GAS, SOLDER AND MISC.	$300	$0	-$300	-100%
HANGERS AND STRUT	$2,400	$706	-$1,694	-71%
LIFT RENTAL	$1,000	$350	-$650	-65%
MISC. COMPONENTS	$3,000	$3,000	$0	0%
TOTALS	$49,819	$26,729	- $23,090	- 46%

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Commercial PEX

Continued from page 60

Taken at a college dormitory re-piping project where all the copper was replaced with PEX-a tubing, this photo shows an isolation and balancing valve with PEX-a tubing in an overhead support application. Unlike copper, the pricing for PEX-a is relatively consistent and affordable, which also makes the material less vulnerable to job-site theft.

incorporated Uponor's EP fittings, which are approved for direct burial in soil.

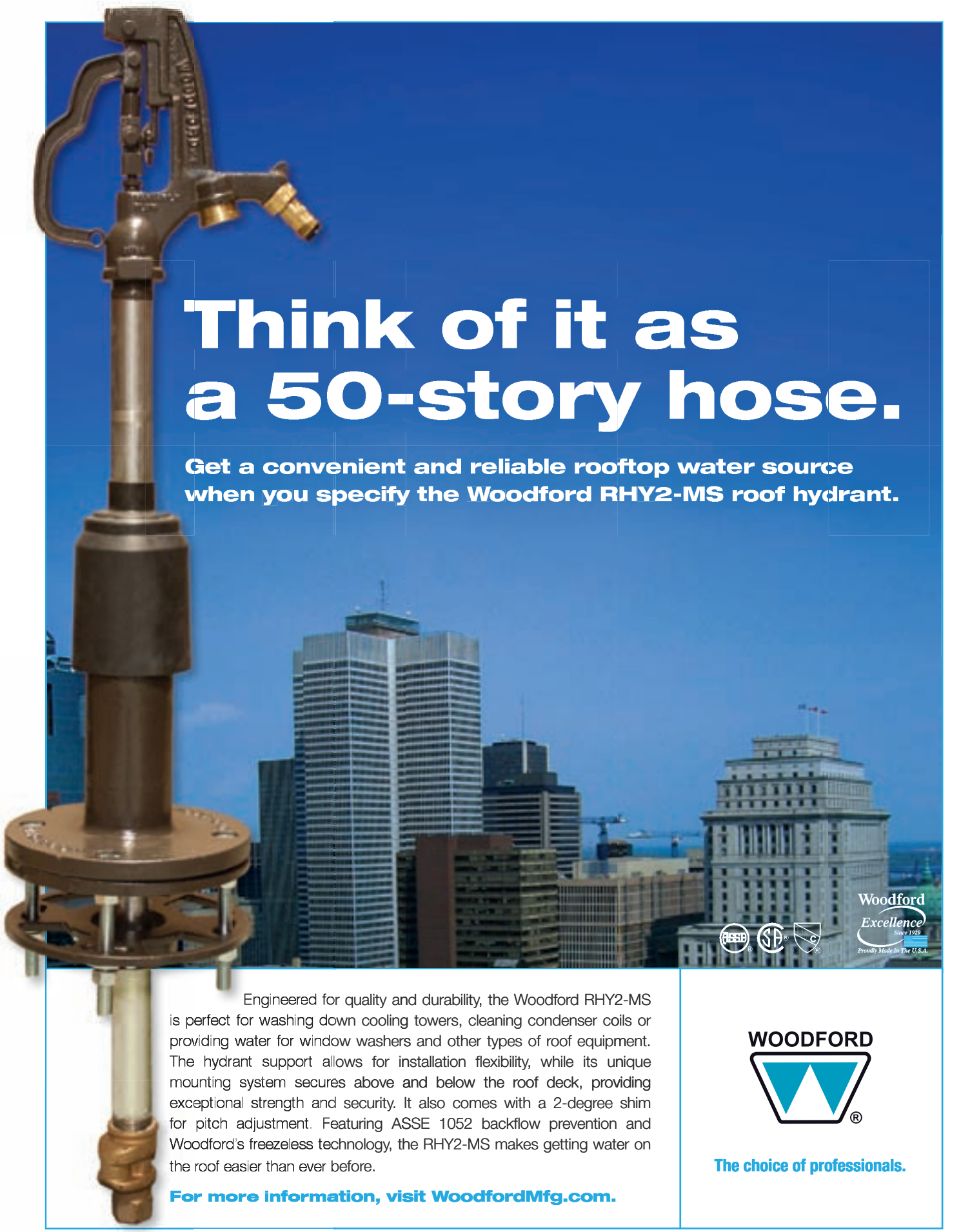
The underground installation started in mid-August; the store opened just 14 weeks later, in mid-November. Both Rice and Kiffmeyer estimate installing PEX-a underground saved at least a week, compared with installing an overhead copper pipe system. "PEX-a provided great time and labor savings," says Scott. "That, in turn, offered great cost savings for the owner."

A subsequent in-depth analysis of the installed cost of the plumbing system revealed dramatic savings. When compared to the copper systems installed in previous Coborn's projects, the Uponor PEX-a system reduced labor costs by 37 percent and material costs — including pipe, fittings, insulation and various accessories — by 54 percent, for a combined savings of 46 percent. See chart on page 60.

As the Coburn's case study clearly demonstrates, by delivering significant material savings, faster installs and reduced liability, PEX-a is changing how commercial jobs are being plumbed. With its established and quantifiable benefits over copper and CPVC, PEX-a is rapidly becoming the preferred value engineering solution in commercial construction. ■

Jayson Drake *is the senior product manager of plumbing and fire safety at Uponor, a manufacturer of PEX-a tubing and a supplier of radiant heating and cooling, plumbing and fire sprinkler systems. He can be reached at jayson.drake@uponor.com.*

The views and opinions expressed in this article are those of the contributor and do not necessarily reflect a position of ASPE.



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Fire Pump Sizing and Selection

By Greg Trombold
Vice President, Membership
ASPE Cleveland Chapter

When starting a fire pump design, the most important item to consider is the water supply. If you are utilizing the city water supply as the primary source for the pump, you need to make sure that an accurate city water test is used. Some good rules to follow are:

- Make sure the water test is less than a year old.
- Make sure the water test is performed as close to the tap point as possible.
- Make sure the test is taken during the time of highest water use for the area.

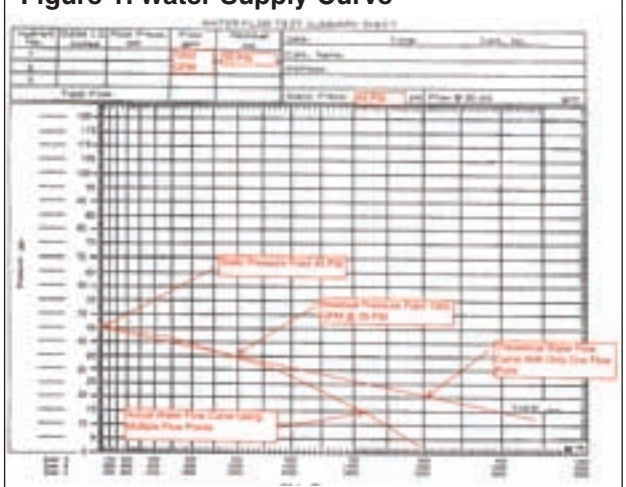
In a cold climate, testing during the summer may be a better choice, since residents are watering their lawns and commercial properties are using more water for cooling. Additionally, in highly residential areas, peak morning use typically occurs early in the day, between 6:30 and 9 a.m., so that may be the best time for the test.

Another consideration regarding the water test is this: Did the city flow enough water to meet 150 percent of the fire pump design point? This will ensure that the municipal supply will provide enough volume to meet the system demand. If not, request a new test using more hydrants or plot a water supply curve (see Figure 1).

If you are using a private water supply, lake, or ground-level storage tank, you must remember that you are not permitted to use a suction lift with a fire pump. Thus, if the water supply is located below the suction inlet to the fire pump, you may have to utilize a vertical turbine fire pump in lieu of the other types of pumps available.

The last job parameter you need in order to size the fire pump is the required flow for the systems the pump will be serving (sprinklers, standpipes, or other). For standpipe systems, this flow is related to the type and size of the structure the pump is protecting. In any case, the demand of the system will dictate the pressure and flow required.

Figure 1: Water Supply Curve



Calculating standpipe system pressure

Two types of structure calculations for pressure are available. One is for high-rise structures (buildings greater than 75 feet in height, measured from the lowest level of fire department vehicle access to the floor of the highest occupiable story) and one is for non-high-rise structures. This is a factor because any high rise requires a pressure of 100 pounds per square inch (psi) at the top of the structure while flowing the rated gallons per minute (gpm) of the fire pump. This discussion concentrates on high rises because the pressure calculations for most non-high-rise buildings are determined through the use of software specifically designed for fire sprinkler hydraulic calculations. These programs are used by sprinkler contractors to keep their pipes as small as possible, which controls the cost of the job.

When calculating the water pressure for a high rise, it is a good idea to use a calculation sheet such as the one shown in Figure 2. If you use a calculation sheet, a few variables need to be filled in:

- Pressure drop in the backflow prevention device and water meter
- Friction loss in the most remote standpipe when flowing 500 gpm
- Elevation change

Continued on page 66

Figure 2: Water Pressure Calculation Sheet

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Pressure calculation sheet fire pumps

Engineer: _____ Job: Example

City water test: Date: 6-5-11 Static pressure: 45 PSI
Residual pressure: 35 PSI GPM flowing: 1250

Pump #1

Pressure required at top of structure	100	
Height of building 212 / 2.31 =	+92	
Friction loss in building piping	+ 10	
Total pressure required for system	202 PSI	(1)
Residual pressure at street	35	
Backflow loss	-7	
Water meter	-3	
Elevation change	-0	
Friction loss in suction piping	-3	
Available suction pressure at pump	22 PSI	(2)
Subtract (2) from (1) **Pump discharge pressure**	180 PSI	

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Fire Pumps

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For the example in Figure 2, the parameters are:

- Building height: 212 feet
- City water pressure: 45 psi static; 35 psi residual
- Required flow rate: 1,250 gpm

Assume that the pump is 1,250 gpm for this example. As you can see, the calculated required pump psi is 180 psi.

A similar calculation can be used for a non-high rise, by changing the 100 psi to the end head pressure (15 – 50 psi, depending on the head). However, the friction loss and pipe sizing become an issue when doing this calculation, which is why most contractors and sprinkler designers use software.

A note about pressure

One thing that some engineers forget is that the pump will discharge at a much higher pressure at churn (no flow) than at the design point. Per NFPA 20 (2010): Standard for the Installation of Stationary Pumps for Fire Protection, fire pumps are allowed to have a 40 percent rise in pressure from rated flow to churn. This is almost never the case, but different pumps and speeds affect the churn pressure, so you should always look at a curve to determine the shutoff pressure. The reason for reviewing this is typically to understand what the maximum pressure (no-flow churn) will be in the system to determine whether high-pressure fittings are needed.

Calculating pump gpm

To calculate pump gpm, two sizing methods are available, the standpipe method and the sprinkler area calculation. In a fully sprinklered structure with standpipes, NFPA 14 (2010): Standard for the Installation of Standpipes and Hose Systems says that the first standpipe requires 500 gpm and each additional standpipe requires 250 gpm, up to a maximum of 1,000 gpm.

For example, a building with two standpipes would require a 750-gpm pump (500 gpm for the first standpipe and 250 for the second), and a building with five standpipes would require a 1,000-gpm pump because that is the maximum allowed by NFPA 14. (Note that the local code or the insurance carrier may require more than the maximum allowed by NFPA 14.)

Area calculations are more difficult. You need to know the sprinkler hazard classifications of the building and its contents to determine the design density, and the square footage (area of operation) of each hazard must be calculated. The five types of hazard classifications from NFPA 13 (2010): Standard for the Installation of Sprinkler Systems are:

- Light hazard: Low quantity of combustibles with low heat release (e.g., churches, hospitals, museums)
- Ordinary hazard 1: Moderate quantity of combustibles with moderate heat release and eight-foot stockpiles (e.g., mechanical rooms, restaurant kitchens, laundry facilities)
- Ordinary hazard 2: Moderate quantity of combustibles with moderate heat release and 12-foot stockpiles (e.g., stages, large library stack rooms, repair garages)
- Extra hazard 1: High quantity of combustibles with high heat release and no flammable or combustible liq-

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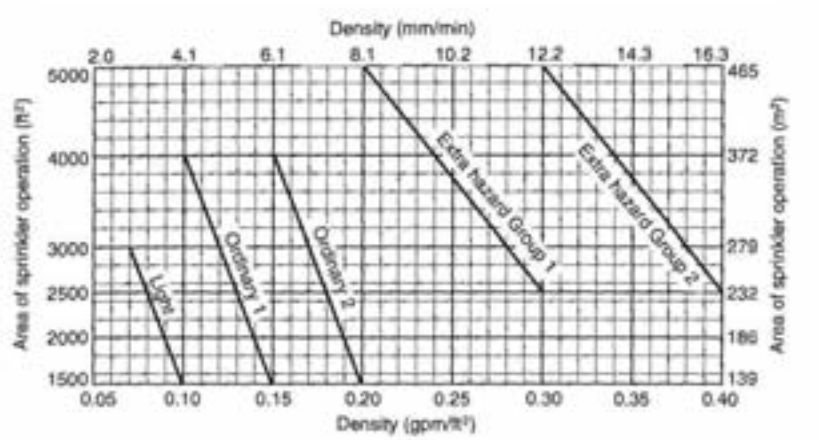
Figure 3: Density/area curves (NFPA 13 Figure 11.2.3.1.5)



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Fire Pumps

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uids (e.g., aircraft hangers, saw mills)

• Extra hazard 2: High quantity of combustibles with high heat release and flammable and combustible liquids (e.g., plastics processing, flammable liquids spraying)

Refer to NFPA 13 for a more thorough definition of the classifications.

Once the hazards have been determined, you next take the most remote 1,500-square-foot area of sprinkler operation and multiply it by the density found in NFPA 13 Figure 11.2.3.1.5 (see Figure 3). Then you must add the inside and outside hose stream demand to the area calculation. This information can be found in NFPA 13 Table 11.2.3.1.1 (see Table 1). Hose stream demand is the amount of water that must be added to the sprinkler system hydraulic calculation to fill the hoses as well as ensure enough supply to operate the sprinklers. Inside hoses are generally 1- to 1½-inch standpipe hoses that may be connected to the sprinkler system for initial fire attack.

For example, if you have a 40,000-square-foot building that is all ordinary group 1, the calculation would be 1,500 x 0.15 (density) = 225 + 250 (hose demand) = 475 gpm total for the fire pump.

If the structure has multiple hazards, the hazard with the highest gpm calculation dictates the pump size. Make sure you touch base with the insurance carrier for a particular project, as they may require higher square footage or density requirements, depending on the job.

Table 1 Hose stream demand and water supply duration requirements for hydraulically calculated systems (NFPA 13 Table 11.2.3.1.1)

Occupancy	Inside hose, gpm	Total Combined Inside and Outside Hose, gpm	Duration, minutes
Light hazard	No hose: 0	100	30
Ordinary hazard	One hose: 50	250	60–90
Extra hazard	Two or more hoses: 100	500	90–120
For SI units, 1 gpm = 3.785 L/min.			

Selecting the pump

Once you have calculated the gpm and psi requirements for the pump, you need to determine the type of pump that works best for the job. The three most widely used pumps are horizontal split case, inline and vertical turbine.

Horizontal split case pumps are also called double-suction fire pumps, because the water pathways direct water to both sides of the impeller. They are the most common type of fire pump on the market, partly because of the ratings available in this style of pump, typically 250 through 5,000 gpm. This was the first type of pump used for fire protection systems.

Inline fire pumps offer several benefits:

• Their size and design offer space savings.

• They offer the ability to increase the ratings allowed by NFPA 20 from a maximum of 499 gpm, to 750 gpm, to today's unlimited rating. (The largest currently available is 1,500 gpm.)

• They offer a low cost of installation because they don't require a base plate that needs grouting.

Vertical turbine pumps are used in situations where the water supply is below the suction flange of the fire pump, because NFPA 20 requires a positive suction pressure to a fire pump.

The other item that needs to be determined is the type of drive: diesel or electric. Once that is determined, you can find the appropriate pump model and horsepower in a manufacturer's catalog. I don't recommend using pump curves to select fire pumps, as every selection must be UL approved, which might lead to picking the wrong horsepower for a particular selection.

One other note on fire pump selection is that selecting pumps that have a higher rpm is not necessarily a misstep, because fire pumps only run once a week for a limited amount of time, so the length of life will be about the same for a 1,750 rpm pump as for a 3,500 rpm pump.

Power supply

If a generator is going to be used as

Continued on page 70

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Fire Pumps

Continued from page 68

a secondary power supply, the fire pump will require a transfer switch, which must be dedicated to the fire pump. A typical design would be to use a combination controller and transfer switch in a cabinet to avoid the need for additional requirements laid out in NFPA 20. A reduced-voltage start also should be considered when connecting to a generator to potentially reduce the size of the generator. This is true even for normal power considerations, as large-horsepower fire pumps with across-the-line starting put significant strain on power systems. The two most commonly used by designers are solid state soft start and wye-delta closed transition. These two have the best starting characteristics of the approved options on the market.

Code issues

Following are some code requirements for fire pumps that you should factor into pump selection and system design.

- Horizontal elbows or tees upstream of a fire pump must be 10 pipe diameters from the suction flange on a split-case fire pump.
- Pumps must maintain a positive suction pressure at the suction flange.
- Electrical feeds to fire pump controllers must have a two-hour fire rating.
- Fire pumps can't be used as pressure-maintenance pumps.
- Variable-speed pumps are allowed by the code.
- Fire pumps need to be installed in a 2-hour rated room.

Avoiding trouble

To avoid problems during the design and installation process, you should always do your homework and consult with the authority having jurisdiction and insurance representative before you begin.

Some jurisdictions have special requirements for fire pumps. For instance, New York City requires a manual round rotor fire pump with every automatic fire pump, and the Ohio EPA requires suction control valves on every fire pump to prevent going below 20 psi in the main. Insurance companies also may have unique requirements that go above and beyond the code. FM Global, for example, requires diesel fuel tanks to be double wall and have a spill basin, and every pump room must have a low pump room temperature alarm.

Knowing these location-specific and unique issues before starting your design will help the process go more smoothly and be more successful. ■

Greg Trombold *has been involved with the plumbing and fire protection industry for more than 20 years, including working with engineers on sizing and selecting equipment, designing the pump and piping layouts for packaged systems, supplying new fire pumps to contractors, assisting contractors with installation of this equipment, starting up the equipment once it is installed, and repairing and servicing all types of pumps in the field. He graduated from Ohio State with a degree in business administration and started with the Trombold Equipment Co. in 1989. He is currently Vice President, Membership of ASPE's Cleveland Chapter.*

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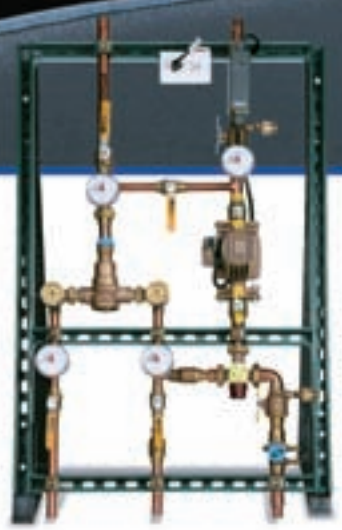

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Circle 45 on Reader Reply Form on page 81

WHAT'S NEW

in the 2012 International Plumbing Code® (IPC)

By Lee Clifton, ICC-PMG,
Director of Plumbing Programs

The IPC continues to emphasize both prescriptive and performance-related provisions. The code changes have made many improvements to the 2012 code that provide clarity of content, resolve common interpretation issues and give plumbing contractors and engineers the tools necessary to take advantage of new technology. A proven venting system method has been added that now compliments the most extensive collection of venting options in the world.

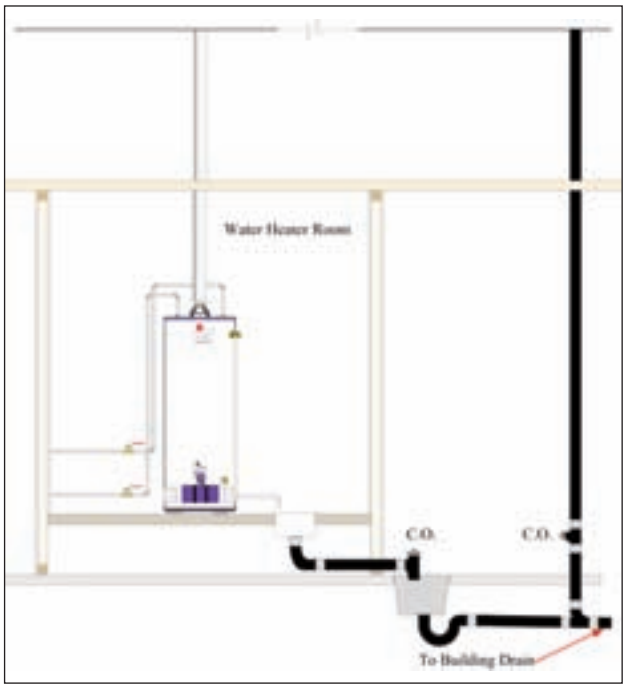
Here are just a few of the significant changes.

Section 802.2 Installation of indirect Waste Piping

2012 Code: 802.2 Installation. All indirect waste piping shall discharge through an air gap or air break into a waste receptor ~~or standpipe~~. Waste receptors and standpipes shall be trapped and vented and shall connect to the building drainage system. All indirect waste piping that exceeds ~~2 feet~~ 30 inches (762mm) in developed length measured horizontally, or ~~4 feet~~ 54 inches (1372mm) in total developed length, shall be trapped.

Exception: Where a waste receptor receives only clear water waste and does not directly connect to a sanitary drainage system, the receptor shall not require a trap.

Commentary: In the past, indirect waste piping was required to be trapped where it exceeded 24 inches in horizontal developed length or 48 inches in total developed length. The justification for increased developed lengths without a trap, 30 inches for a horizontal measurement and 54 inches in total developed length is based on



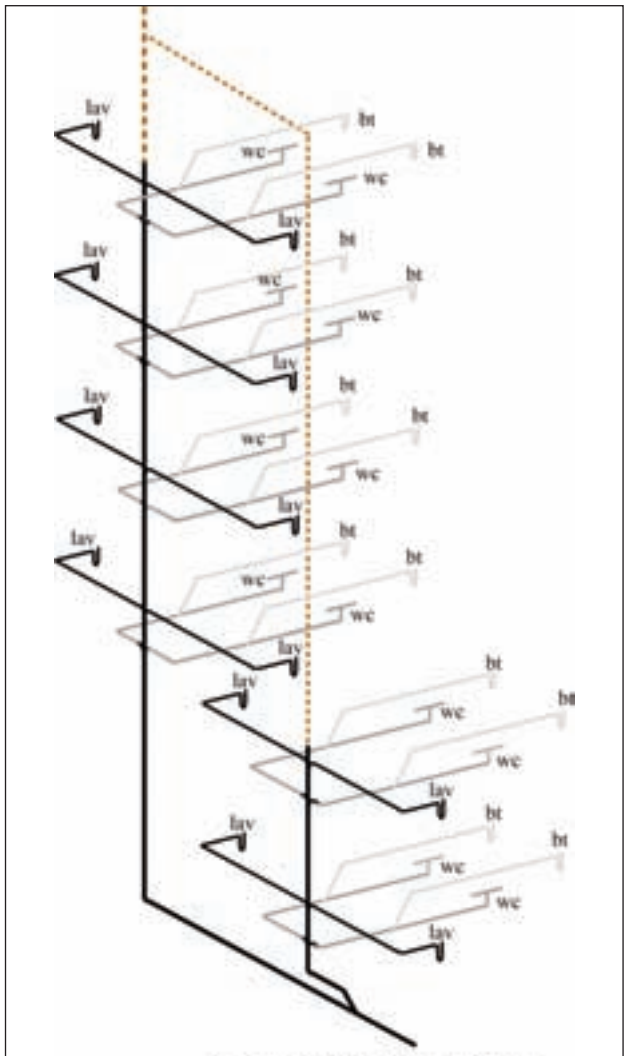
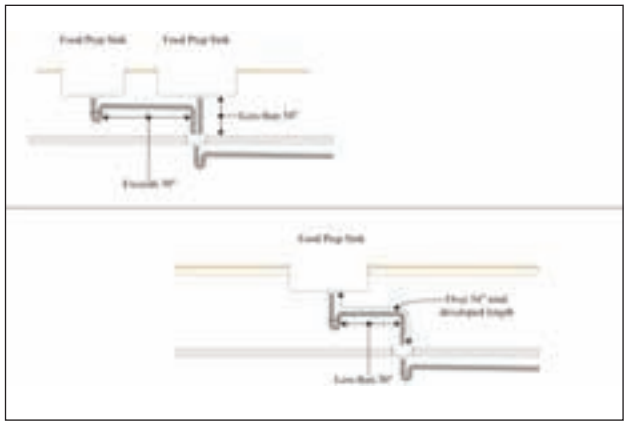


Figure 917 Single Stack System
For a Six Story Building



Section 1002.1 addressing fixture traps, including the allowance of 30 inches center-to-center for a combination fixture as permitted in Exception 2. The 54-inch total developed length allowance is simply the 30-inch horizontal length allowance plus the 24-inch vertical distance allowed from a fixture to its trap. The changes are considered logical and will provide consistency with other allowances in the code. The new exception is fundamental in that traps are unnecessary for clear-water waste in an indirect piping system.

Section 917 Single Stack Vent System

917.1 Where permitted. A drainage stack shall serve as a single stack vent system where sized and installed in accordance with Sections 917.2 through 917.9. The drainage stack and branch piping shall be the vents for the drainage system. The drainage stack shall have a stack vent. (Additional information and sizing table provided in section 917 is not shown here.)

Commentary: In a single stack vent system the drainage stack serves as both a drainage and vent system. The drainage stack and branch piping are considered as vents for the drainage system as a whole. Pipe sizing in a single stack drainage system is larger than in a conventional one; however, a significant cost saving is achieved by the reduction of the vent piping needed. This venting system serves as a viable alternative to the more traditional systems that are being used.

For a more in-depth preview on the significant changes that have occurred to the 2012 International Plumbing, Mechanical and Fuel Gas Codes (PMG), ICC has made available a 20-minute video presentation at youtube.com/user/ICCMEDIA. This overview of changes to the 2012 International PMG Codes will give you a preview of what the *Significant Changes to the International Plumbing Code, International Mechanical Code, and International Fuel Gas Code 2012 Edition* publication has to offer. The webinar will inform code users on how helpful the new book is in identifying the specific code changes that have occurred and, more important, help them understand the reasons behind the changes. ■

The webinar at youtube.com/user/ICCMEDIA will inform code users on how helpful the new book is in identifying the specific code changes that have occurred and, more important, in understanding the reasons behind the changes.

The International Code Council is a member-focused association dedicated to helping the building safety community and construction industry provide safe and sustainable construction through the development of codes and standards used in the design, build and compliance process.

Designing and Specifying Precision High-efficiency Heating Equipment

Plumbing and heating contractor Jerry Davis and mechanical engineer Tim Souza live and work on opposite sides of the country, but they are both strong advocates of proven, compact, high efficiency wall-hung boiler systems. They also share an appreciation for installation training and certification as a key success factor for any mechanical specification.

"We only design and install 90%-plus, propane-fired equipment," says Jerry Davis, vice-president of Dubben Brothers, a hydronic heating contractor and propane supplier operating out of a 106-year-old plumbing hardware store serving the Catskills region of New York state. The firm is in its fifth generation of family ownership, and it still operates out of its original storefront location at 90 Main Street in Delhi, N.Y.

"We have 17 employees, seven of whom are top-notch plumbing and hydronic heating contractors dedicated to the installation and 24/7 repair of heating systems that we design and build ourselves. The bulk of our installation business is the replacement market as well as new second homes for customers from the New York metropolitan area," says Davis, whose firm also often provides advisory services for specifying engineers in the region.

Tim Souza is a principal at TEP Engineering, a Santa Rosa, Calif.-based mechanical engineering firm serving a diverse clientele base throughout the San Francisco Bay Area. His firm includes six mechanical engineers, as well as staff with over 60 combined years of HVAC and plumbing contracting experience.

"We incorporate high efficiency heating and domestic water systems in our project designs and specifications because of the substantial energy savings they produce," says Tim Souza. "They help us meet demanding Title 24 energy compliance and new California green building code requirements. Additionally, the Baxi combi boiler units save precious floor space by combining the hydronic heating and domestic water production into one compact unit."

The similarities and shared values of the two firms also include their preferred high efficiency boiler (Baxi), and what they expect in an installing contractor's qualifications (factory training and certification).

The introduction of higher efficiency and more compact hydronic heating equipment is bringing North America closer to European high acceptance for wall-hung boiler technology. Substantial fuel consumption, utility bill and space savings make fully modulating, condensing wall-hung boilers, such as the Baxi Luna line, a compelling choice for both new home and retrofit applications.

Baxi wall-hung boilers are compact heating appliances that save up to 60% in fuel use and utility bills, cut greenhouse gas emissions up to 90% and free up valuable living space. Baxi boilers are closet-installation approved and are whisper quiet (45 dBa), making them preferred appliances in flood-prone areas. The boilers can be used for infloor radiant, snow melt, heated towel racks and radiators, as well as for forced air (with a hydronic air handler).

"Our supply house in Oneonta (Irr Supply, the exclusive Upstate New York distributor of Baxi products) introduced us to the Baxi high efficiency product line. We were impressed that it was market-tested, and we attended two technical training sessions put on by the manufacturer before making our first Baxi Luna HT combi boiler installation in September 2006.

"Our first Baxi was in a new home built by a European United Nations diplomat," says Davis. "It was an easy sell, as the customer was familiar with the product. We have never had a service issue with this unit."

Over the past six years, Dubben Bros has installed every model of Baxi high efficiency boiler, as well as Baxi solar water heating systems and high output designer radiators.

Tim Souza discovered Baxi heating solutions around the same time as Dubben Bros. did. He has specified Baxi combi boiler for affordable housing authority communities in Santa Rosa, among other projects he is designing and specifying. "The California Energy Code requires that mechanical systems for affordable housing projects beat standard energy code requirements by at least 15%," says Souza. "The Baxi Luna HT 380 combination heating and domestic hot water boiler, for instance, enabled us to beat standard requirements in most cases by 60% for space heating and 45% for domestic hot water."

A leading European heating manufacturer since 1867, Baxi has been at the forefront in developing wall-hung boiler technology over the past four decades and manufactures 4,000 boilers a day for export to 70 countries, including the United States.

Up to 98% energy efficient, the low-NOx Baxi Luna HT light commercial range includes three fully modulating, condensing heating-only models, ranging in high output of

153 MBtu/h and 348 MBtu/h. Twelve Baxi commercial boilers may be strung together, using a staging controller, to produce a total output of up to 4.2 MMBtu/h. System redundancy and impressive turndown ratios make this wall-hung system attractive for commercial applications. Baxi boilers are shipped from the factory set up for natural gas; they are easily converted to propane, using the QAA73 controller made for Baxi by Siemens.

All Baxi boilers are Energy Star rated and CSA approved, and the heat exchanger bears the ASME H-Stamp. The North American line also includes fully packaged residential models (112 MBtu/h down to 32 MBtu/h output), available in combination heating and domestic hot water (Baxi Luna HT 380) or heating-only mode (Baxi Luna HT 1.33). The combi model can heat a home up to 5,000 square feet and produce 3.9 USGPM (at an 80-degree temperature rise).

Baxi engineers have included multiple built-in safety features, including the following: electronic, gradual ignition (no standing pilot light/no open flame); high temperature limit (set with supplied QAA73 controller made by Siemens); flue high limit switch; central heating high limit switch; fan pressure switch; differential pressure switch; flame sensing electrode and a redundant gas valve plunger (that activates if the primary plunger fails); ; back flow prevention devices; Grundfos pump with air vent; expansion tank; frost protection; automatic self-diagnostics and a Legionella prevention function.

"We have not installed any other brand of gas boiler since we switched to Baxi," says Jerry Davis. "We like the product's reliability, versatility for new or retrofit applications, venting options, ease of service, the factory training, product certification and in-market trouble shooting provided by our Baxi reps (J and K Sales). We get good support from Irr Supply, as well as from Marathon International, the North American distributor of Baxi products"

Dubben Bros. staff members are all thoroughly familiar with Baxi products. They have all attended Baxi training and are installer certified, using an interactive Baxi training and certification CD-ROM. In addition, six of the firm's employees have a Baxi installed in their own homes, and others are planning to follow suit.

Tim Souza, a principal at TEP Engineering in Santa Rosa, says, "Efficiency, low sound levels, size, versatility, serviceability and reliability are all key factors in picking the right high efficiency boiler." Jerry Davis of Dubben Brothers in Delhi, N.Y., says his contracting firm only installs Baxi Luna HT high efficiency boilers, and he adds to Tim Souza's list: factory training, product certification and troubleshooting support from the manufacturer and in-market representatives.

"Efficiency, low sound levels, size, versatility, serviceability and reliability are all key factors in picking the right high efficiency boiler," says Tim Souza. "The manufacturer's ongoing support of the product is also essential, notably in a multi-family application. Other important factors include the availability of contractors who are familiar with the product, factory trained and certified for installation and maintenance."

The California Green Building Code (Section 702, Installer and Special Inspector Qualifications) stipulates that "HVAC system installers shall be trained and certified in the proper installation of HVAC systems including ducts and equipment by a nationally or regionally recognized training or certification program." These include manufacturer-approved training and certification programs.

Jerry Davis says his firm believes that any mechanical system specification for a high efficiency boiler system should include a requirement that installing technicians be factory certified in order to bid on a project, "even if that qualification is not a state requirement." To learn more about Baxi products in North America, visit them online at www.wallhungboilers.com. ■

The views and opinions expressed in this article are those of the contributor and do not necessarily reflect a position of ASPE.

KAUST under construction

King Abdullah University of Science and Technology (KAUST) near Jeddah, Saudi Arabia, combines several planning and design elements to achieve greater sustainability. The university's new campus was constructed on a 22-mile (36 km) stretch of desert 50 miles (80 km) north of Jeddah along the Red Sea. The campus is part of a larger master plan, which includes a new town of 10,000 to 12,000 people that surrounds and supports the university.

KAUST was designed to propel the Kingdom into the 21st century, with modern teaching facilities and equipment costing $1.5 billion. The university's mission is to advance science and technology to new levels by educating tomorrow's leaders, while catalyzing the diversification of the Saudi economy and addressing challenges of regional and global significance

All campus buildings meet the strict ASHRAE Standard 55-Thermal Environmental Conditions for Human Occupancy, guaranteeing that interior temperatures and humidity will remain at comfortable levels. To help meet the campus's unique HVAC needs that result from the extreme climate in the region, as well as from some very demanding system challenges, Xylem recom-

KAUST has propelled the Kingdom into the 21st century, with modern teaching facilities and equipment costing $1.5 billion.

mended Bell & Gossett Series VSX double-suction, split-case pumps.

The VSX pumps met and/or surpassed a long list of demanding application requirements, including a minimum specification for 80% efficiency. The requirements also set strict guidelines for Net Positive Suction Head (NPSH) and identified limited space areas that required small pump footprints. VSX pumps were chosen because of their proven vertical split-case (VSC) platform that features vertical-suction and discharge flanges that reduce equipment footprint by up to 40% compared to many horizontal double-suction and large inline pumps.

A total of 27 large series VSX VSC model and VSH model pumps were installed throughout the campus. With motors ranging from 300 to 1000 hp, the installed equipment included:

- Nine VSX-VSC 14 × 16 x 22A, 7,500 gpm/130 ft. with 300 hp, 4160V/60/3, TEFC, 1200 rpm motors;
- Nine VSX-VSC 12 × 14 × 22A, 7,500 gpm /380 ft. with 900 hp, 4160V/60/3, TEAAC, 1800 rpm motors; and
- Nine VSX-VSH 16 × 18 × 19A, 15,000 gpm /196 ft. with 1000 hp, 4160V/60/3, TEAAC, 1800 rpm motors.

As a result of its revolutionary design, the VSX platform offers many installation options. Using CFD technology, the VSX delivers identical performance in any of its three flange configurations, which allows users to maximize piping possibilities and meet a broad hydraulic range for chillers, towers, distributive and general pumping requirements.

Coordinating the design and installation of the KAUST HVAC system was a team effort between engineers, contractors and the Bell & Gossett representatives in Saudi Arabia, who worked to supply specialized drawings, weekly progress and production schedules, vibration monitoring and compliance with industrial specifications.

The massive project started in the fall of 2006 and was finished in just three years. To achieve this ambitious timetable, planning groups accelerated the process with a "Racing the Sun" design, in which HVAC professionals from ten offices across multiple time zones contributed to the planning effort during just one 24-hour period.

The Bell & Gossett VSX pumps helped King Abdullah University of Science and Technology meet its requirement for 80% efficiency pumps, as well as solve many installation challenges. As a result, KAUST students study in a comfortable environment, and the university is able to achieve its mission to advance science and technology to new levels in the region. ■

The views and opinions expressed in this article are those of the contributor and do not necessarily reflect a position of ASPE.

Product News

Plumbing Engineer's Product of the Month

Condensate neutralizer

Select states require condensate from condensing appliances to be treated before passing into a public sewer system. This condensate neutralizer accessory provides installers with an effective way to eliminate acidity from the condensation that is drained from a condensing boiler or condensing tankless unit. The easy-to-install feature works by running the condensation through a container filled with limestone media, which raises its pH level to make the liquid less acidic, resulting in neutral water that can be drained directly from the unit. Designed for both vertical and horizontal mounting, the condensate neutralizer's user-friendly clear capsule design allows homeowners to see when the limestone media needs to be replaced. **Rinnai.**

Circle 100 on Reader Reply
Form on page 81

Solar thermal storage tank

The Strato-Therm+ solar thermal storage tank is designed to provide a simple, cost-effective means of integrating solar energy into any application. Strato-Therm+ offers the functionality of a solar thermal storage tank, indirect water heater and hydronic buffer tank in a single, space-saving unit. Equipped with a solar heat exchanger connected to the storage vessel and a corrugated stainless steel coil within the tank, the advanced new Strato-Therm+ maximizes heat transfer in a solar thermal system and increases collector performance. **Lochinvar.**

Circle 103 on Reader Reply
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Eye/face wash

The HALO eye/face wash provides the most effective emergency relief available. HALO technology covers 85 percent of the face and provides 20 percent better protection than any other eye/face wash. An exclusive self-draining feature removes standing water from the sprayhead. **Bradley Corp.**

Circle 101 on Reader Reply
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915 Shark Series grinder system

Preassembled grinder system — complete with alarm and check valve — is designed for new construction, retrofits and replacements. Utilizing our new and unique Tri-Slice™ cutter, this small yet extremely powerful ½ HP, 115 V grinder system provides over 250,000 cuts per minute and significantly eliminates the maintenance and clogging worries associated with other grinder and sewage ejector systems. **Zoeller.**

Circle 102 on Reader Reply
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Solar circulators

Although the SOLAR series is designed for the lower flow rates that are common in residential and light commercial solar thermal applications, they provide high efficiency performance regardless of flow/head rate. The Grundfos SOLAR class operates efficiently at flow rates between 0.5 – 40 gallons per minute or gpm, with head rates up to 47 feet high – typical ranges for residential and light commercial forced circulation solar systems. **Grundfos.**

Circle 104 on Reader Reply
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High-efficiency toilet (HET)

The Huron HET offers a unique space-saving shape in a floor-mount, rear-outlet design. Measuring a scant 24½ inches from the wall, nearly four inches shorter than a standard toilet, the Huron toilet combines leading HET performance and product features not traditionally available to commercial specifiers. The sturdy floor-mount design is ideal for institutional and healthcare/bariatric applications, while its Right Height® rim measurement of 17¼ inches makes it a solid choice for accessible and ADA-compliant installations. The high-efficiency, low-consumption toilet utilizes between 1.1 and 1.6 gpf, while offering direct-fed siphon jet action. **American Standard.**

Circle 105 on Reader Reply
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Replacement cartridge

The new brass shell Posi-Temp® cartridge is a heavy-duty replacement for all of Moen Commercial's shower systems. It features superior durability, exceptional strength and resistance to heat. The large, custom-seal design prevents freeze-up in the valve body, so the cartridge can be easily serviced. Best of all, it is compatible with IPS, CC, PEX or CPVC inlet connection options. **Moen Commercial.**

Circle 106 on Reader Reply
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Commercial plumbing fixture catalog

A new comprehensive catalog has been introduced, featuring the company's extensive line of commercial products. The 206-page catalog is designed to make it easy to find the right faucet, fitting or component for any application. Count on Chicago Faucets to provide durable, high performance plumbing fixtures for your entire facility. **Chicago Faucets.**

Circle 107 on Reader Reply
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Circuit Sentry Flo-Setter™

New energy saving balancing valve maintains the set flow rate within +/-5%, regardless of pressure fluctuation in the system. The Circuit Sentry Flo-Setter features a new easy-to-set GPM dial that requires no adjustments once it is set, even if the system is changed. The Circuit Sentry Flo-Setter valve is easy to install and maintains set flow rate even when installed next to a pipe bend or fitting. The easy-to-read gallons per minute scale on the lockable handle ensures that the flow setting is simple and user-friendly, while the integral P/T plugs allow verification of required differential pressure. **Bell & Gossett.**

Circle 108 on Reader Reply
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Infrared cameras

Next generation FLIR i-Series point-and-shoot infrared cameras feature higher resolutions and wider field-of-

view choices. Three rugged models that help you find problems faster and more accurately. New performance options include the upgraded i7 with 36% more thermal imaging resolution than before. In fact, at 19,600 pixels, the i7 actually exceeds RESNET resolution standards — important if you're in the building industry. **FLIR Systems.**

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Classifieds

Letters *Continued from page 82*

Code (IFGC) in this case. Specifically, when it comes to the requirements regarding the installation of gas-fired appliances and equipment, the IMC defers to the IFGC, as noted in Section 301.3 (shown below):

Fuel gas appliances and equipment. The approval and installation of fuel gas distribution piping and equipment, fuel gas-fired appliances and fuel gas-fired appliance venting systems shall be in accordance with the International Fuel Gas Code.

Depending on the local jurisdiction, the operative code is the IFGC or the National Fuel Gas Code (NFGC). Both codes do allow and address the use of non-metallic vent systems. The discussion about possible conflicts with the IMC is irrelevant and incorrect.

Using PVC pipe to vent a gas-fired appliance that has not been safety certified for use with that non-metallic vent system is an improper, potentially unsafe installation. From the perspective of providing a safe installation, it is no different than the situation in which an appliance that specifies a 6" minimum clearance from combustibles is actually installed with only 1" of clearance from plywood panel. This does not mean that the appliance should not be installed in a room that has plywood walls. It does mean, as stated in the IFGC or NFGC, that the appliance must be installed in accordance with its listing and the manufacturer's installation instructions.

With regard to the specific subject of PVC pipe, the article notes that there is "No standard referenced in any of the codes in the United States for a plastic flue vent for combustion flue gas piping…." This carefully worded statement may be true, but it does not accurately reflect the current situation regarding standards for vent systems. Both the NFGC and the IFGC state that, "Plastic pipe and fittings used to vent appliances shall be installed in accordance with the appliance manufacturer's installation instructions." As noted, the certification and listing of gas-fired appliances to nationally recognized safety standards includes the specification and review of the installation instructions provided with the appliance. So, although the NFGC and IFGC may not specifically identify a standard for plastic vent type, they do reference standards that evaluate and certify the use of plastic vent systems on gas-fired appliances and equipment.

Sincerely,
Frank A. Stanonik
Chief Technical Advisor
Air-Conditioning, Heating and Refrigeration Institute

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Letters to the Editor

Is PVC an acceptable vent material for flue gases?

Dear Editor:

The reference article, "Is PVC an acceptable vent material for flue gases?" (May 2011 Plumbing Engineer) identified several important issues regarding the safe and proper venting of gas appliances. The one area that the article did not address adequately is the requirements contained in nationally recognized gas appliance safety standards covering the listing of appliances for use with non-metallic vent systems. With a proper understanding of the requirements of these appliance safety standards, it becomes clear that the answer to the question posed by the article is, "Yes, PVC is an acceptable vent material if the appliance has been safety certified and listed for venting with PVC."

Although no U.S. PVC pipe manufacturer recommends the use of their PVC pipe for venting gas appliances, it should be recognized that, from the perspective of the PVC pipe, both hot air and hot water are fluids that share the same basic characteristics of fluid dynamics. A Btu in heated air is the same as a Btu in heated water. The temperature limits specified for PVC concern just temperature; it makes no difference whether the fluid being conveyed in the pipe is hot water or hot air. If the temperature limit is not exceeded, the pipe will maintain its structural integrity. If a gas appliance has been safety certified for use with a non-metallic vent system using any Z21 series safety standard, its design will have been tested to verify that the vent material temperatures have not exceeded the following:

Material	Heat Deflection Temperature °F (°C)	Reference Standard**
PVC	158 (70)*	ASTM -F891, ASTM-D2665 or CSA B181.2, ASTM-D1785 or CSA B137.3, ASTM-D2241 or CSA B137.3
CPVC	212 (100)*	ASTM-D2846 or CSA B137.6, ASTM-F441 or CSA B137.6, ASTM-F442
ABS	180 (82)*	ASTM-D2661 or CSA B181.1, ASTM-F628

* Based on Heat Deflection Temperature (ASTM-D4396, -D1784, -D3965 referenced in above ASTM's: HDT @ 264 psi).

** The reference standards address specific pipe types using the material.

The heat deflection temperature is the temperature at which the material will start to deform. It is the more appropriate parameter to describe the plastic material's resistance to heat. The maximum operating temperature specified for plastics focuses on the reduction of the pressure rating of the pipe as temperature increases. The heat deflection temperature limits listed in the table are based on a pressure of 264 psi. Residential water systems have a pressure of about 40 psi. In contrast, the pressure of the vent gases from gas appliances is on the order of inches of water column, i.e., a fraction of 1 psi. So, as far as this aspect is concerned, vent gases from gas appliances do not pose any issue for PVC.

For gas-fired water heaters, this test is conducted under the extreme operating condition of the thermostat set at its highest setting and a flow rate that allows continuous operation. The water heater is installed in a closet or alcove with the minimum installation clearances and the maximum-length vent systems. The dilution air supplied at the draft hood or power vent blower, as applicable, is restricted. The water heater is operated under these conditions until either the temperature of the vent material reaches equilibrium or the water heater shuts down. If it continues to operate until the temperature of the vent material reaches equilibrium, the material temperature is measured and it cannot exceed the applicable value noted above. If the water heater has a control system that shuts it down, that action shall occur before material temperature exceeds the values shown above.

A fundamental principle to promote the safe operation of gas-fired equipment is that the equipment, which has been certified for compliance with the applicable safety standard, be installed in accordance with the installation instructions provided. The adequacy and accuracy of the installation instructions are evaluated as part of the equipment's safety certification.

With regard to the venting system to be used with the equipment, the safety standard includes tests to determine the vent system(s) that are appropriate for the model. The installation instructions must then specifically identify the vent system that the equipment is listed to use. In those cases where the model is approved for vent systems other than Type B vent, the manufacturer must either supply the vent system required to be used with the equipment or clearly identify and specify the use of the vent system parts.

The gas industry — both manufacturers and utilities — take the safety of gas appliances very seriously, more so than any other group in the United States. If an appliance has been safety certified to the applicable nationally recognized safety standard, the specifications for safely and properly venting that appliance (e.g. size of vent, vent material and length of vent system) are a part of that certification. If the appliance is installed in accordance with the installation instructions, the vent installed on that appliance is acceptable and safe.

The reference article does not specifically discuss whether the appliances cited as examples were installed in accordance with their safety certification. If those appliances were installed with vent systems not specified in the installation instructions (i.e., that were not part of the model's safety certification), the assurances provided by the safety certification and listing have been compromised.

The article expresses concern regarding an increase in flue gas temperatures due to scale buildup in the tank. While the scale has different heat transfer characteristics than steel, it is not an insulator. Also, in the case of gas storage water heaters that have one or more flue tubes that transfer heat to the water, the scale that forms generally collects at the bottom of the tank. Therefore, the heat transfer that occurs through the flue tube(s) is not significantly affected by that scale buildup.

As an aside, there are manufacturers of PVC pipe in Canada that have the products certified to ULC S636. To the best of our knowledge, that listed PVC gas vent system product is no different in composition and structure than the "regular" PVC pipe sold by those companies.

The article mischaracterizes the relationship of the International Mechanical Code (IMC) to the manufacturer's installation instructions for gas-fired appliances and does not acknowledge the preeminence of the International Fuel Gas

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