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Plumbing Engineer

A TMB Publication

August 2011

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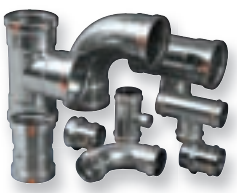

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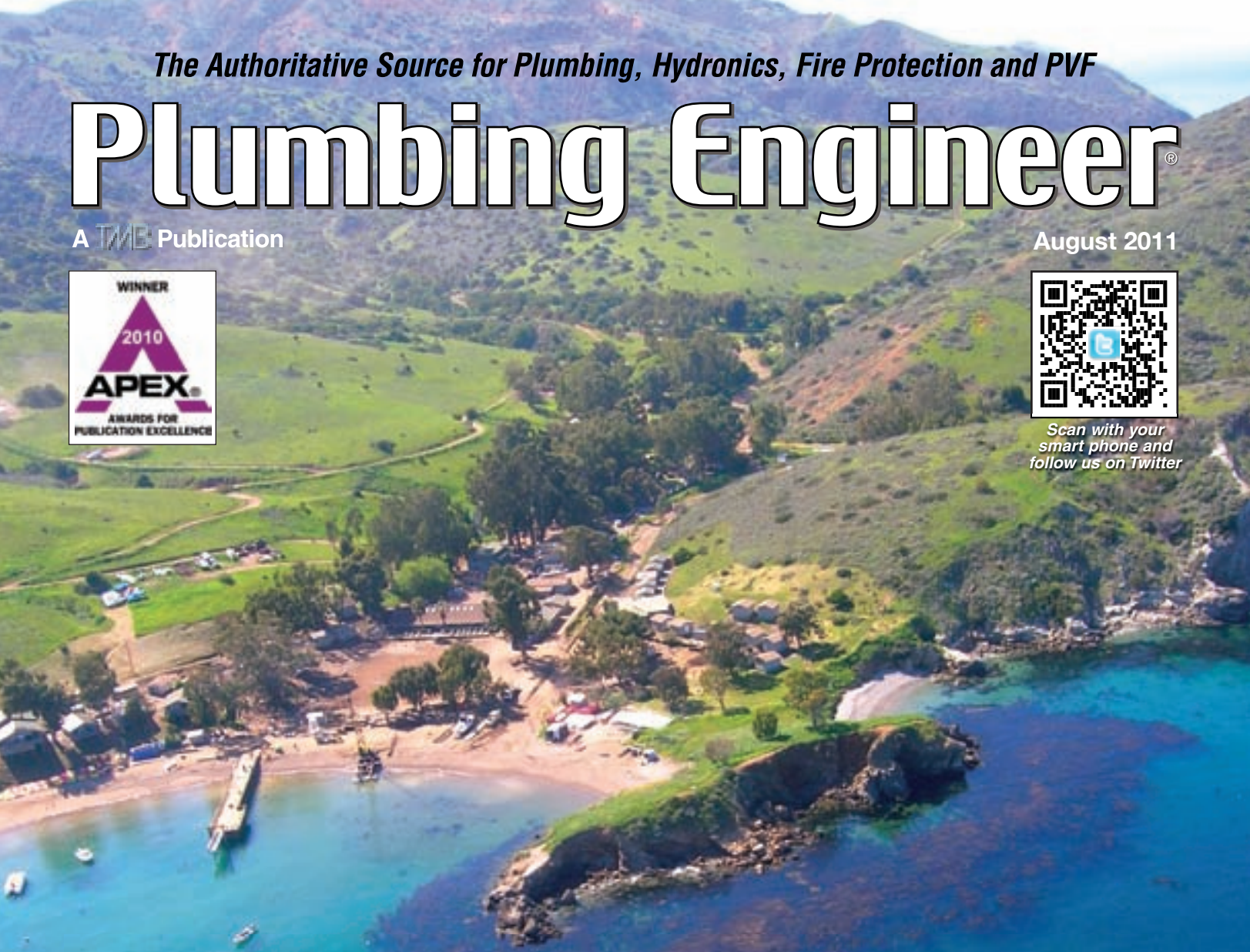

Beyond Greywater

On-Site Wastewater Treatment at Emerald Bay

ALSO INSIDE:

- Finely-tuned Hydronic Systems: Sum of Many Parts
- Tankless is More: Exploring the Benefits
- Q&A with Noble Company's George Rudolph
- Loose the Tank, Save the Energy

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U.S. Fire Administration Report on School Fires, August 2007, Vol 8, Issue 1 findings.
*Average per year

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- ADA 4.19.4, ICC/ANSI A117.1, ADAAG 606.5
- International Building Code (IBC) Chapter 8
- General Services Administration (GSA) P-100
- 2009 US Army Corps of Engineers/Military Facilities Specification (ASTM E84)
- IAPMO PS94 2008 Sec. 3.5 ASTM E84 25/450 Testing

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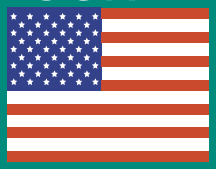

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Plumbing Engineer
A TWB Publication

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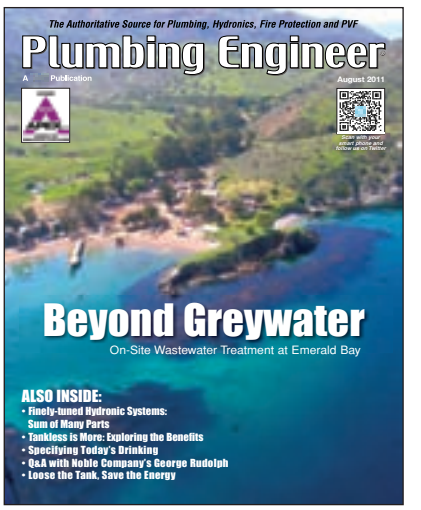

Cover photo courtesy of Richard Hammond

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Editor's Letter

John Mesenbrink, editorial director
editor@plumbingengineer.com

Understanding QR codes

Have you heard of QR codes yet? Here is a quick introduction: You may have seen them in a magazine ad here in the pages of *Plumbing Engineer*, on a billboard, a web page, even on the front cover of the very magazine you hold in your hands now.

They come to us from Japan where they are very common. QR is short for Quick Response (they can be read quickly by a smart phone). They are used to take a piece of information from a transitory media and put it in to your smart phone. Once you have scanned the barcode-like image with your phone's built-in camera and a specialized app, it may give you details about that business in the ad, or details about the person wearing an item of clothing in a catalog, display a URL that will take you to a movie trailer, or it may give you a coupon that you can use at a retail outlet.

Scan this QR code with your smart phone to visit plumbingengineer.com

However, unlike a standard barcode, QR codes store (and digitally present) much more data, including URL links, geo coordinates, and text. The other key feature of QR Codes is that instead of requiring a chunky hand-held scanner to scan them, just about any modern smart phone with access to Apple's App Store or the Android Market can scan them.

In the case of *Plumbing Engineer*, we're utilizing them in some very unique ways. On this month's cover wrap you've no doubt seen the QR code just below the magazine logo. Scanning it with your smart phone will allow you to quickly and easily update your magazine subscription. On the actual front cover of the magazine you may have noticed another QR code with the Twitter logo embedded within the center. Scanning that will take you right to the *Plumbing Engineer* Twitter feed (twitter.com/plumbingeng) where you can stay updated to all of the latest happenings within the industry. Lastly, the QR code that runs in-line with the text of this column will take readers directly to the home page at plumbingengineer.com.

QR codes are becoming very common here in the United States as Americans become increasingly more reliant on their mobile devices. These squares of elaborately arranged boxes are so easily integrated with various services that many of our advertisers have figured out QR codes are their best friends, and we hope you'll feel the same way as *Plumbing Engineer* continues to use them as a way to interface more efficiently with readers. ■

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Editorial, Advertising, Production, Accounting and Administrative Offices

2165 Shermer Rd., Suite A
Northbrook, IL 60062
(847) 564-1127 • Fax: (847) 564-1264
E-mail: *info@tmbpublishing.com*

Owner
Tom M. Brown

Editorial & Production Staff
John Mesenbrink, *Editorial Director*
Marilyn Cunningham, *Associate Editor*
Cate C. Brown, *Production Manager*
Mark Bruno, *Art Director/Prepress*

Contributors
Timothy Allinson, P.E., *Designer's Guide*
Sam Dannaway, *Fire Protection*
Ron George, CPD, *Code Classroom*
John Abularrage, *Hydronics*
Bob "Hot Rod" Rohr, *Green Systems*
Bristol Stickney, *Solar Solutions*

Sales Staff
Brad Burnside, Publisher
East
2165 Shermer Rd, Suite A, Northbrook, IL 60062 Phone: 847/564-1127
Cell: 224/659-3984
Fax: 847/564-1264
E-mail: brad@tmbpublishing.com

David Schulte
Midwest, South and E. Canada
2165 Shermer Rd, Suite A, Northbrook, IL 60062 Phone: 847/564-1127
Cell: 847/420-4686
Fax: 847/564-1264
E-mail: dave@tmbpublishing.com

Diane Spangler
West, Texas and W. Canada
PO Box 9802, Fountain Valley, CA 92728 Phone: 714/839-6700
Fax: 714/839-6777
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Industry News

Leading North American plumbing organizations come together

CHICAGO — For the first time, leading North American plumbing organizations came together on June 7, 2011, to discuss current issues impacting the plumbing community. Stakeholders represented included plumbers, contractors, engineers, inspectors, code officials, standards development organizations and manufacturers. The meeting was facilitated by the American Society of Plumbing Engineers (ASPE) and was held at the Alliance for Water Efficiency (AWE) facility in Chicago.

The key issue discussed by the group was a presentation on electronic (hands-free) faucets provided by Johns Hopkins University staff at a recent national conference and the subsequent media coverage. During the June 7 meeting, the participants reviewed the Johns Hopkins presentation, based on the limited public information available and also heard presentations from the following: Dr. Paul Sturman, PE, from the Center for Biofilm Engineering at Montana State University, who spoke on biofilms; Doug Erickson from the American Society for Healthcare Engineering (ASHE), who discussed the status of a project that is surveying hospitals on their use of electronic faucet systems and Jim Mann, executive director of the Handwashing Leadership Forum.

The following conclusions and recommended actions resulted from the meeting:

• The use of electronic faucets provides significant benefit by reducing the potential of cross-contamination from faucet handles to healthcare providers' hands.

• Broad industry participation (manufacturers, engineers, subject-matter experts and installers) early in any research process would enhance the research regarding accuracy and results.

• As no one in the group had seen the actual study, additional information is needed concerning the results presented by Johns Hopkins, and the group agreed that outreach should continue. Questions prepared by the group will be provided to Johns Hopkins, along with an invitation for them to participate with the group in further research and data collection.

• Full support was given to the position statement recently published by ASHE and the Association for Professionals in Infection Control and Epidemiology (APIC).

• The ASPE Research Foundation will coordinate research projects designed to address questions raised by the Johns Hopkins presentation.

• A separate position statement on the use of electronic faucets will be developed by the group for future release.

There is tremendous value in bringing together stakeholders to discuss important industry issues. While this meeting was the first of its kind, it will not be the last, as significant benefits resulted from cross-industry communication on the issue.

"No matter what area of the plumbing community meeting attendees represented, there was one common focus from all: a commitment to providing plumbing systems that help protect public health and safety," stated Jim Kendzel, MPH, CAE, executive director/CEO of ASPE. "It is our hope that this highly successful meeting will become a foundation for future positive, interactive dialogue among those groups directly impacting plumbing in North America."

Organizations represented at the meeting included:

• Alliance for Water Efficiency
• American Backflow Prevention Association
• American Society of Plumbing Engineers
• ASPE Research Foundation
• Canadian Institute of Plumbing and Heating
• Canadian Standards Association
• International Association of Plumbing and Mechanical Officials
• International Code Council
• Mechanical Contractors Association of America/Plumbing Contractors of America
• NSF International
• Plumbing Contractors Association of Chicago and Cook County
• Plumbing Manufacturers International
• Plumbing-Heating-Cooling Contractors Association
• Underwriters Laboratories

AO Smith buys boiler maker Lochinvar for $418M

FROM THE ASSOCIATED PRESS — MILWAUKEE — Water heater maker A.O. Smith Corp. will acquire boiler maker Lochinvar Corp. for $418 million.

The deal does not include the privately held company's existing debt, A.O. Smith said. The deal should add to A.O. Smith's profits by 10 cents per share starting in the fourth quarter, except for one-time accounting charges related to the purchase, and 40 cents to 50 cents per share in 2012.

Lochinvar makes high-efficiency boilers used for commercial and residential heating and hot water use.

The deal is expected to close in the third quarter of this year.

Chairman and CEO Paul W. Jones said buying Lochinvar fits with his company's strategy "to expand our core product offering with new technologies, which emphasize high-efficiency products that can be applied globally."

He said the deal is a "significant first step" in the growth of its water heating business and using the cash from selling its electrical products unit.

Lochinvar had sales of $200 million for the year that ended June 30, A.O. Smith said. Its manufacturing and

More Industry News on page 10

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engineering operations are in Tennessee. The deal also includes Lochinvar's subsidiary in the U.K.

Sloan first manufacturer to receive IAPMO Green Certification for commercial plumbing systems

FRANKLIN PARK, ILL. — Sloan high-efficiency toilets (HET) and high-efficiency urinals (HEU) are now certified under the new IAPMO R&T Inc. Green Certification program. Sloan is the first manufacturer to earn this certification for non-residential, commercial plumbing products. In addition to its vitreous china HETs and HEUs, the new HMA7000 model of the AQUS® water reuse system for residential and light commercial projects is also certified.

The Green Certification program identifies and tests products that are water-efficient, based on water use reduction when compared to the water use baseline indicated in each specification. It will be helpful for contractors, building inspectors, architects and other professionals who currently have to wade through many types of green rating systems and standards in the industry.

The listing shows the Green Certified Sloan plumbing products to be compliant with any or all of the following:

- 2010 California Green Building Standards
- IAPMO Green Plumbing and Mechanical Code Supplement
- Green Building Initiative's Green Globes®

IAPMO's green supplement incorporated as within Plumbing Code

ONTARIO, CALIF. — The plumbing provisions of the IAPMO Green Plumbing and Mechanical Code Supplement (GPMCS) will be included as an Appendix to the 2012 edition of the National Standard Plumbing Code, published by the Plumbing Heating Cooling Contractors (PHCC) – National Association.

The National Standard Plumbing Code committee voted unanimously to incorporate the provisions from the GPMCS, in order to provide a needed resource to plumbers, engineers, installers, contractors and code officials tasked with designing, installing, inspecting or adopting sustainable plumbing systems. The New Jersey PHCC chapter and the New Jersey chapter of the American Society of Plumbing Engineers offered testimo-

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Continued from page 10

ny in support of the proposed change.

The GPMCS was developed as a tool to be used as an overlay to any plumbing code, including the NSPC. It provides code officials with comprehensive and progressive enforceable green code provisions that help eliminate baseline code barriers and provide the critical information needed to assure that the sustainable construction practices being incentivized by green rating programs, such as USGBC's LEED and Green Building Initiative's Green Globes, are safe and reliable. Hence, the incorporation of the GPMCS into the NSPC Appendix precisely fulfills the vision IAPMO stakeholders embraced while developing the GPMCS.

"The building codes are perhaps the biggest hindrance to the construction of green buildings," said Dave Viola, IAPMO director of special services and staff liaison to the Green Technical Committee (GTC) that developed the GPMCS. "The NSPC committee took a huge step in eliminating these barriers by making available to NSPC code users the very best in sustainable plumbing code provisions."

With the addition of the GPMCS, the 2012 NSPC will contain energy and water conservation measures, efficient hot water system design criteria and provisions addressing the safe design, installation and maintenance of alternate water source systems, including harvested rainwater, graywater and reclaimed water for commercial and residential buildings. The NSPC is adopted and enforced in the States of Maryland and New Jersey.

Fire Protection Research Foundation names award winner

WASHINGTON — The Fire Protection Research Foundation, (FPRF), an affiliate of the National Fire Protection Association (NFPA), has announced that the 2011 Harry C. Bigglestone Award for Excellence in Communication of Fire Protection Concepts is going to Robert Jansson and Lars Borstrom for their paper, *"The Influence of Pressure in the Pore System on Fire Spalling of Concrete."*

Grundfos partners with Cleantech Open

REDWOOD CITY AND FRESNO, CALIF. — The Cleantech Open (www.cleantechopen.org), announced that Grundfos, one of the world's leading pump manufacturers, is providing expertise and, potentially, capital

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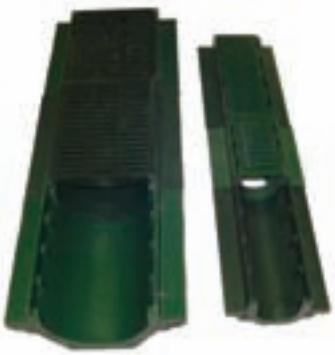
JOSAM

Diverse Conditions Require Diverse Materials

SMC/GRP
4", 8" and 12" widths
With and Without Slope



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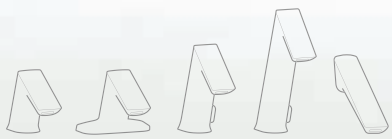

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SLOAN®

Designer's Guide

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

Some call me Tim?

If you are a fan of Monty Python you might recognize this title quote as a line from *The Holy Grail*. It's the scene where King Arthur and his knights stumble across a wizard with the gift of throwing fireballs to explode trees.

Arthur: *What manner of man are you that can summon up fire without flint or tinder?*

Tim: *I... am an enchanter! (As he explodes another tree)*

Arthur: *By what name are you known?*

Tim: *There are some who call me... Tim...*

Arthur: *...greetings, Tim the Enchanter.*

On the UK release of the DVD the actors explain that "Tim" was intended as a particularly unlikely and un-menacing name for such a powerful wizard, but in an interview with Shaun Micallef in 2007, John Cleese claimed that "we chose 'Tim' to annoy Tim Brooke-Taylor."

Whatever the reason, I have a handful of special friends who, as a result of that film, call me The Enchanter.

So, what does this have to do with plumbing, you might rightfully ask? Well, memories of that film got me thinking about *Rudolph the Red-nosed Reindeer*, and the elf who wanted to be a dentist. For some reason I thought the elf character in *Rudolph* was also named Tim, but research corrected my memory: He was actually named Hermey — an even more innocuous name than Tim, if ever there was one.

So, the reason I was thinking about Tim and Hermey and dentists was because I recently faced the challenge of designing a dental facility for one of my projects, and it has been an educational adventure.

Dental facilities are a niche of NFPA that is poorly defined, so the design parameters are difficult to embrace. The basic requirements of any dental facility, as anyone who has ever been to the dentist could guess, are compressed air, vacuum and water. For those of us who visit "happy dentists," there is an element of nitrous oxide involved as well.

Things get a little more complicated when the dental suite is part of a major hospital, which includes dental surgery, as well as the standard dental treatment rooms (DTRs). The typical DTR has DCA (dental compressed air) and DLV (dental low vacuum) provided to the dental chair from the floor below. Often air and vacuum are also provided, on a console behind the dental chair as well for the use of the assistant. Dental chairs also have water, but, since the water must be completely pure, most chairs have a bottle of distilled water mounted to them that is pressurized with the dental air. Take a look next time you go to the dentist. This is done in lieu of relying on a central treated water system that may or may not be of sterile quality.

The dental air provided to the chairs is furnished with the same type of compressors that would provide medical compressed air, except they operate at 95 psi rather than 55 psi. This air is used to power the dental tools and is not intended for respiration, although it is of respiratory quality.

The dental low vacuum is provided by pumps that are somewhat specialized in nature. Most medical equipment vendors do not supply dental vacuum pumps because of their unique requirements; a specialized manufacturer must be sought. Dental low vacuum operates between 6" and 8" Hg, rather than the 15" to 19" Hg of medical vacuum (hence the name dental low vacuum). The system is considered a wet vacuum — piping must slope to the source to allow for drainage. The vacuum pumps must include an amalgam separator as well as a receiving tank that collects the waste water from the system. This separator has a washdown cycle that automatically cleans the tank during off hours.

Major dental suites also include dental surgical treatment rooms and oral surgery rooms. Surgical treatment is similar to a DTR with the addition of a surgical boom that has all the medical gases you would provide in an operating room (i.e. medical air, oxygen, medical vacuum, nitrous oxide, WAGD and nitrogen). Oral surgery has all of these same services, except the dental chair is usually replaced with a surgical table.

Other provisions in a major dental suite are for dental prosthetics, or tooth replacement, and the associated dental prosthetics lab, where the artificial teeth are made. The dental prosthetics room is similar to a DTR, with the addition of fuel gas to fire small ovens for fabricating teeth. The lab also requires fuel gas, for the same reason, on a grander scale, as well as laboratory air at the various technician stations.

Since dental compressed air is not used for respiration, the same air can be used for laboratory purposes, but the piping system should be a dedicated one, with isolation valves at the compressor source to differentiate the two systems.

The dental lab will also include a sterilizer for cleaning the dental tools. Typically, these sterilizers require treated water from the central treated water system, if one is available. Otherwise, a local treatment system should be provided.

Sizing of the dental air and vacuum systems is similar to sizing medical air and vacuum, except the flow rate of the DLV system is greater than its medical vacuum counterpart. Typically, each dental chair should be provided with 7 SCFM of vacuum, with little or no diversity, depending on the size of the system and the nature of the facility. If it is a small facility with one dentist and several chairs, you might be able to apply a diversity, but take care, since the dentist will likely have hygienists who could be using the dental vacuum while the dentist is with another patient. Most of the dental vacuum pump manu

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GRUNDFOS

Code Classroom

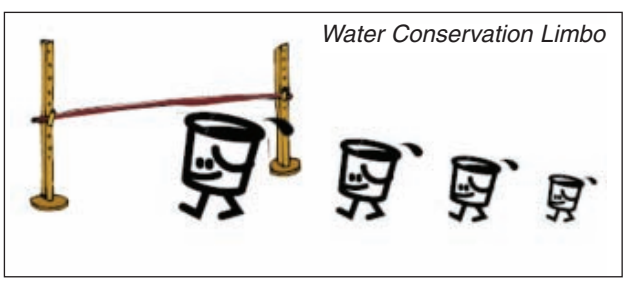
Ron George, CPD
President, Plumb-Tech Design & Consulting Services, LLC

Water conservation research and legislative news, Part I

Numerous plumbing and conservation groups are working to conserve water and energy. Researchers have tested many models of water closets for their ability to flush the bowl contents and transport them at least 40 feet down the drain, in accordance with the ASME A112.19.2-2008/CSA B45.1-08 Ceramic Plumbing Fixtures standard. Maximum performance testing was developed to assess which water closets performed satisfactorily in the late 1990s, and testing has been updated in recent years. Information on the maximum flushing performance testing results can be found at www.map-testing.com/info/designers.html.

Several water conservation-minded organizations have joined forces to make sure that water use reductions are made with an eye on the big picture. We seem to be in a water reduction limbo, with many water and energy efficiency programs simply focusing on points for water use reduction, with no regard as to drainage system solids transporting performance at lower flow rates. Research is needed to determine the minimum flow rate to effectively transport solids down the drain line for each pipe size and slope. For this reason, several years ago I added the slogan, "Save Water Wisely" to the bottom of my emails.

Many states have arbitrarily selected water use reduction numbers based on goals in the green or sustainability programs offering points for water use reductions: LEED offers points for various 10 percent water use reduction increments. Many politicians who want to be perceived as forward thinking and environmentally friendly have proposed legislation to further cut water consumption by various plumbing fixtures in the year 2014 in California and Texas. It is like the 1992 Energy Policy Act all over again: Politicians are mandating water reduction goals that were chosen without testing or research to show whether those flow rates are attainable or sustainable.



Water Conservation Limbo

Plumbing Efficiency Research Coalition

The American Society of Plumbing Engineers (ASPE) has joined the Plumbing Efficiency Research Coalition (PERC), which now has six member organizations. The coalition was founded in 2009 to develop research projects that will support the development of water efficiency and sustainable plumbing products, systems and practices. The goal is for projects to be financed through government grants, foundations and private financing.

The representatives of each of PERC's member organization are: Jim Kendzel, executive director/CEO of ASPE; Mary Ann Dickinson, Alliance for Water Efficiency (AWE); Pete De Marco, International Association of Plumbing and Mechanical Officials (IAPMO); Jay Peters, International Code Council (ICC); Gerry Kennedy, Plumbing-Heating-Cooling Contractors National Association (PHCC-NA) and Barbara Higgens, Plumbing Manufacturers International (PMI).

The coalition has identified drain line transport as its first research project; IAPMO's Pete DeMarco serves as project coordinator for this inaugural research study and also chairs the technical committee assigned to the project. Each of the member associations of PERC has named a representative to the committee. With the parameters of the project defined, the organization is now seeking funding.

In January 2011, representatives of PERC signed a memorandum of Understanding (MOU) with the Australasian Review of Reduction of Flows on Plumbing and Drainage Systems committee for their program known as "AS Flow" at the offices of the U.S. Environmental Protection Agency. Steve Cummings, an Australian researcher, and his colleagues have pioneered many ultra low flow drain studies in Australia because of water use restrictions. The MOU details several areas of collaboration between the groups to ensure that research efforts are not duplicated and that information and results are shared. The AS Flow program is also investigating the impact of reduced water flow in sanitary drainage systems, resulting from reduced water use from low flow plumbing fixtures and fittings, appliances and commercial and institutional equipment.

These ultra low flow fixtures have created a condition that is being referred to as "dry drain syndrome." I have always said that there needs to be enough water in the river to float the boats. This research will determine what the minimum flow volume for various fixtures needs to be in order to have proper drain line transport of solids.

Critical drain line transport study needs funding support

PERC received its first research funding donations from the National Resources Defense Council (NDRC) Action Fund and "AS Flow" in Australia. The donations were reported to be for $10,000 each and are greatly appreciated; however, there is a long way to go for funding before research can begin. Budget projections show the first drain line research project will cost approximately $170,000. The coalition still needs to raise about $150,000 in funding before research can begin. Due to the complexity associated with the number of variables in

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"real world" plumbing systems, PERC representatives believe that a multi–faceted design experiment is required to properly measure the impact of the toilet fixture toward drain line transport relative to other plumbing system variables, such as pitch and flush volume.

Reduced flush volumes from high efficiency plumbing fixtures reduce the drain line flows. What is in question is whether these reduced flows are likely to cause an increase in blockages in the drain lines. Much of the U.S. information on this subject is anecdotal, without foundation in fact. We have all heard the stories about the increase in drain line cleaning service calls shortly after the Energy Policy Act of 1992 established lower flow rates for plumbing fixtures beginning in 1994. International studies and some field failures reported recently in Australia have indicated that flush volumes consistent with high-efficiency toilets (HET) or ultra-low flush (ULF) toilets may result in systemic drain line transport-related failures in building drains or sewer lines in those countries.

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PERC has proposed a study to scientifically evaluate drain line transport issues and to determine whether the use of higher volume discharges at intermittent intervals (one or two percent of flushes) could be an effective way to clear drain lines. Drain line carry is a critical issue that must be better understood, as concerns over reduced flows have discouraged some utilities from implementing commercial HET replacement programs.

Due to a lack of funding, work has yet to commence on this study a full two years after PERC identified drain line transport as its first priority project and a year after the Alliance for Water Efficiency's (AWE) Research Committee identified drain line carry as its highest research priority. The AWE is inviting participation by organizations or manufacturers to become funding partners and step up to help get this important project launched.

Proposal to investigate drain line transport in buildings

To better understand where we are and how we got here we need to go back to the enactment of the Energy Policy Act of 1992, which set maximum flow rates for most plumbing fixtures. All water closets (toilets) manufactured in the United States or imported into the United States were required to flush no more than a maximum average of 1.6 U.S. gallons. Since manufacturers needed time to design and manufacture newer low flow fixtures, the legislation allowed a two-year grace period for residential fixtures and a five-year grace period for commercial fixtures. The legislation for residential models became effective January 1, 1994, and it became effective for all commercial models on January 1, 1997. At that time, concern for drain line solids transport efficiency was voiced by many in the plumbing industry and many of those in various professional associations.

Soon after the deadline, there were many reports of poor performing 1.6 gallon per flush (gpf) water closet models. It was also discovered that many people were finding ways to boost the flush efficiency by modifying some of the water closet models on the market in response to significant consumer complaints about poor flush performance. Since then, water closet manufacturers have made great strides in improving flushing performance. Intermittent and anecdotal complaints of drain line carry transport problems were not thoroughly researched prior to the legislation, and manufacturers placed much of the blame on oversized, older or faulty sanitary drain lines.

Recently, the need to find additional efficiencies on water-consuming plumbing fixtures to meet additional LEED point requirements has resulted in the creation of voluntary specifications that eliminate another 20% from the flush discharge volume of water closets, bringing consumption down to a maximum average of 1.28 gpf. At some point the laws of physics apply: If a 1.6 gpf water closet moves the solids 42 feet down the drain line, and if 1.28 gpf moves the solids 28 feet down the drain line, at some point the solids won't move at all. There must be a minimum hydraic depth of flow or a wave depth for the solids to surf on.

The States of California and Texas have passed legislation to require all toilets sold in those states to be 1.28 gpf high efficiency toilets (HETs) by the year 2014. There are other provisions in California that will significantly accelerate this transition, and it is anticipated that other areas of the country will soon enact similar requirements. Some water closet manufacturers are now voluntarily offering models that flush at 1.0 gpf. One manufacturer is actively marketing a model that flushes at 0.8 gpf. This activity has rightfully raised the debate of drain line solids transport efficiency. Many plumbing experts are concerned that we are at or approaching a "point of diminishing returns," where a significant number of sanitary waste systems will be adversely affected or plugged by drain line stoppages caused by poor drain line transport or what has been referred to as "dry drain" problems. Dry drains are especially a problem in larger commercial systems that have long horizontal runs to the sewer.

I witnessed the drain line transport problems in a hospital project. When we renovated a basement area of a hospital old 3.5 gpf water closets were replaced with 1.6 gpf fixtures. After the renovation, the drains became clogged every few weeks, and when hospital maintenance personnel removed the cleanout in the basement corridor

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of this multi-million dollar Magnetic Resonance Imaging wing, raw sewage ran all over the basement floor of the hospital. The cleanup costs were very expensive. This situation repeated itself several times, until adjustments could be made in the flushing volume. Was saving a few gallons of water worth exposing people to raw sewage on a regular basis?

I say, "Save water safely." We need to perform the research before setting lower flush volumes. For many years, drain line transport problems have been reported in Europe and Australia and studied by AS flow members, further raising awareness and concerns here in North America.

Looking forward, newer technologies, such as non-water consuming and high efficiency urinals (HEUs), lower flow rate faucets, showers and increasingly efficient water consuming appliances will further reduce the amount of water discharged into sanitary waste systems.

We need to perform the research before setting lower flush volumes. For many years, drain line transport problems have been reported in Europe and Australia and studied by AS flow members, further raising awareness and concerns here in North America.

Equally significant are greywater reuse systems that collect discharged water from lavatory basins, clothes washers, bathtubs and shower fixtures in a residence for reuse, usually for irrigation purposes. This is another emerging technology that significantly reduces wastewater in residential sanitary drainage systems.

On the commercial side, the emphasis upon water and energy use reduction has resulted in a proliferation of products in the medical and food service sectors that substantially reduce flows to the drain. Liquid ring vacuum pumps that used to use water for a vacuum seal are being replaced with newer, water-free technologies. In commercial kitchens, the pre-wash sink overhead spray has proven to be a large user of water. Newer low flow pre-rinse spray heads can conserve large amounts of water and energy. To date, an extensive research project of sufficient scope has yet to be conducted that would determine whether significant problems could arise regarding drain line transport in these "efficient buildings."

Emerging Technologies with Potential to Minimize Drain Line Blockages

Based on the casual observations of previous drain line transport research efforts, it is known that intermittent injections of clear water surges of sufficient volumes can flush the drains and transport solids in the drain line great distances and, theoretically, clear a building drain out to the connection to the sewer. For commercial installations, flush-o-meter-valves that employ hands-free electronic activation can now be programmed to flush at pre-designated times and at user-selected volumes.

For example, consider a commercial office building with restrooms employing a bank of High Efficiency flush-o-meter-valve toilets that flush at 1.28 gallons per flush (4.8 Liters per flush). For example, at pre-determined intervals, the toilets furthest upstream (on the drain line) can be programmed to flush once or twice per day with a higher flush volume that clears the building drain of all solids and transports the solids to the sewer.

These new programmable features have the potential to offer a very low-cost solution for many commercial installations. As such, PERC is recommending that this potential solution be worked into the test plan.

PERC Laboratory Testing for Drain Line Transport Study

The focus of this effort will be to verify the feasibility of using programmable flush-o-meter valves or other sources of clear water to clear long drain lines of deposited solids and to measure the relative importance of other systemic variables. This work would best be conducted on an apparatus employing 4" diameter pipe set at both minimum slope of one percent and a slope of two percent. The study would involve investigating various flush volumes so as to intentionally deposit test media along the length of the test apparatus. The data from the resulting transport distances will allow for determining the relative importance of the test variables. At the end of each test run, a higher volume clear water discharge will be introduced into the drain line apparatus (simulating a discharge from a pre-programmed flushometer-valve) in order to observe the clearing potential of the clear water discharge.

A 300 foot long (~90 meters) test stand is recommended to conduct this test. This will allow for adequate distance to show resolution in drain line transport at the various test flush volumes. In addition, the long distance simulates worst case commercial building drain installations and will allow us to determine if the high volume clearing has potential to clear very long commercial building drains.

To minimize costs, PERC will seek to conduct this test program on a suitable existing test apparatus. PERC is currently in the process of executing a MoU with the AS-Flow committee in Australia. Once the MoU is executed, PERC plans to review this test proposal with the AS-Flow Committee to determine the most cost effective location to conduct this work.

Look for part II of Ron George's column in the September issue of *Plumbing Engineer*. ■

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.

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FPE Corner

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

My code wish list, Part 1

During design of a particular system, and in the process of trying to ensure the system complies with the various provisions of the code(s) or standard(s) in play, have you ever thought to yourself, "Is it really necessary to do this?" Well, I seem to be saying it all the time. The young engineers in the company think, "There goes the old geezer mumbling to himself again."

Please understand: I am not complaining about the members of committees overseeing these documents. It is up to all of us to fix stuff in our codes and standards that we think can be done better. It is not the particular committee's sole responsibility to do so. Anyone can, and should, make proposals in areas where one feels the document can be improved.

I am going to start with three provisions contained in UFC 3-600-01, *Fire Protection Engineering for Facilities*. This document establishes the fire protection requirements that are to be used on projects involving the U.S. Department of Defense. Their requirements do not have to pass the rigorous consensus standard requirements used in the NFPA and, as some would argue, in the ICC. A particular requirement usually results from a consensus of the DOD fire protection engineers, of which there are probably about 50 or so. In my opinion the result often is increased cost to the system without concurrent increase in system value. For those DOD AHJ's out there, please know that I do this only in the best interests of my country.

Paragraph 4.2.3.8 UFC 3-600-01 requires two combined sprinkler/standpipe risers in buildings of four of more stories. It requires the risers to be connected to one another on each floor, and each connection is provided with a floor control valve. The purported reason for the requirement is as a force protection (anti-terrorism) measure, to increase sprinkler system survivability. Please help me understand this. If one of the sprinkler risers is "taken out" during a terrorist attack, all you will have is a big leak and no water for sprinklers. It will take manual intervention to isolate the system and restore protection to the building, assuming there is a building left to protect.

In the meantime, the cost of the sprinkler system is dramatically increased with the requirement for the additional riser and all the additional floor control valve assemblies. I sure hope someone tells the sprinkler contractor fixing a leaking sprinkler on one of these systems that *two* floor control valves must be closed before the sprinkler is removed (You mean you didn't read the sign: I hate it when that happens.)

Table 4-1 of UFC 3-600-01 requires minimum 3,000 square feet remote design areas for the various occupancy hazard classes for sprinkler systems, rather than the 1,500 square feet minimums we see in NFPA 13. Also, hose stream allowance requirements for light, ordinary, and extra hazard are 250 gpm, 500 gpm and 750 gpm, respectively, instead of the NFPA 13 requirement of 100 gpm, 250 gpm and 500 gpm. The 3,000-square-foot design area essentially doubles the cost of a sprinkler system for DOD facilities. This cost-with-no-benefit requirement ranks right up there with $5,000 toilets and $600 hammers.

The provisions of NFPA 13 have stood the test of time and should be more than adequate. Also, the additional flow and pressure required to meet this requirement often forces the addition of a booster fire pump to the system. Not only is there significant additional cost, the addition of a fire pump system and the attendant lack of maintenance we so often see is likely to reduce the overall reliability of the sprinkler system.

Here's another head-scratcher. UFC 3-600-10N is a draft version of UFC 3-600-01, which contains requirements specific to the Navy. Though a draft, its use is required for Navy projects. Paragraph 2-2.1.1 does not permit one to use bolted steel tanks for ground level fire protection water storage. This forces the engineer to specify a more expensive welded-steel or concrete tank. The private sector has had great success with bolted steel tanks.

OK, let's beat up on the private sector a bit. Did you know that the storage (warehouse) fire sprinkler design criteria contained in NFPA 13 is only valid for those buildings that have ceiling slopes of 2 in 12 or less? NFPA 13, 2010 edition, paragraph 12.1.2, quietly reveals a major disclaimer stating: *"12.1.2 Ceiling Slope. The sprinkler system criteria specified in Chapter 12 and Chapters 14 through 20 are intended to apply to buildings with ceiling slopes not exceeding 2 in 12 (16.7 percent) unless modified by a specific section in Chapter 12 and Chapters 14 through 20."* So what do you do if the building in question, often an existing one, exceeds 2/12. The answer is that you are stuck, unless you want to stick your neck out and make something up, like a 30% increase in the design area.

One option is to tell the architect that her building with the severely sloped roof must be changed (Hope the snow load does not mind.) or she will need to provide a drop ceiling throughout the entire warehouse area. So why are we in this dilemma? Well, as I understand it, the major testing agencies that are providing listings and approvals for design criteria for storage protection only have flat ceiling test facilities. Research is needed to provide the engineer with some answers. Sprinkler system design should not dictate how a building is built.

Next, I wish that, in sprinklered buildings, we could eliminate the requirement for interconnecting standpipe system piping that is not located in a protected enclosure (such as a stairwell) to be enclosed in fire resistance construction. NFPA 14, 2010 edition paragraph *6.1.2.2 states, "6.1.2.2 Standpipes and lateral piping supplied by standpipes shall be located in enclosed exit stairways or shall be protected by*

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FPE Corner

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a degree of fire resistance equal to that required for enclosed exit stairways in the building in which they are located." If the building is 100% sprinkler protected, I see no need to protect the standpipe interconnecting piping. The interconnection can be located on a lower floor, and will most certainly be quite remote from a fire, a fire that has probably been well controlled by the sprinklers, and, in the case where the standpipe is needed, at a height most certainly well above the lowest levels of the building.

I believe this requirement is why we see so much steel pipe buried underground to interconnect risers to avoid the protection requirement. (You see, this is often left to the mechanical engineer, not the civil engineer, so you get steel pipe "protected from corrosion" instead of something like DI or PVC). I also see a lot of this underground pipe being replaced, because it has rusted out over the years.

Providing sprinkler protection in elevator shafts and elevator machine rooms? Need I say more? Actually, I might. This is a good topic for a future article.

Here is a wish that came true. At the recent NFPA Technical Sessions in Boston, the membership wisely defeated a proposed new provision to require more smoke dampers in NFPA 90A. This was accomplished in spite of the presence of a huge voting contingent from the damper industry. I know this is not a great concern to the plumbing engineering community, but I guess a lot of you are doing HVAC. Now, I think there are important applications for smoke dampers, but the provisions of NFPA 90A have worked for me for over 30 years (That old geezer is mumbling again).

Mechanical smoke control in most fully sprinklered buildings? In my experience smoke management design cannot be adequately accomplished in buildings unless the building is fully sprinklered. This is so the fire can be kept small enough to limit smoke production to a level that can be practically handled. The irony is that, in my opinion, in most instances, the presence of fire sprinklers makes smoke management unnecessary.

These are just of few of my many concerns. I would be interested in your Code Wish List. And, if you think of it, make a code change proposal. And please remember, always follow the code. ■

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.

Solar Solutions

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

Bristol's Six Principles for Good Solar Hydronic Design

#37: Propylene glycol: solar heat transfer fluid

In any hydronic closed-loop solar heat collector system the heat transfer fluid is the life-blood. It must be sealed and pressurized in the solar heat piping, much like the "Freon" fluid in a refrigeration system. To insure that the solar heating system is reliable over a very long time, the heat transfer fluid in the system must not leak out, it must not freeze, it should not boil, and it must tolerate high temperatures inside the solar collector without "cooking."

Propylene glycol (PG) has become the most common heat transfer fluid used in closed loop solar heating systems that contain antifreeze. It has a long track record over many decades in this application and is widely available from a number of sources at a reasonable cost. This is not automotive antifreeze, which is a different substance (ethylene glycol), is much more toxic and should never be used in domestic solar heating equipment. When working with PG it is good to get to know its properties, capabilities and limitations, which have a direct bearing on the pumping, piping components and temperature controls required by these systems.

Solar home heating systems are most often used to heat potable domestic hot water, and single-wall in-tank heat exchanger coils have become very popular for this purpose.

Solar home heating systems are most often used to heat potable domestic hot water, and single-wall in-tank heat exchanger coils have become very popular for this purpose. When a single wall heat exchanger fails, it is possible for the heat transfer fluid in the coil to leak into the potable water. Because this (and other environmental leakage) is a real possibility, the ideal solar heat transfer fluid would be biodegradable when released into the environment and non-toxic if consumed by people or animals.

Pure propylene glycol has a very high score in this regard, as evidenced by its use as a food and drug additive. Millions of people consume pure PG as part of their diet every day, mixed into their food and medications. So, the question is, how pure is the PG used in solar heating systems? The answer is that it is typically 95% pure before it is mixed with water. Typical PG heat transfer fluid contains additives to prevent corrosion and boost the resistance to high temperature degradation. The additives make up about 5%, by weight, of the concentrated PG fluid. The concentrated fluid is mixed with de-mineralized water before final usage, so, for example, if mixed half and half with water, the final concentration of additives would be about 2.5%.

These small concentrations of additives are apparently nowhere near toxic levels. The makers of the PG heat transfer fluid provide Material Safety Data Sheets (MSDS) for the concentrated and the pre-mixed products. The MSDS language is very reassuring. For example, "First-aid measures" listed on one of these sheets include the following entries:

Skin Contact: Wash skin with plenty of water.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Ingestion: No emergency medical treatment necessary.

The MSDS listing under "Ecological information" seems equally benign:

Persistence and Degradability: For the major component(s), Material is readily biodegradable.

Ecotoxicity: For the major component(s): Material is practically non-toxic to aquatic organisms on an acute basis.

Heat tolerance for some common brands

Look for PG manufacturers who specifically formulate their glycol products for compatibility with solar heating systems. Those that do will say so very clearly in their product literature, along with a high temperature rating that indicates compatibility with the normal operating temperatures of hot solar collectors. Pure PG will "cook" at high temperatures and long exposure will cause it to change from a clean, transparent liquid to a brown substance resembling molasses that smells like alcohol.

The MSDS listing for DowFrost, for example, acknowledges this in the section under "Thermal Decomposition," which states: Decomposition depends upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Aldehydes, Alcohols and Ethers.

In other words, the heat transfer fluid will remain thermally stable in a closed system at recommended temperatures and pressures. But if the high-limit temperatures are exceeded and/or oxygen is introduced into the closed system, the fluid will degrade. During decomposition, gases are generated that can cause extra pressure in closed systems as well.

So, you can see that preventing the glycol from overheating is a design consideration of primary importance. That is why solar heating design discussions (even in

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"We just completed the monitoring of the new solar hot water system at the Chattanooga Fire Hall (where we received LEED Gold status too). The Heliodyne system is kicking butt! Reclaim and reheat 500 gallons with a 2.3 hour recovery time at 100 degree rise (almost 34% better than expected). Looks like you guys are going to end up being the "go-to guys" in this town."

Randall Metcalf, CEO, Campbell & Associates, Inc.

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EXCELLENCE BY DESIGN®

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this column) so often focus on controlled overheat dissipation (heat dumping) to keep the solar collectors below the high-limit temperature of the glycol in question. When overheat controls are provided, they are often set to keep the collectors below 220 F (104 C) to extend the life of the glycol. Here is a short list of some common glycol brands and their temperature ratings as listed by the manufacturers.

There is a wealth of information available for PG heat transfer fluids.

• DowFrost and DowFrost HD

DOWFROST inhibited glycol-based fluid has an effective operating temperature range of -50 F to 250 F (-46 C to 121 C), while DOWFROST HD inhibited glycol-based fluid is effective from -50 F to 325 F (-46 to 163 C).

• Cryotek and Cryotek AG

Use any Cryotek anti-freeze in hydronic closed loop solar heating systems that require freeze protection. Operating Temperature Range for Closed System: Up to 250 F (121 C)

• Tyfocor L and Tyfocor LS Pre-mixed

Premature aging will occur above 338 F (170 C), slow thermal decomposition above 392 F (200 C).

• Dynalene Solar Glycol-XT (Bio Glycol made from corn.)

Recommended Temperature Range Closed System: -17 F to 350 F (-27 C to 176 C)

DowFrost in depth

There is a wealth of information available for PG heat transfer fluids. One of the most prolific sources is from Dow at www.dow.com/heattrans/tech/data.htm. Many useful publications in PDF format on this site are available for free. One of the most comprehensive is the DowFrost Engineer Operating Guide, which is a gold mine of technical information about the properties of PG with advice about how to use it properly. If you want to know freezing point, boiling point, conductivity, specific gravity, density, viscosity, temperature limits and lots of other details this is the reference to get.

Testing methods

As the PG ages and degrades over time, the freeze protection concentration can change, the acidity can change, and the additives can lose their effectiveness. You can quickly determine the condition of your fluid by examining its appearance and odor. Any drastic variation from the initial fluid specifications, such as a black or dark gray color, presence of an oily layer, a burnt odor or heavy sludge in the fluid may indicate the need for fluid replacement.

Test equipment is also available to measure the quality of the fluid. This can be done with test strips, supplied as a kit by the manufacturer, that resemble litmus paper. Test strips will tell you the pH, the freeze protection level (indicated by the percent concentration) and the state of the inhibitors. We often use a refractometer gauge that resembles a small telescope to quickly check the freezepoint/concentration, or a digital gauge that reads out percent and freeze value directly on an LCD display. Digital pH meters are available as well.

The following advice is taken from the DowFrost Engineer Operating Guide:

Control of pH between 8 and 10 is important to minimize corrosion and glycol degradation. Using narrow range pH paper such as pHydrion Control paper with a 7.2 to 8.8 pH range is an easy and reliable way to read your pH level.

A pH tester can also measure alkalinity or acidity of the fluid. The desirable pH range should fall between 8.0 and 10.0. Adjustments can be made by using a 50% solution of sodium hydroxide or potassium hydroxide if the pH is between 7.0 and 8.0. Any fluid with a pH below 7.0 should be replaced. An inexpensive pH tester is available from Misco Products. The accuracy of this instrument is +/- 0.5 pH. Misco also makes a Freezepoint/Concentration tester.

Final notes

These articles are targeted toward residential and small commercial buildings smaller than ten thousand 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 in these articles only to provide examples for illustration and discussion and do not constitute any recommendation or endorsement. ■

Bristol Stickney has been designing, manufacturing, repairing and installing solar hydronic heating systems for more than 30 years. He holds a Bachelor of Science in Mechanical Engineering and is a licensed mechanical contractor in New Mexico. He is the chief technical officer for 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

The success of any solar hydronic home heating installation depends on the often-conflicting balance between any of these six principles. Finding the balance between them defines the art of solar heating design.

Modern Hydronics

By Bob "Hot Rod" Rohr, Radiant Expert

Separation satisfaction

Hydraulic separation has been the talk of the town for the past several years —hydronically speaking, of course. The intent, or goal, of hydraulic separation is probably already familiar to most designers and installers.

If you have designed or installed closely spaced tees or primary secondary piping, you have been offering hydraulic separation. That dual tee configuration provides a pathway for multiple flows to get along without upsetting one another. The closely spaced tees, properly sized and installed, allow for various flow paths through the fitting. This provides a means for circulators of different size and flow rates to work together without causing flow conflicts. The introduction of small tube heat exchangers, common in some mod con boilers, drove this concept home. It is not unusual to see a medium or high head circulator required on the boiler side and a much smaller circ for the distribution side.

Photo by Paul Rohrs

You may have used or noticed special fittings that are available from manufacturers to accomplish quick and easy P/S. Taco, Webstone and PHP are just a few that build unique P/S components.

Advantages for customers

Much has been written about primary secondary (P/S) piping over the last few decades. Credit industry leaders for demystifying the concept and bringing it main-piping stream. As many know, Gil Carlson, perhaps is the granddad of primary secondary and hydraulic separation.

You may have learned about the sizing and piping finer points from any of the numerous papers and articles written from industry trainers and educators. Manufacturers have embraced the concept, acknowledging the advantages it offers their customers. They understand how it can reduce problems relating to the safe and efficient operation of their products. Boiler manufacturers, in some cases, provide a P/S piping panel or device as standard equipment or as a plug-and-play option.

You may have used or noticed special fittings that are available from manufacturers to accomplish quick and easy P/S. Taco, Webstone and PHP are just a few that build unique P/S components. Some, like the Taco fitting, are merely a custom-built fitting that allows the flows to separate. The Webstone Hydro-Core takes the concept a step further, with a ball valve included to provide isolation with a pump flange and a purge cock on the return side.

More utility

Various manufacturers now offer hydro separator devices that provide multiple functions. In addition to providing the closely spaced tees in a cylinder fashion, these devices also provide some basic air and dirt removal functions. With a cylinder diameter about three times the pipe connection, the device provides a chamber for the flows to separate. The "wide spot" in the piping road provides a means for the air and dirt to separate. With a domed top, you have an ideal spot for an automatic air vent. An expansion tank could be mounted below, with the auto-fill valve installed for a nice clean installation. Some brands provide a port for installing a temperature gauge or control sensor. So, one component can give you multi-functions in a rugged, clean, insulated and well-constructed component. You will find these products built for small residential jobs with 3/4" or 1" pipe sizes. In addition, many manufacturers offer large flow devices 12" and larger. Separators have a place in cooling piping in addition to hot water applications.

Taking the concept even further, there are now buffer tanks that provide hydraulic separation functions. Think of these as super-sized separators. In addition to separation, air and dirt removal is part of the package. These tanks are available in various sizes, from 30 gallons up to 119-gallon capacity. The tanks should be well insulated (fully wrapped in insulation) to allow them to be used in chilled water installations. These buffer/separator tanks will generally have multiple large-diameter connections to allow for any piping configuration. A tank like this would be ideal for a system that has numerous zones to help eliminate boiler short cycling. Hydronic systems that are micro zoned, where the smallest zones are still beyond the low boiler turndown output, are prime candidates for buff-sep tanks.

The products to solve your piping challenges are on the shelves. Examine them all to see which fit into your next piping project.

Been humming that Rolling Stones song at the supply house counter, "I can't get no sep-er-ray-shun …?" Well, it's time to quit singing the blues. You've got so many cool choices. ■

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

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Plumbing Engineer's LEAD FREE REPORT

ICC-ES PMG Certifies to Annex F of NSF/ANSI Standard 61 Requirements to Help Manufacturers Meet Deadline

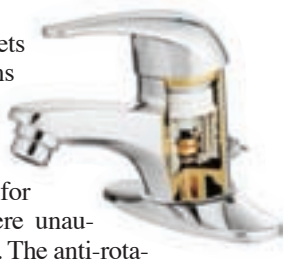
NSF/ANSI Standard 61's deadline limiting lead extraction is quickly approaching, and ICC Evaluation Service (ICC-ES) Plumbing, Mechanical and Fuel Gas (PMG) Listing Program is encouraging clients not to miss this important deadline. ICC-ES PMG announced that it is prepared to certify to the existing informative requirements regarding the reduction of statistic criteria for lead (Q) from 11 ppb to 5 ppb for all section 9 devices, and from 11 ppb to 3 ppb for supply stops, flexible plumbing connectors and miscellaneous components. These requirements will be included in Standard 61 as normative (mandatory) effective July 1, 2012. ICC-ES PMG uses the most qualified testing laboratories along with a team of respected engineers and toxicologists to conduct such evaluations.

"This is an opportunity for manufacturers of faucets, supply stops, flexible water connectors and similar products to take advantage of our Transfer and Save program and have their products evaluated by a credible certification body at a low cost with the highest level of acceptance in North America," said Dawn LaFleur-Qualley, Certification Program Manager.

The ICC-ES PMG program offers a full range of certification activities, including PMG listings and evaluation of sustainable product attributes. ICC-ES PMG can certify your products to AB1953, Annex G of NSF/ANSI 61, S.3874 (Federal Law for Reduction of Lead in Drinking Water) and the requirements of WaterSense for free. For more information, please contact ICC-ES at 1-800-423-6587 ext. 7643, or by e-mail at espmg@icc-es.org.

Watts LavSafe™ Thermostatic Faucets offer laminar flow, vandal resistance

Watts has released its new, lead-free LavSafe thermostatic faucets. The commercial, industrial and residential faucets feature an internal thermostatic valve.



LavSafe's new Laminar flow outlets are ideal for healthcare applications where bacteria growth is a primary concern in both private and public restrooms. LavSafe's vandal-resistant outlets are a perfect match for schools, and public restrooms where unauthorized tampering is also a concern. The anti-rotational plate design provides added security.

With LavSafe, installation and maintenance are quick and simple. All key components are above sink level for easy access, eliminating the need to install a separate tempering valve below the point of use.

Water tempering takes place at the point of delivery. Because the faucets don't require a separate, external thermostatic valve, there are fewer parts and fewer potential leak points. This translates to shorter installation times, less inventory and fewer maintenance callbacks.

The new LavSafe faucets are available in two contemporary models - standard and gooseneck. Both models meet plumbing standard ASSE 1070, have ADA-compliant handles, and are certified to be lead free* in accordance with NSF/ANSI 61 plus Annex G. Low flow models are available between .5 and 1.5 GPM.

Precision tempering also allows water heating systems to operate at higher temperatures, ensuring germ-free water storage and distribution, and overall system efficiency. ■

Lead Compliant Products from Zurn

Zurn Lead Free (XL) plumbing products are durable, high quality, and manufactured to comply with state laws and local codes that mandate lead content levels. Zurn Lead Free faucets, fixtures and water control products, as well as Zurn Pex tubing and fittings are manufactured with less than one quarter of one percent (0.25%) total lead content by weighted average. Zurn is your single source for lead compliant products.

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Beyond Greywater

On-Site Wastewater Treatment at Emerald Bay

Photo courtesy of Richard Hammond

By Peter Kraut

With the explosion of LEED and the advent of green building codes, greywater treatment has become more common in plumbing design. Many homeowners and building operators are excited about the idea of saving water. The effort to separate sewer flows and the expense of the equipment often is not considered as they head down the design path and into construction. They are dismayed when they find out that the only use for greywater is as below grade drip irrigation and that, in order for it to be used for toilet re-flush or cooling tower makeup, it must be treated to a higher standard. The cost of "going green" suddenly becomes too much, and our most precious resource is flushed down the drain.

AdvanTex® AXMAX Treatment System utilizing textile filter media and micro-dosing spray nozzles. Photo courtesy of Orenco Systems®, Inc.

The Western Los Angeles County Council of the Boy Scouts of America took a different path. Faced with water costs exceeding four cents per gallon at Camp Emerald Bay on Catalina Island, they had to find a way to reuse every precious drop. They contacted wastewater treatment expert Steve Braband of BioSolutions Inc., who began outlining a program for onsite wastewater treatment.

The camp serves over 7,000 campers each year, most residing for a full week, and the collection points are spread out over 88 acres. The camp's central dining facility is not far from the beach and is surrounded by staff cabins, a marine center and support buildings. The main circulation corridor heading inland is flanked by several buildings, including a general store, a craft building and the future Environmental Learning Center.

Most equipment is hidden in plain sight

The rest of the land is divided into 19 smaller camps surrounding six toilet and bathing facilities. These are currently discharging into four septic systems, each

Continued on page 38

For the fifth straight year, Bradford White is the tank water heater brand most purchased by professional contractors. And again, we are the most recommended brand.

"We made the switch to Bradford White almost 15 years ago when we started having problems with another brand. Our reputation depends on the products we recommend so quality and reliability are critical. We couldn't be happier. Bradford White is loyal to the plumbing profession. Their products and people are top notch." ***Kevin and Ryan Carney - Carney Plumbing – Heating – Cooling, Line Lexington, PA***

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.

And now our support for you gets even better. Bradford White has just opened a 24/7, factory-based call center.

This fully staffed technical service team is there when you need it, anytime day or night.

We're making it easy for you to be a Bradford White contractor.

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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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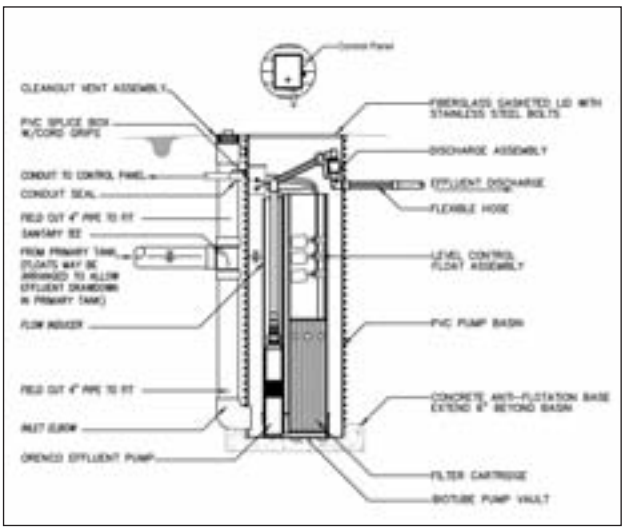
comprised of a tank and a leach field. Numerous historical septic systems also exist throughout the camp, most of them abandoned. To centralize the collection in a facility this vast, the design utilized the significant slope to minimize trenching and carry all of this waste to a new waste treatment plant.



Biotube® Pump Vaults remove suspended solids and pump effluent to the next phase of treatment

To get a better understanding of the flow rates, water usage was analyzed. Fortunately, the camp had already begun a program to conserve water. Patty Breech of UHG Consulting helped put this conservation plan together. It included the use of low flow fixtures, finding and fixing leaks and metering to determine where the water was being used. With these meters and a head count of the campers each month, it was soon demonstrated that the camp used 40,000 to 200,000 gallons of water per month. As much as 50,000 gallons per month may have been used for irrigation. The remainder equated to 25 gallons per person or about half of what the codes and standards suggest for sizing septic systems. Armed with this information, the new wastewater treatment equipment could be cut in half. It was then assumed that 19 gallons per person per day was used in toilets/bathing and six gallons per day per person in meal preparation.

The design begins with the majority of the solids being separated into a local settling tank, much like a septic tank. In waste treatment, however, the process begins here, so the tank is sized for 2 ½ days of retention. Simply multiplying 19 gallons times the peak number of campers times 2 ½ days yielded the tank size. The result called for nine tanks, ranging from 1,500 to 25,000 gallons, plus an 8,000 gallon grease interceptor serving the dining hall. To maximize the solids retention in these tanks, a Biotube® filter manufactured by Orenco Systems® Inc. was used. It allows effluent flow from the clear zone of the tank, between the sludge and scum layers. Using vertical flow and small orifices, these filters remove about two thirds of the total suspended solids before the effluent leaves the septic tank.

The effluent from all of these septic tanks is then collected in two 15,000 gallon holding tanks. These create a surge volume to level out the peak flows and allow for a system sized closer to the average flows. For this purpose, Biotube® pump vaults with effluent filters and effluent pumps deliver a metered quantity of effluent to the treatment system. Unlike a septic system, waste treatment relies on the aerobic process of digestion. These two words, aerobic, meaning "with oxygen" and digestion, meaning "the mechanical and chemical breakdown of food," establish the natural process of treating waste. Through retention, this process has already begun, but a much more sophisticated approach is needed if the water is to be used for toilet re-flush.

Several characteristics of the wastewater must be known for the final system configuration. Among them are CBOD5 (five-day carbonaceous biochemical oxygen demand), TSS (total suspended solids) and TKN (total kjeldahl nitrogen or the sum of organic nitrogen, ammonia NH3 and ammonium NH4+). Water softener backwash is prohibited, and greases and oils must be removed through pre-treatment. Although the wastewater should be tested prior to installation, the design for a camp of this nature can begin with common residential strength wastewater characteristics, as shown in Table 1.

Characteristic	Average (mg/L)	Weekly Peak (mg/L)	Rarely Exceed (mg/L)
$CBOD_5$	130	200	300
TSS	40	60	150
TKN	65	75	150
G&O	20	25	25

The goals for this project were to reduce CBOD and TSS to 5 mg/L and to reduce nitrogen by 90%. For this purpose, an AdvanTex® treatment system was selected. This modular, fully-plumbed wastewater treatment system incorporates a special textile filter media below recirculating spray nozzles in a fiberglass tank with telemetry-enabled controls.

Waste treatment relies on aerobic digestion; the textile filter media provides a place for the aerobic bacteria to thrive. The recirculating spray nozzles use a process called micro dosing. This method of wetting the textile at regular intervals allows the bacteria to feed and then starve, ultimately consuming them. The tanks are installed in series; each tank passes the effluent on to the next tank, where the cleaner water continues the same process for greater refinement. The controls monitor the levels in the surge tanks, regulate the effluent pumps, control the micro dosing and even monitor and record the quality of the final product.

Even with a sophisticated treatment system such as this, nitrogen and ammonia can be difficult to remove. For this process, the Western Los Angeles County Council of the Boy Scouts of America turned to Will Kirksey of the Living Machine®. Similar to the waste treatment system described above, this process is controlled by pumps regulating water levels and moving it back and forth between several tanks. The tanks are

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filled with a gravel aggregate, specially engineered films of beneficial microorganisms and plants working together in a living, highly complex ecosystem. These establish one of three wetland types. For Emerald Bay, a horizontal subsurface flow wetland was selected. In the end, an ultraviolet system is used to kill any pathogens that are left in the water.

Waste treatment relies on aerobic digestion; the textile filter media provides a place for the aerobic bacteria to thrive. The recirculating spray nozzles use a process called micro dosing. This method of wetting the textile at regular intervals allows the bacteria to feed and then starve, ultimately consuming them.

The culmination of the process occurs at the site of the future Environmental Learning Center. This landmark building, along the main path through camp, will house classroom and conference space, with exhibits explaining the waste treatment system, rainwater harvesting system and other sustainable practices incorporated into the camp. From here, the effluent will be used to feed toilet re-flush as well as for drip irrigation, with the goal of reducing potable water demand by 50% or more.

The Western Los Angeles County Council is pursuing a significant number of grants and donations for this project. Meanwhile, a solid operating budget has allowed continual progress towards its goals. Rob Jernigan, Richard Hammond and Peter Barsuk of Gensler have created a master plan for the camp that includes capacity for over 1,100 people. It focuses on sustainable design and includes photovoltaic solar arrays on the hill behind the new Marine Biology Center. All of these measures may add up to huge cost savings. In a small community on an island off the coast of Los Angeles, the cost of "going green" may actually have a return on its investment. ■

Peter A. Kraut, P.E., is a licensed Mechanical Engineer in 23 states. He founded South Coast Engineering Group, near Los Angeles in 2001. He can be reached via email at pkraut@socoeng.com.

Finely-tuned Hydronic Systems:
Sum of Many Parts

By John Vastyan

Go ahead: Ask the hydronic gurus, say Dan Foley, John Abularrage or Paul Pollets, what it is that makes the "perfect boiler system." Well, I did it for you, and one thing's for sure: It's more than just shopping for boilers.

Today, with stratospheric energy rates, homeowners and building managers alike are pushing the need for high efficiency systems. In response, installers must consider overall specifications, budget, boiler options, controls and heat distribution because, after all, high efficiency systems are the sum of many parts.

Condensing boilers, deftly extracting heat from condensate, have now pushed combustion efficiency into the 95 to 99 percent range. System components play a key role too: Variable speed circulators are attuned to precise Delta T and sleek, Btu-spitting zone valves do their part in maximizing overall system efficiency.

That's smart use of energy. This also becomes a key system advantage when long-term operational cost of systems is scrutinized. When trade professionals can calculate a three- to four-year payback for new equipment, there's real incentive to move ahead with the project.

So, if the spec dictates high efficiency, the next question may be, "How high?" Non-condensing boiler technology offers a lot, with broad capabilities and fuel efficiency into the mid-to-high 80s. If that's not enough, the conversation often turns to the latest, über-technology.

But, as many of you know, other facets influence the type of system that's best suited for the job. A key factor in the selection of a boiler has to do with the anticipated temperature of the return water or glycol mix. If the temperatures are low (say, in the range of 60 to 130 F), a condensing boiler will operate most efficiently. If return water/glycol mix temperatures are high – above 130 F – then non-condensing equipment may make more sense.

"Along with the need to consider system temperature, stage-fired or modulating units should be considered," said John Abularrage, president of Stone Ridge, N.Y.-based Advanced Radiant Design Inc. "These units supply less than full input when the full input of a boiler isn't required. In many cases, a condensing boiler even gains efficiency when it's running at a lower firing rate. Multiple boilers can be another way to increase system efficiency, again allowing for lower input to the system when full input isn't needed. "

The condensing + non-con twist

One of the more interesting approaches to commercial boiler system design is the deliberate joining of condensing and non-condensing boilers. Mixing condensing and "non-con" boilers in the same system is a concept that's getting more attention these days.

"By setting a condensing boiler to be the lead boiler when the system temperature is at its lowest and/or outdoor reset controls are bringing water temperature down, the installer or system designer can better ensure that the investment made in a condensing boiler will be worth it, in terms of efficiency gain and fuel-savings," added Dan Foley, president of Foley Mechanical Inc., based in Lorton, Va.

"If more heat is needed in the system, a non-condensing boiler can be the next in line," he continued. "The second non-con boiler — and additional downstream boilers, if called for — would then be an advantage, considering lower initial cost and suitability for efficient operation with higher return temperatures."

The basic concept is to operate the condensing boiler when loads are low and, thus, so are supply water temperature needs. As the load increases, such as when weather gets colder, so does the supply temperature requirement with outdoor reset control. The higher the water temperature, the less condensate that's produced within a condensing boiler, and its efficiency decreases toward that of a substantially less expensive, non-condensing boiler.

"So the idea is to shift load to conventional boilers as the water temperature goes up, since they will have efficiencies comparable to the condensing boiler operating in a non-condensing mode," said Foley. "This is likely to make sense in larger systems using relatively high design load temperatures, such as those using fan-coils, air handlers, baseboard

convectors or radiators."

There are also regional differences to consider. "If the boiler system will be used as a backup for air-sourced heat pumps, geothermal heat pumps, or solar, these factors will play into the question importantly," said Paul Pollets, president of Seattle, Wash.-based Advanced Radiant Technology. "Typically, these systems provide lower return water temperature, keeping the condensing boilers in their 'sweet spot' most of the time."

In areas where these systems are most popular, winter seasons are tempered somewhat, so high water temperatures are not routinely needed to heat interior space. These areas are likely to have broad outdoor temperature swings as well. Systems that can change the temperature of water used for heating tend to accommodate these outdoor temperature swings most efficiently.

System efficiency: the sum of many parts

Though the boiler(s) may be the most important single piece of a hydronic system, overall system efficiency depends on the interrelationship of several key parts, all of which are changing and evolving as new ideas and technology influence their role in the mix.

1. Boiler efficiency

Boiler efficiency is determined by two key factors: combustion efficiency and thermal efficiency. "How effectively the boiler interacts with the hydronic system is determined by its ability to deliver heat either quickly, or slowly, depending chiefly on the needs of the system and the ability

Condensing boilers, like the Rheos+ or NeoTherm boilers, are built to extract latent heat from the moisture that forms in the condensing heat exchanger, dramatically enhancing combustion efficiency."

of the boiler to adjust to changes in the system's demand for heat," explained Joan Mishou, manager of applications engineering at Laars Heating Systems Company. The common term is "to size to the load."

System efficiency is at its best when the equipment works at peak performance, with fuel consumption happening at the highest levels of combustion efficiency, at all levels of heat demand.

"But no doubt, one of the key factors in attaining optimal system efficiency today is the advent of condensing boiler technology," added Mishou. "Condensing boilers, like our Rheos+ or NeoTherm boilers, are built to extract latent heat from the moisture that forms in the condensing heat exchanger, dramatically enhancing combustion efficiency."

Laars NeoTherm boiler Rheos+ boiler installations

The use of a condensing boiler can play an even more important role. "Their tough resistance to thermal shock and the ability to accept low return water temperatures puts them in a category of their own and opens up many new possibilities for hi-volume, cold-start systems. One example is a commercial snow melt system," said Watts Radiant's John Sweaney. "A condensing boiler takes very low inlet temperatures in stride; in fact, the lower temperature of incoming water (or a water/glycol mix, as is usually the case), the higher the combustion efficiency of the boiler."

2. System performance = efficiency

"Other important factors in determining system efficiency include modulation, or staged firing, as opposed to On-Off," added Abularrage. "This demonstrates the giant strides the industry has made during the past several years. Modulating and staged fired boilers reduce fuel consumption by 'sizing to the load' so that the amount of heat produced by the system precisely matches the need."

According to Mishou, another key facet is that more sophisticated controls are now capable of sampling changes over time and "learn" the responses of the system to changes in conditions such as heating load, outdoor air temperatures and firing stages of the boiler(s).

Tying to the earlier statement about outdoor reset controls, a system's response to outdoor temperatures is important. Other variables include water storage temperatures and system loop temperatures.

3. Heat distribution

Heat distribution and its impact on overall system efficiency consists chiefly of Btu load, the need for high or low temperature distribution and the presence (or lack of) insulation, and its effectiveness. Also, will the system be convection or radiant? High or low mass?

Of course, large radiant systems require a boiler or boilers with high output. A key advantage, however, is that when the thermal mass of a floor or heated surface has reached temperature, shorter and less frequent boiler cycle-times are required.

"Better yet, a boiler system with modulation permits the heating, and, later, steady heat-maintenance, of the heated surfaces," added Foley. "Either a fully modulating burner or the lead-lag staging of boilers would allow a system to meet ever-changing load requirements for best efficiency. Another option is to add mass to the piping system to increase boiler run times during periods of low demand. For this, insulated storage tanks can be used to contain volumes of water, easily adding mass to a piped system."

"Snowmelting systems pose a different challenge, high demand and high mass with extremely cold water/glycol temperatures," added Sweaney. "Here, the challenge is not short-cycling of the boiler. Thermal shock happens when

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freezing return-water temperatures come crashing into the heat exchanger in a long, hard, cold start."

The new generation of condensing boilers takes this icy slap in stride. Many modern boilers aren't susceptible to thermal shock, because their heat exchangers and waterways are built to handle it, especially condensing systems that give their best performance under these conditions.

The role of circulation

One of the most important things in achieving optimal circulation for hydronic systems is for installing contractors to match a pump's performance, or flow characteristics, to the specific job that it needs to perform within the system.

These needs can be accomplished manually or electronically. The latest advancements are responsive, energy-wise circulators such as Taco's wet rotor, variable speed (VDT, or variable ΔT) circs, and, when coupled with Zone Sentry or iSeries zone valves, circulation happens with extreme efficiency, especially during partial-load operation.

In this photo, variable speed circulators are used in conjunction with zone valves.

New, variable speed drive VDT circs have an integrated microprocessor-based variable speed differential controller. Installers simply dial in the design delta-T of the system or zone (from 5 – 50 F). The circulator automatically adjusts its performance to match the system's ideal Btu/hr output, while reducing fuel consumption four to five percent and eliminating velocity noise.

Unlike a ΔP (differential pressure) pump that's always on, always drawing power 24/7/365, a Delta-T circulator shuts off when there is no call for heat. "When it comes to comfort, it's all about supplying the right amount of Btu to zones at the right time," explained John Barba, Taco's training program manager.

"With a VDT circulator, the specific amount of heat delivered to the structure is optimized to match a building's heating load, regardless of how many zones are calling for heat, or as outdoor temperatures change," he added.

Return water temperatures play a key role in optimizing the system efficiency and performance of both cast iron and modulating-condensing boilers. Water return temperatures and boiler cycling are optimized by controlling the Delta-T.

The perfect hydronic storm: dropping Delta-Ts

Another concern is pressure differential within the system. As zone valves close, a system curve intersects a pump curve at higher pressure differentials.

One of the best solutions is to use a mid-flow, low head, flat-curve circulator. With such a pump, system pressure rises minimally, eliminating the need for a bypass valve. But – if the job has higher head requirements than the circulator can deliver, a better solution may be a variable speed pump.

"If all of the zones in a system are calling for heat, we may find that the delta-T drops to 16 degrees, not the 20 it is typically designed for," said Barba. "Doesn't sound like much, right? But that equates to about a 20% difference. With only two zones calling, the delta-T drops to about 15

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Smart, efficient near-boiler piping

Modern hydronic heating systems have evolved in complexity over the last few decades; no doubt we'll continue to refine and improve upon them. With this evolution, the need for proper piping design and technique has become more important.

Simple systems, such as a boiler and one or two baseboard zones, are pretty forgiving to piping error. However, systems that include radiant heat or fan coils aren't so tolerant. A single piping error in a radiant system, for example, could lead to a system that refuses to deliver the expected comfort and efficiency.

As boiler technology has pushed operating efficiencies to new heights, the need for correct near-boiler piping has become more critical. These components typically include the system expansion tank, fill (pressure-reducing) valve, air separator, and, in some cases, depending on system design, a circulator and system purge.

The arrangement of these components in the near-boiler piping is a critical point of consideration when installing the system, while also considering ease of access for later service work.

According to Jim Erhardt, national market manager, Watts Water Technologies, Watt's preassembled, pre-engineered Boiler Header Module is available for prompt shipment in this foolproof configuration (See photo):

- Placement of the circulating pump, with its suction port immediately downstream of the expansion tank, ensures that the pump's developed head pressure is added to system fill pressure.
- The fill valve is piped to the system with the expansion tank. This safeguards the valve from fluctuating pressure caused by the pump.
- Optimal placement of the system air separator — there's no better place for this component than at the point of highest temperature and lowest pressure. This is where dissolved gases are most likely to come out of solution and are most easily arrested and cast out of the system.
- Inclusion of a system purge — after all, if a need arises, we want quick and efficient purging of an entire multizone system, including the boiler.

The Power of Innovation

Introducing the only commercial size instantaneous water heater above 250,000 BTU/HR.

Once again, AERCO leads the way in commercial water heating technology with the introduction of Innovation, its newest line of premium water heaters. Featuring a tankless design, advanced condensing/modulating technology, and a scale-resistant heat exchanger, Innovation delivers performance and economic advantages to any system.

Here's why Innovation stands out from the crowd:

- Available in three sizes: 600, 800 and 1060 MBH
- Up to 99% efficiency
- High reliability
- Low NOx
- Small footprint
- +/-4° temperature control, thanks to feed-forward sensing and unmatched turndown
- Reduced standby and cycling losses

To learn more about the Innovation family of water heaters, visit www.aerco.com/innovation10

AERCO

AERCO International, Inc.
800.526.0288 • email info@aerco.com

Circle 24 on Reader Reply Form on page 65

Tankless is more: Exploring the Benefits

Plumbing Engineer offers its tankless report, a compilation of information from the major tankless manufacturers in the industry. Tankless' growth — even in this market — can be attributed to many factors, "While the federal tax credit incentives have been reduced drastically from previous levels, there are still a number of factors that are positively affecting growth. Local utility rebates, increased interest in energy efficiency and more efficient product development all contribute to the current growth rate," said David Chisolm, A. O. Smith brand manager. The manufacturers appear in no particular order.

Noritz America

11160 Grace Avenue
Fountain Valley, CA 92708
714.433.2905
www.noritz.com

Offering a maximum input of 180,000 Btu per hour and using state-of-the-art condensing technology, the NRC98 has an Energy Factor of approximately 0.93, or nearly 10 points higher than that of a comparable, conventional tankless model and over 30 points more than the EF for a standard gas-fired storage water heater. Available late spring, the NRC98 will be ENERGY STAR®-qualified.

Company History: Noritz America was established in California in 2002. Today, Noritz has corporate offices in five U.S. locations: Fountain Valley, Calif.; Dallas; Marietta, Ga.; Hawthorne, N.Y.; and Elk Grove Village, Ill. All five sites include showroom, training and technical-support facilities. In 2010, the facility in Marietta (Atlanta) underwent an expansion to include a showroom.

Company News: The tankless market is continuing the trend towards higher-efficiency, PVC-vented, condensing water heaters.

Condensing tankless water heaters use a secondary heat exchanger to boost efficiency by capturing more heat from combustion gases as they escape up the flue. This heat-absorption process, in turn, cools these gases enough to permit venting with less costly, more installer-friendly PVC piping, rather than Category III Stainless Steel.

Greater energy savings have played an important, but still secondary role in the rising profile of condensing tankless water heaters, which offer efficiency gains of approximately 10 to 15 percentage points over conventional units — from percentages in the low to mid-'80s to around 95%. Like their conventional counterparts, all condensing units carry the ENERGY STAR label.

Tankless Forecast: Studies show that water heating can account for up to 25% of the energy consumed in a home. Choosing a tankless water heater can drastically reduce this large piece of the household energy pie, while saving space and meeting all of a household's hot water needs.

Tankless FAQ: *Can I use the existing gas service when replacing a tank water heater with a tankless unit?*

No, not generally. The energy savings found with tankless heaters is due to the on-demand technology and fully modulating gas valves. Gas is burned only when hot water is required, and the tankless unit uses only the exact amount of gas required for the demand. This can save between 30 percent and 50 percent on water heating energy use. However, when the tankless equipment is firing, it typically requires more gas than a tank-type heater would for the identical demand. This, in turn, usually requires upsizing the gas service. Gas-line sizing charts must therefore be referenced.

Navien America

20 Goodyear
Irvine, CA 92618
www.navienamerica.com

All Navien units include a free intelligent remote control system.

Company History: Navien America, Inc., is a technology innovator of the condensing tankless gas water heater offering the highest efficiency on the market. The company was established to open new markets in the United States and Canada for parent company KD Navien. Navien America takes pride in providing high-quality and innovative products that are environmentally friendly, energy efficient, and offer high-tech comfort and convenience to its customers — products it describes as "the ultimate in energy efficiency with high-tech comfort." Navien America is an official Energy Star® partner.

Company News: Navien America, Inc.'s ultra-condensing tankless gas water heater models offer the highest thermal efficiency ratings in the industry. Sales of company's tankless gas water heaters and combination gas boiler/water heater units have tripled in the United States in the past several years alongside the expansion of Navien America into a new 130,000-square-foot corporate office and training facility in Irvine, Calif. In addition to the corporate location they also opened a new training facility and showroom in Cherry Hill, N.J.

Tankless Forecast: The tankless market is approaching one million units a year; this is against a back drop of about total market of eight million water heaters sold yearly in the Unites States. The tankless water heater market keeps taking share from the tank market because tankless water heaters make greater economic sense.

Quietside Corporation

8750 Pioneer Blvd.
Santa Fe Springs, CA 90670
717-243-2535

The ODW is available in 4 capacities from 99,000 Btu/h to 199,000 Btu/h. This unit provides performance and efficiency coupled with the comfort of on demand domestic water.

Company History: Founded in 1998 with facilities in California, Pennsylvania and Texas, Quietside is a master distributor of HVAC and plumbing equipment. Its products include Samsung air conditioning, as well as Quietside tankless water heaters. Quietside focuses on products that are accepted worldwide, yet are still niche products within North America.

Company News: Quietside just opened a new facility in Ft. Worth, Texas. The company also added 25,000 square feet to its already 50,000-square-ft. facility in Carlisle, Pa.

Rheem Mfg. Co.

1100 Abernathy Road
Suite 1400
Atlanta, Ga. 30328
www.rheem.com

Using condensing technology, the outdoor/indoor models of the Prestige Series Condensing tankless water heater units offer a .94 EF.

Company History: Founded in 1925 by brothers Richard and Donald Rheem in Emeryville, Calif., Rheem began manufacturing water heaters, boilers and tanks in 1930, and later added gas furnaces and winter air conditioners to its portfolio in 1947. Today, Rheem is the only manufacturer in North America producing both HVAC and water heating solutions. This uniquely enables the company to leverage efficiencies from its water heating and HVAC divisions.

Company News: In the fall, Rheem will introduce the second-generation Hybrid Electric Water Heater. This product will feature the hybrid industry's first color touchscreen LCD display, which will give homeowners greater insight into the home's water heating energy usage. The product also includes three user-friendly modes of operation: Energy Saver, High Demand (Normal) and Electric Heat Only.

Tankless FAQ: *Do dielectric unions need to be used during the installation of a tankless gas water heater?*

No. Unions are designed to prevent electrolysis between two dissimilar metals, such as a steel water tank and copper plumbing. This is not an issue with tankless water heaters and copper plumbing due to the copper heat exchanger.

Grand Hall USA, Inc.

3838 West Miller Road
Garland, Texas 75041
866.946.1096
www.eternalwaterheater.com

Company History: In 1985, Grand Hall, the Eternal manufacturer, opened the U.S. office in Dallas. Today, the 200,000-sq.-ft. distribution facility built in 2003 utilizes state-of-the-art technology to enhance operations. The facility also houses customer support, administration and marketing. In 2006, Grand Hall launched the first Eternal hybrid water heater in the U.S. and won many industry accolades. The third generation of the Eternal hybrid series was released in 2010.

Company News: Grand Hall now has Building Information Modeling (BIM) files available for the Eternal hybrid water heater. By working with SMARTBIM, Grand Hall can provide 3D digital representations of the hybrid water heater. The Eternal floor and wall mounted BIM versions are available at www.smartbim.com on the manufacturer objects webpage.

Tankless Forecast: Grand Hall believes that the tankless market overall will remain stagnant in 2011 since the category generally is geared toward new installations due to gas and venting replacements. Long term, Grand Hall expects the category to continue to grow due to the Department of Energy's renewed focus on energy efficiency in water heating. Also, as the economy improves, people will address more latent issues in their home or business and upgrade their water heaters.

Rinnai America Corporation

103 International Drive
Peachtree City, GA 30269
800.621.9419
www.rinnai.us

Rinnai's unique condensing design incorporates two innovative heat exchangers to achieve optimum heating value from every cubic foot of natural gas or propane. The stainless steel system recaptures residual heat from flue gases to pre-heat incoming ground water, which then circulates to the primary copper heat exchanger.

Company History: Rinnai Corporation is the world's largest manufacturer of gas appliances. Established in 1920 as a manufacturer of pressurized oil cooking stoves, Rinnai has expanded its product portfolio to include a wide range of residential and commercial gas appliances for efficiently heating water, air and food. Specifically, this includes continuous flow tankless water heaters, highly sophisticated ductless direct vent furnaces, vent-free heaters, kitchen appliances such as tabletop stoves, ranges and ovens, and dish washers and dryers. Rinnai products are known throughout the world for their superior quality and safety, modulating gas valve technology and sophisticated thermostatic control systems. The company built its reputation upon its achievements in technological innovation and manufacturing efficiency and is now one of the largest companies in Japan.

Company News: Rinnai's new branded valve kit is automatically packaged with all Rinnai tankless units (except the R98HPi/e large Btu units), simplifying the installation and maintenance of Rinnai products for installers.

Rinnai customers and installers now have the option to extend the labor warranty of their tankless water heater by registering the unit with Rinnai within 30 days of installation.

Tankless FAQ: *Can you use Rinnai tankless water heaters with a recirculation system?*

Yes. If you use an on-demand type of system, the warranty for Rinnai's condensing and non-condensing units remains unaffected. However, if you use a continuous recirculation system that runs directly through the Rinnai tankless unit, the heat exchanger warranty could drop to three years depending on the model. Please consult the manual for additional requirements and guidelines regarding recirculation to ensure the best fit for your application, and be sure to check with the pump manufacturer to see if they have models specifically designed to work with tankless water heaters.

AHI Technologies LLC (formerly American Hometec, Inc.)

3411 Silverside Rd.
Wilmington, DE 19810
877.662.6457
www.coilless.com

The patent pending ThermoLock™ digital temperature controlled electric tankless for sinks and eye washing apps come with AHI's Coilless Technology®.

Company History: In 2006, AHI Technologies LLC opened its doors as a designer and manufacturer of tankless water heaters, utilizing breakthrough, patented and patent pending technologies. In 2009, AHI Technologies launched its one-of-a-kind Coilless Technology® for electric tankless water heaters. Coilless Technology water heaters provide unlimited hot water with no lime-scale build up or required maintenance, and provide adjustable power consumption settings for users. AHI Technologies is also the first company to offer H2O Saver Technology, which enables water conservation with gas tankless water heaters.

New Products: American Hometec Inc. officially changed its name to AHI Technologies LLC. The company is seeing explosive growth in education, retail and commercial applications and continues to see a rise in demand for residential electric and gas tankless water heaters.

Tankless FAQ: *How do electric tankless water heaters compare to gas tankless water heaters in regards to piping & venting requirements for tankless installations?*

Electric tankless water heaters do not require expensive vent piping, but may require an electric service upgrade. Electric tankless are more suitable for point-of-use installations to save more energy and water. These units work well for low flow applications for which gas tankless units typically are not best suited. Coilless Technology-enabled electric tankless water heaters are also suited for taking care of multiple applications.

Stiebel Eltron, Inc.

17 West St.
West Hatfield, MA 01088
413.247.3380
www.stiebel-eltron.com

Company History: Dr. Theodore Stiebel founded Stiebel Eltron in Berlin in 1924. Initially, the company concentrated on the manufacture of electric water heaters for the German market. In the decades that followed, Stiebel Eltron branched out into additional products and pioneered the development of tankless, electric water heaters starting in the 1950s. Today, Stiebel Eltron is the largest manufacturer of tankless, electric water heaters in the world. The solar water heating and heat pump systems have been developed over the last 30 years and Stiebel Eltron is a world leader in solar thermal and heat pump technology, as well. The sales and service operation for the North American market is located in West Hatfield, Mass. Here, Stiebel Eltron maintains a sales, service, distribution, and spare parts facility. We have been located in North America since 1980.

Company News: The DHC-E (pictured), a series of microprocessor controlled tankless electric water heaters, is a powerful, flexible, point-of-use water heating solution. The mighty DHC-E 12 offers high 12 kW output, in an affordable, compact package. Great for that kitchen sink at the end of a long pipe run, or for multiple low-flow sinks in a commercial application.

Tankless Forecast: The short term over the last few months has shown an overall increase in tankless business, in spite of some monthly ups and downs. Stiebel Eltron is optimistic that the longer term will bring increased tankless sales for the year 2011. Given the current general demand for more energy efficient products and public incentives for people to invest in these products, Stiebel Eltron will be well positioned as 2011 develops and beyond to take advantage of improving business.

Eemax Inc.

353 Christian Street
Oxford, CT 06478
800.543.6163
www.eemax.com

If storing a small amount of hot water is needed, Eemax recently introduced a family of point-of-use hot water mini tanks ranging from 2.5, 4 and 6 gallons.

Company History: Proudly Made in America, Eemax was established in 1988 with a line of tankless heaters for commercial applications ranging in size from .5 gpm to about 1.5 gpm. The original Eemax technology was patented and quickly emerged as the most flexible technology on the market, which was a critical factor in the early stages of the development in the U.S. market for electric tankless heaters. In early 2000, Eemax responded to an emerging demand for electric tankless heaters with the introduction of a line of residential products so consumers could enjoy the benefits of tankless heating. Over the last five years Eemax has established a leadership position in the residential market to complement its leadership in commercial business.

Company News: Eemax continues to lead the electric tankless water heater industry with product innovation. Experts in developing electric tankless water heaters to meet a variety of hot water applications, form the full line of residential product to the most comprehensive line to commercial ETWH available. Eemax focuses on providing solutions to plumbing codes with the AccuMix™ line, which complies with ASSE 1070 to meet exit temperature requirements to the line of Safety heaters to meet ANSI Z358.1 for tepid water for safety eye, eye/face and drench showers. ProAdvantage™ is another product recently introduced, which provides the convenience of digital external finger tip temperature control and ruggedly constructed for industrial and commercial applications. Design trends focusing on more efficient building design, like elements spelled out in LEED, drive the use of electric tankless water heaters.

A.O. Smith

500 Tennessee Waltz Parkway
Ashland City, TN 37015
1-800-527-1953
www.hotwater.com

Company History: Delivering hot water solutions for more than 70 years, A.O. Smith produced its first residential water heater in 1939, establishing a tradition of innovation that continues to this day. Sold exclusively by plumbing wholesalers and plumbing contractors, A.O. Smith's selection of water heating units is unmatched for quality and diversity.

Company News: The company is seeing continued growth in the innovative new product it launched in 2010: the Next Hybrid® combination tank and tankless high efficiency water heater, which offers many of the advantages of tankless to the tankless consumer but at significantly lower installation costs. Bringing efficiency solutions with its mobile showroom, the tour schedule can be found at www.hotwater.com/mmv.

Tankless Forecast: A.O. Smith sees promising growth both in the short term and long term for the tankless market. Growth rates are estimated at 10%, annually. This growth rate is not as significant as in previous years; however, in an industry that experiences limited growth, the tankless market segment is growing steadily. Local utility rebates, increased interest in energy efficiency and more efficient product development all contribute to the current growth rate.

Tankless FAQ: *What are the special conditions that must be taken into consideration when installing a tankless model?*

Due to the higher But input, tankless models require at least a ¾" gas line to the unit. Most homes utilize a ½" gas line to the water heater, so in replacement applications particularly, the homeowner will most likely need to upgrade to a larger gas line. In addition, non-condensing tankless models require stainless steel vent material and cannot use the exiting B-vent commonly used with most conventional tank-type water heaters. Stainless venting can be expensive, although tankless models can be vented horizontally through an outside wall, which can help offset the venting cost. Condensing tankless models can use PVC venting, which is less expensive than stainless steel venting. In warmer climates, tankless models can be installed outdoors, eliminating the need for venting altogether.

WaiWela (ETS)

5350 Joliet St., #2
Denver, CO 80239
P: 303-339-4900
www.waiwela.com

The new WaiWela PHH-32RDV high efficiency condensing gas tankless water heater will support 3-4 major hot water functions. This unit uses condensing technology that allows it to be the most efficient tankless water heating solution at 0.94 Energy Factor. ENERGY STAR rated; qualifies for Federal Tax Credit.

Company History: Efficient Technology Sales, LLC, based in Denver, represents WaiWela Quality Water Heaters. Company founders have been committed to energy conservation and environmentally sound products since 1977. ETS pioneered the use and development of tankless water heaters in the United States. Tankless supplier is Paloma Industries of Nagoya, Japan. Today, WaiWela tankless gas water heaters and mini tanks have gained wide acceptance and brand recognition. In a crowded field, ETS is distinguished through product quality, exclusive product safety features and unparalleled education and customer support.

Company News: WaiWela (ETS) introduced two new products to the extensive line of gas tankless water heaters and mini water heaters. The high efficiency condensing tankless gas water heater PHH-32 is ENERGY STAR rated, 0.94 Energy Factor, and the most efficient gas tankless water heater in the market. New to the line of WaiWela Mini Water Heaters is the WM-6.0, a six gallon, under-the-sink water heater. ETS is also moving in to a newly constructed mezzanine classroom and training facility and will offer classes on tankless and solar thermal installation.

Tankless Forecast: Because of the state of the economy, rising gas prices and stagnant consumer spending, sales of tankless water heaters have only grown slightly. Economic recovery directly correlates to the tankless water heater industry. Everyone is looking to save money and tax incentives will play hand-in-hand with solar credits. Future growth will rely on consumers being educated about the energy efficiency and money saving benefits of tankless water heaters.

Bosch Thermotechnology Corp.

50 Wentworth Avenue
Londonderry, NH 03053
866.642.3198
www.Bosch-Climate.us

Company News: Bosch's focus is on serving our customers with high efficiency products for room climate and water heating that include leading technologies like geothermal heat pump, air-to-water heat pump water heaters and gas condensing water heating technology.

Bosch enhances the quality of life by providing solutions, which are both innovative and beneficial. Bosch is celebrating its 125th anniversary in 2011. Additional information can be accessed at www.bosch.com and www.125.bosch.com.

Tankless Forecast: Very strong growth on condensing high efficiency technology is expected to surpass the non-condensing segment by mid-2013; moderate growth on hybrid solutions.

• The main driver for Bosch installers is with retrofit business. Bosch sees commercial as an ideal segment for its growing product portfolio with good opportunities, however residential installations are the bulk of today's business.

• Solar Thermal Systems: The federal, state and local incentives are a positive driving force in the residential segment. Commercial is the main driver for Bosch Solar Thermal at the moment with large scale projects to be announced very soon.

Q&A with George Rudolph, National Sales Manager-Engineered Fluids for Noble Company

Founded in 1946, in Grand Haven, Mich., Noble Company has a reputation of providing quality, innovative products for the plumbing, hydronic, fire sprinkler, and tile industries. In addition to their headquarters and manufacturing facility in Spring Lake, Mich., the company also has a manufacturing plant in Baton Rouge, La. They manufacture a diverse product offering for several industries, which are sold through leading distributors in several channels.

As distribution continues to consolidate, what were once very individually defined markets have become more integrated as distributors seek additional revenue streams. As an example, traditional PVF distributors have branched out into the hydronic/solar/geothermal and fire sprinkler industries. This has given Noble opportunities to offer additional products to their existing distributor base, which at one time only purchased the shower pan liner from the company. Today, the company sells to HVAC/R, PVF, fire sprinkler, plumbing, and tile distributors nationally.

Recently, *Plumbing Engineer* caught up with George Rudolph, National Sales Manager-Engineered Fluids for Noble Company. The following is an excerpt of that Q&A:

How did you get involved in the industry?

After a short stint working for a sanitary chemical and paper products distributor, I jumped into the plumbing industry in 1993, taking a sales position with a plumbing fixture manufacturer. Prior to joining Noble Company in October 2009, I spent the previous 13 years in various sales and management capacities with one of the world's largest manufacturers of plumbing fixtures and fittings, working with leading wholesale distributors and their customers. So in a sense, I never really have left the bathroom in 20 years, but now I spend most of my time in the heating and fire sprinkler industries.

How can engineers/builders benefit from spec'ing your product (through quality, innovation, on-time shipping, customer service and satisfaction)

Noble Company products are engineered with the installer in mind. As we develop new products, consideration is given as to how the product installation will save time (and ultimately, money) and the benefits it will deliver post-installation. As an example, our Chloraloy CPE waterproof membrane carries a lifetime warranty against product failure, which is almost unheard of in the plumbing industry. Many plumbers have shied away from installing shower pan liners due to the potential for leaks, generally associated with the rotting and cracking of less-expensive PVC liner. Chloraloy may cost a bit more, but peace of mind is priceless in today's litigious world.

Our antifreeze fluids are blended with deionized water, which greatly reduces the potential for corrosion in hydronic systems, due to mineral content in municipal water supplies. Our FreeStyle Linear Drains are simple to install. They secure flat to the substrate without the requirement of leveling procedures and materials, thus reducing installation time.

We like to think that our customer service begins when you place the order, and it never ends. Our distributors have grown accustomed to impeccable lead times (quite often, our standard products ship within two days of order placement) and our technical support during and after the sale is "world class". We stand behind our products and constantly strive to improve our customer's experience in partnering with us.

Any news/new products at Noble?

With the recently announced code changes by the NFPA regarding antifreeze use in wet fire sprinkler systems, Noble has introduced two new antifreeze fluids. FireFighter ®PG38 (ready-to-use, factory pre-mixed propylene glycol) and FireFighter GL48 (ready-to-use, factory pre-mixed glycerine) were both launched in March of 2011. FireFighter GL48 is certified FBC™ System Compatible by The Lubrizol Corporation for use in BlazeMaster® CPVC piping systems. Noble has positioned itself as a leader in freeze protection for the fire sprinkler industry.

We introduced our FreeStyle Linear Drain about a year ago, and continue to gain momentum with commercial and residential applications for this unique product. The "Aging in Place" movement, along with hospital and healthcare requirements for barrier-free, curbless showers, and Universal Access, has been a demand driver for linear drains. As lifestyles evolve from bathtubs to showers, we believe this product has tremendous potential in the market.

Currently, we are looking at additional engineered fluid opportunities in the hydronic and fire sprinkler markets which would broaden our product portfolio and offer additional value to our customers.

Describe the core products/services offered at Noble.

Noble Company produces antifreeze and heat transfer fluids for hydronic, solar, geothermal, and fire sprinkler applications (under the Noburst and FireFighter brands); extruded chlorinated polyethylene (CPE) sheet membranes for waterproofing and sound and crack prevention under tile floors (Chloraloy and NobleSeal brands); pre-

formed shower bases (ProSlope and ProBase), niches, benches, and curbs for the plumbing and tile industries, and linear drains for tile showers (under the FreeStyle Linear Drain brand).

Noble Company provides unparalleled technical support to contractors and distributors, including installation seminars and fluid testing services. Heating systems containing antifreeze require annual maintenance checks, and this fact is often ignored. Our technical team can help contractors and homeowners extend the system life of our engineered fluids, which in turn prolongs the life of the mechanical systems as well.

How has Noble faced the struggling economy?

First, let me say that Noble Company is proud that all our products are made in America. We have two manufacturing plants (Michigan and Louisiana). Our marketing tag line is "American Company, American Products". So, while the last few years have been challenging, we continue to manufacture here in the USA and never succumbed to the pressure of downsizing our operations and moving manufacturing or sourcing raw materials off shore.

As a small to medium sized company, we are able to move with the trends and changing tides of the past few years. An emphasis on hotel construction moved to healthcare and education construction; a focus on condo development moved to military base development; and the new NFPA-13 code changes for fire sprinkler antifreeze showed our customer-responsiveness and market-urgency as we were the first antifreeze company to immediately provide Propylene-Glycol and Glycerin formulations in their new required mixes.

As is has been said…the only thing constant is change, and Noble Company prides itself on being dynamic.

How do you think Noble helps end users in struggling times? (rebates, training, education, reduced prices, etc.)

Training and education have always been the foundation of our product offering. During slower economic conditions, contractors generally have more time available and this allows us to spend valuable face time with them. While we have always strived to offer quality products at a fair price, it is the perceived value of the product which resonates with the customer.

Understanding how Noble Company products save time, money, and reduce the need for costly "call-backs" add up when times are tough. The product may cost a bit more, but if the installation time is reduced by half over traditional methods, or a lesser amount of our product is required than a competitor's to achieve the same result, we are delivering tangible savings. Educating our customers to that effect really delivers bottom-line results.

Do you deal directly with wholesalers? If so, describe the importance of the wholesaler manufacturer relationship?

As the decade-old adage goes, "it's wholesale or no sale". While the intent of that phrase was to delineate wholesale from big box retail, it really underscores the important role that wholesale distributors play in the market. Wholesalers perform several essential functions which allow manufacturers to grow. They extend credit to contractors which enable us to move product to market, they maintain a reasonable inventory of our products, they have solid product knowledge, and most importantly, they own the relationships with the people who install our products.

We work regularly with our wholesale distributor partners, both locally and nationally, to consistently deliver quality products, at a fair price, and in a timely fashion. Often, wholesalers have central distribution and logistics services which make it easy for us to get our products into smaller markets without excessive costs. Having a distributor who can get our product to a customer the same or next day allows us to grow and expand our markets together.

When business slows and projects become much more cost sensitive, wholesalers are able to bridge the gap based on the relationships they built with contractors. While price is, and always will be, a consideration, people still buy from people they trust, and our wholesalers have earned that trust with their customers based on years of building relationships.

What is Noble's presence globally?

The majority of Noble Company sales are from here in the USA, Canada, and Mexico. However, when we go overseas, we go big. The largest building in the world is in Dubai, United Arab Emirates. It is called the Burj Khalifa. This building has our NobleSeal waterproofing products throughout and was quite an exciting project for us. In addition, we have other projects in the Mid East. This area of the world wants quality American products, and we are thankful Noble is on their shopping list.

Describe the process of getting your product code body certified. Which code bodies certify your products and does it vary product to product?

The organizations that certify our products are many, as our product line is diverse. Noble products have all the necessary certifications required by our markets. Agencies like the ICC (International Code Council) PMG listings certify plumbing, mechanical, and fuel gas products meet requirements in codes and standards. UPC and Canadian approvals are provided by the IAPMO (International Association of Plumbing and Mechanical). These are two of the organizations we work with. Our engineering staff works closely with each code body. In addition, Noble is involved with many industry associations to keep abreast of changes and trends that could affect certifications. ■

Lose the Tank, Save the Energy

Metropolitan Industries replaced the old tank water heaters with three Navien NR240A natural gas tankless water heaters, each rated 98% efficient with a Btu rating of 199,000, drastically reducing the cost of heating the mansion's water.

Tankless water heaters or hot water on demand water heaters provide hot water only as it is needed, reducing the standby energy losses associated with typical storage water heaters. As one might expect, and as the U.S. Department of Energy has indicated, this energy savings will help a facility or dwelling save money.

Among the most popular benefits of tankless water heaters are the constant supply of hot water that reduces consumption and lowers water bills, and the significant energy savings that puts money back in the end user's pocket while qualifying the purchaser for Federal tax credits under Section 25C of the Federal Internal Revenue Code for the tax years of 2009 and 2010.

For homes that use 41 gallons or less of hot water daily, tankless water heaters can be 24% to 34% more energy efficient than conventional storage tank water heaters. They can be 8% to14% more energy efficient for homes that use a lot of hot water — classified at around 86 gallons per day by the U.S. Department of Energy.

The average efficiency of the available tankless water heaters on the market is between 82% and 93%. And in fact, the Navien condensing tankless water heater is 98% efficient, one of the highest rated in the industry.

Navien America Inc., based in Irvine, Calif., achieves this tremendous efficiency thanks to its stainless-steel primary and secondary condensing heat exchangers, which are able to recover the thermal energy in the condensation that would otherwise be lost. The use of stainless steel primary and condensing (secondary) heat exchangers allows up to 20 times more resistance to erosion and condensate corrosion than the typical copper heat exchanger.

Navien units are able to provide instantaneous hot water because of the built-in hot water recirculation pump and buffer tank, which puts hot water at the faucet the moment it is turned on. This neat feature saves water and reduces water bills since a homeowner won't be waiting for the hot water to arrive to faucet. Navien units also include dual-redundant microprocessors to ensure uninterrupted operation. A fingertip Intelligent Remote Control System is supplied with every unit, allowing the owner to easily make any needed adjustment to the water heater from the inside comfort of their home.

Navien's contractor-friendly design allows the use of PVC venting up to 100 feet, reducing the costs of installation dramatically by eliminating the need for stainless steel venting. Another benefit of PVC venting is that it allows the end-user to install the unit right next to the old tank water heater — eliminating the need to move the unit to an outside wall. And each of these units comes with peace of mind in the form of a 15-year warranty, one of the best in the industry.

Metropolitan Industries is the authorized representa-

Built in the 1800s, the 8,000-square-foot University of Illinois President's Mansion is occupied by the University President and sits on 10 acres of land. During formal events, hot water, or the lack of it, was a constant issue — especially during graduation, sporting events and meetings. If more than three people showered at the same time, the hot water supply would run out.

tive of Navien tankless water heaters for the entire state of Illinois, Northern Indiana and half of Missouri. Two recent installations by them demonstrate both the commercial and residential application capabilities that incorporate energy-savings for the end-user.

President's Mansion - University of Illinois

The University of Illinois President's Mansion in Champaign, Ill. was an interesting application requiring the muscle and efficiency of a Navien solution.

Built in the 1800s, the 8,000-square-foot mansion is occupied by the University President and sits on 10 acres of land. Such amenities include over a half-dozen bathrooms, eight bedrooms, servant quarters and executive kitchen.

The President's Mansion is a tool used to entertain dignitaries, donors and other very important people. During these events, hot water or the lack of it was a constant issue — especially during graduation, sporting events and meetings. If more than three people showered at the same time, the hot water supply would run out.

The existing hot water heating system consisted of two 100-gallon natural gas tank water heaters that were only 60% efficient when new, and lacked sufficient hot water even when the house was only partially occupied.

Given the existing system was a tank system, heating the water when the mansion was vacant was an expensive issue as well. Tank systems have an eternally lit pilot flame and will turn on to heat the water periodically even when demand is at its lowest, unlike a tankless system that only uses energy on demand. Also, as minerals are prone to build-up in the tank over time, the heaters sometimes become less and less efficient thereby adding to the energy costs.

Metropolitan Industries replaced the old tank water heaters with three Navien NR240A natural gas tankless water heaters, each with a Btu rating of 199,000. These new water heaters — installed in June 2010 — provide an endless supply of continuous hot water and with 98% efficiency, reduces energy costs associated with the Mansion. The systems are on a recirculation loop that saves an average of 12,000 gallons of water per year because the need to "wait" for hot water to arrive at the tap is eliminated. Since the installation, supply issues have been eliminated and the costs of heating the water were drastically reduced.

Sunny Hill Nursing Home

After reading an article written by Metropolitan released in a trade magazine and also attending a seminar conducted by Metropolitan Industries, the Maintenance Director of Will County approached HVAC Division manager Matt Brickey for his input regarding replacing existing commercial hydronic boilers with a skid-mounted Navien package.

The nursing home used their massive hydronic boilers to supply heat to their domestic hot water storage tank through an internal shell and tube heat exchanger. The problem with this configuration is inefficiency because the huge boilers would short cycle 24/7 due to satisfying

Pictured is a prefabricated domestic heating system skid consisting of eight 98% efficient Navien tankless water heaters, a variable speed supply pump that circulates domestic water from the domestic storage tank to the heaters, a control system and all the necessary piping & valves manufactured by Metropolitan Industries Inc. for Sunny Hill Nursing Home.

the load quickly, turning off, and then turning back on again shortly thereafter due to a drop in domestic water temperature.

Short cycling causes numerous issues for a heating

Case study

Continued from page 51

system. One, it causes more stress on the boiler components by constant expansion and contraction. Boiler parts will wear and fail quicker than their intended life cycle. The second issue is the amount of wasted heat energy that is thrown up the stack. Each time a boiler turns on, or off, it goes through a purging process. During this process, a substantial amount of energy is lost in the form of wasted heat when the boilers short cycle.

Metropolitan's solution was designing a heating system that can directly heat the domestic water more efficiently and allow the maintenance staff to shut down their existing boiler plant in the warmer months. Metropolitan supplied a skid-mounted 98% efficient Navien condensing domestic heating system that modulates and heats the existing domestic tank without any short cycling. A unique feature of these units is the ability to cascade them for high-Btu applications.

The system included eight tankless water heaters, a variable speed supply pump that circulates domestic water from the tank to the heaters, a control system that monitors tank temperature and adjusts pump speed accordingly by sensing the flow and all the necessary piping and valves manufactured on a prefabricated skid for a complete functional system. This system also allows for ease of installation by the contractor because field work is limited to making piping connections from the tank to the skid, bringing electrical power to a single point connection, and running the CPVC exhaust & intake to the outside wall.

The anticipated natural gas energy savings during the summer months is expected to be a whopping 50% to 75%. In both project examples, the end user saved money because of reduced energy demand

The anticipated natural gas energy savings during the summer months is expected to be a whopping 50% to 75%.

In both project examples, the end user saved money because of reduced energy demand by using Navien condensing tankless water heaters. Metropolitan Industries stocks a large supply of these units in their shop ready for immediate delivery, and can fabricate large custom commercial systems for contractor installation. ■

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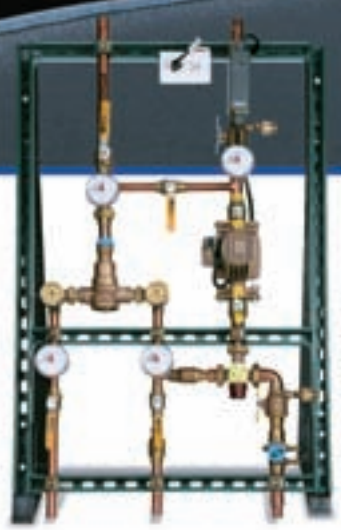

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Product Application

Tyco Pathfinder CPVC Fittings Detect Sprinkler System Dry-Fits

It takes a skilled contractor to deliver quality residential fire sprinkler system design and installation services for a 116,000-square-foot building, so Buffalo, N.Y.-based Clover Construction tapped the Davis-Ulmer Fire Sprinkler Company. A leading fire protection and alarm firm in New York state, Davis-Ulmer demonstrated its expertise for the Buckley Square Apartments in Salina, N.Y.

Construction started on the suburban-Syracuse senior living facility in late fall of 2010. Because the building is so large, its construction required nine phases. The construction schedule dictated that the sprinkler system, designed to NFPA 13R standards with more than 28,000 feet of one-inch CPVC pipe and 1,500 one-inch fittings, be installed – and tested – in phases along with the rest of the building.

PATHFINDER Fittings Provide a Solution

Nine months before construction started, Davis-Ulmer asked Tyco Fire Protection Products (TYCO), a world leader in fire suppression technology, to help with solutions for installing and testing the system in concert with the construction schedule. Both companies quickly realized that freezing temperatures and a lack of on-site water would create challenges to testing the fire suppression system in phases, specifically when it came to identifying any improperly cemented joints, also called "dry-fits," that might exist in the system.

TYCO's PATHFINDER CPVC Fittings have been designed specifically to help installers quickly and efficiently identify dry-fits using a low-pressure air test.

TYCO introduced Davis-Ulmer to its new PATHFINDER CPVC Fittings, designed specifically to help installers quickly and efficiently identify dry-fits using a low-pressure air test.

"There are many instances where you'd rather test with air than with water," said Don Ricca, residential product manager at TYCO. "Just like the Buckley Square Apartments project, sometimes jobsites don't have water available. Sometimes it's very cold outside, and you can get into freezing situations. It's very beneficial to be able to test with air."

Hildreth explained that after analyzing the conditions specific to the Buckley Square Apartments project against the benefits of the new TYCO product, making the choice to use PATHFINDER Fittings was simple.

"We've been installing CPVC systems for numerous years, and Davis-Ulmer has a successful history with TYCO," said Hildreth. "We chose to exclusively use PATHFINDER Fittings because we were able to conduct air testing in phases, which allowed the owner and other contractors to build in stages. These phased air tests allowed the other contractors on the jobsite to progress with the finishes in the front while still doing framing on the back.

PATHFINDER Fittings Identify Dry Fits

"We know that sprinkler installers have their own methods for identifying dry-fits; PATHFINDER standardizes that process," said Ricca. "PATHFINDER technology allows contractors to use a low-pressure air test to quickly and efficiently locate dry-fits."

The first step in a low-pressure air test is to apply 15 psi of air to the system. The system must hold that air pressure for a minimum of 15 minutes.

"The key to PATHFINDER technology is two-fold. First, any drop in air pressure is your signal that you may have a dry fit," Ricca said. "Second, each PATHFINDER Fitting includes a small, grooved channel designed to allow air to escape when there is no solvent cement applied to the fitting. The 'hissing' sound that results from air escaping through the channel is how you identify the exact location of the dry-fit."

If a dry-fit is identified during the low-air-pressure test, the system must first be depressurized. The dry-fit is removed and a solvent cement weld is applied to the new joint. After the solvent-cement weld is given the proper time to cure, the system must be tested again with low-pressure air to ensure that no other dry-fits are present.

Salina Deputy Fire Marshal Jason Perkins, the building official charged with final sign-off of the system, observed a low-pressure air test and PATHFINDER Fittings in action.

"I'm confident in the test because it is UL approved. It's part of the manufacturer's specifications that they're required to do the testing," said Perkins. "What I like about PATHFINDER technology is the assurance that it gives me that there will not be any dry-fits in the system."

PATHFINDER Fittings Obtain Davis-Ulmer's Approval

Hildreth said Davis-Ulmer will continue to use PATHFINDER Fittings in future projects.

"Now that we have a comfort level with PATHFINDER Fittings, we'll use them in more applications going forward because of the benefits of using air prior to water," Hildreth said. "The owner and the end users gain reassurance that they're not going to have problems during final testing."

"Contractors who make the choice to use PATHFINDER Fittings will quickly see how the technology improves their ability to deliver quality, dry-fit-free installations."

For more info visit www.tycofsbp.com. ■

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- Industry's highest efficiency rating - 98%
- Ready Link® Cascade System
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- Extended lifecycle utilizing dual stainless steel exchangers
- Advanced remote control - NR-10DU
- Industry's best warranty!

Remote Controller
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Product News

Plumbing Engineer's Editor's Choice

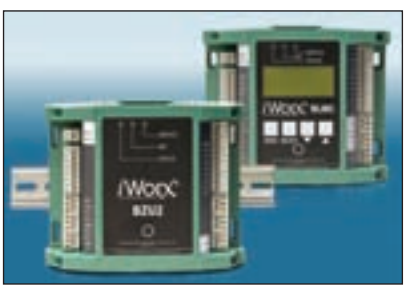
Configurable Rainwater Harvesting Systems

Configurable Rainwater Harvesting Systems for commercial, institutional and residential applications can reduce water consumption by up to 65%. BRAE's commercial and institutional systems offer storage capacities of 200 to over 2 million gallons, and manage the filtration, storage, distribution and treatment functions typical to rainwater systems. Above and below ground residential systems store between 225 and 3,000 gallons of rainwater to meet a range of consumer demands. BRAE specializes in helping customers interface rainwater systems with building management systems and developing tools to showcase their investment and enrich curricula in educational environments. **BRAE, a Watts Water Technologies company**.

Circle 100 on Reader Reply Form on page 65

iWorx® Enhanced with Open Protocol

iWorx is a web-based building management, monitoring and control system designed specifically for high-



end residential and light commercial markets. iWorx is an easy-to-install, simple-to-use, solution that provides a full suite of control product applications that range from boiler controls, heating and air conditioning applications, and even include products for emerging new technologies like BTU metering. iWorx is now even more configurable and flexible with an interface to the NiagaraAX Framework that provides simple integration with other Building Automation Systems. **Taco.**

Circle 103 on Reader Reply Form on page 65

Fire Protection Seismic Design Tool

The new tool allows engineers, architects and contractors to determine whether or not their fire protection bracing systems will meet their project's seismic load requirements, and to automatically create project submittals. Unlike other seismic tools

offered in the industry, Anvil's tool will be provided free-of-charge on its website. **Anvil International, a subsidiary of Mueller Water Products, Inc.**

Circle 104 on Reader Reply Form on page 65

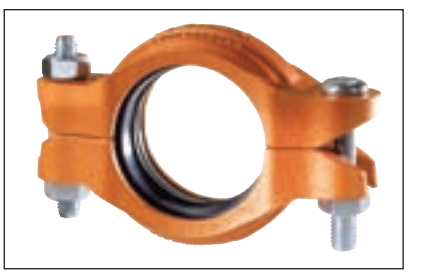
Concealed Undermount Faucets

A one-piece, cast brass body delivers unsurpassed durability and strength. Fewer parts and more pre-assembled components than previous models save time for quicker installation. New on the faucets is a retrofittable restricted-swing spout option that keeps the water off the deck and in the sink. All faucets meet the widest range of applications with a fully-threaded valve body that adjusts to almost any deck thickness. Third-water and adjustable-center models are available for added flexibility. **Chicago Faucets.**

Circle 102 on Reader Reply Form on page 65

Pivot-bolt coupling

The GRINNELL Figure 640 Pivot-Bolt Coupling joins rolled grooved, hard-drawn copper tubing systems ten times faster than traditional joining methods and in less than half the



time of other standard grooved couplings. Receives approval from UL, ULC, UPC, and NSF-61 Certified. Available in sizes 2" to 8". **Tyco Fire Protection Products.**

Circle 105 on Reader Reply Form on page 65

INTRODUCING THE ACCELERA® 300 HEAT PUMP WATER HEATER: ACCELERATE YOUR SAVINGS!

New!

Energy from nature.

The new Accelera® 300 can extract up to 80% of its energy requirements from the air around it. Heat pumps have been around for decades, but a heat pump water heater is a brand new concept. The Accelera® 300 works like an air conditioner - but instead of dumping the heat outdoors, it puts it into the water.

The Accelera's compressor and fan consume only 1 kWh of electricity to generate the heat equivalent of 3 – 5 kWh. The efficiency of the unit goes up with increasing ambient air temperatures. This ground breaking efficiency redefines what a water heater is capable of, and what savings can really mean !

QUALIFIES FOR FEDERAL TAX CREDIT OF: **$300**

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Product News

Pressure Balancing Shower Valve

The new shower valve offering includes a solid range of products to meet each customer's specification requirements, and all products are available for immediate sale. The shower valve features solid brass body construction, metal handle and trim, and a replaceable ceramic cartridge with rotary actuation and adjustable temperature limit stop. Valve products can be sold as a package with all pieces—shower valve, shower head, trim, and tub spout—or as separate pieces to meet a particular application. The trim kit and other components can also be ordered separately to suit specific installation requirements. Additional features: integral supply stops with spring checks (all brass), ½" sweat connections, shower valve opens from cold to hot, 2.5 gpm shower head, ASSE 1016 listed and ADA compliant. **T&S Brass.**

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Three-Phase 480v Delta Units

With a compact design that delivers high-powered results, the Thermostatic Three-Phase, Series Six, and Series Twelve "Delta" models range from 20kW to a whopping

150kW (largest in the industry) powerhouse for commercial and industrial applications. Each model features a flow device that activates the heater only on demand so there is continuous hot water and no standby heat loss, no wasted water and energy making them 99% energy efficient. **Eemax, Inc.**

Circle 108 on Reader Reply Form on page 65

Plumbing Engineer's Editor's Choice

Hydro generator lav system

The One HydroVantage™ series hydro generator lavatory system is a paired performance package combining the Zurn hydro generator sensor faucet along with Zurn vitreous china lavatories and trim packages. The hydro generator faucet is a self-sustaining hydroelectric faucet that generates its electrical power and comes complete with a 10 + year back up battery. Zurn One HydroVantage systems are available in various lavatory designs, faucet styles and trap, supply and drain configurations. **Zurn Engineered Water Solutions®.**

Circle 107 on Reader Reply Form on page 65

Pre-assembled Sump Pump System

The new SPAC-Series is a fully assembled sump pump system for residential applications. The 18" x 22" polyethylene sump pit features a fully installed sump pump with a 1½" schedule 40 PVC discharge. A molded raised platform in the bottom of the pit secures the pump during shipping and reduces the potential for debris to enter the pump. Systems are available in either 1/3 hp or 1/2 hp, and are designed with energy efficient motors that require less electricity to operate. **Liberty Pumps.**

Circle 109 on Reader Reply Form on page 65

Anystream® Icon™ 8-Jet Showerhead Upgrades

The newly redesigned Anysteam® Icon 8-Jet showerhead joins the Icon 6-jet showerhead, which was redesigned and introduced in March. The Anystream® Icon™ showerheads have undergone many changes over the years but still retain their signature spray performance which made them famous throughout the plumbing and hospitality industry. Upgrades to the product included a metal faceplate free from screw holes, contoured peanut handle, and extended body to create a smooth body shape up to the connection ball. **Speakman Co.**

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resources to participants in the 2011 edition of the Cleantech Open. Grundfos executives will serve as subject-matter experts, mentors and judges to early-stage cleantech startups in the Cleantech Open, providing these entrepreneurs the knowledge and business relationships that will increase their ability to make a tangible impact on economic growth and environmental change

Richter to keynote WaterSmart Innovations opening session

LAS VEGAS — Brian Richter, an international authority on river conservation and director of The Nature Conservancy's Global Freshwater Program, will be the opening session keynote speaker for the 4th Annual WaterSmart Innovations Conference and Exposition, Wednesday, October 5, in Las Vegas.

At The Nature Conservancy, Richter's program promotes sustainable water management with governments, business and local communities. He has consulted on more than 120 river projects worldwide, focusing on the challenge of sustaining healthy rivers and lakes, while meeting human needs for water and energy.

His global expertise makes him highly sought by international corporations and investment banks seeking insight on watershed management issues. He is the developer of the Indicators of Hydrologic Alteration software, and his technical and analytical tools are used by water managers and ecologists worldwide.

ASHRAE presents 2011 Lou Flagg Historical Award to global collaborators for their 'History of Radiant Heating and Cooling Systems'

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) has presented the prestigious 2011 Lou Flagg Historical Award to Canadian Robert Bean, R.E.T., P.L. (Eng.) and two collaborators from Denmark and South Korea on a recently published, two-part historical series on radiant heating and cooling.

The trio was recognized at the 2011 ASHRAE Annual Conference in Montreal, held June 24-29, for the most outstanding recorded history of either projects or persons related to the heating, ventilation, air conditioning and refrigeration (HVACR) industry.

Bean, who served as the lead researcher, and co-authors Professor Bjarne Olesen, Ph.D., from the Danish

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Technical University and Professor Kwang Woo Kim, Arch.D., from the Seoul National University were recognized for their global collaborative work on the "History of Radiant Heating and Cooling Systems," published in the January and February 2010 issues of the ASHRAE Journal. Bean, Olesen and Kim, who began the project in 2006, are specialists in building energy and indoor environmental quality and have extensive knowledge of radiant-based HVAC systems.

A Registered Engineering Technologist through the Association of Science and Engineering Technology Professionals of Alberta (ASET), Bean is a graduate of N.A.I.T.'s Building Construction Engineering Technology program and a Professional Licensee (Engineering) through The Association of Professional Engineers, Geologists, and Geophysicists of Alberta (APEGGA).

NFPA releases additional code resources

WASHINGTON — The National Fire Protection Association (NFPA), www.nfpa.org, announced additional NFPA resources in PDF format. A PDF of the 2011, 2010 and 2009 National Fire Codes® sets can be downloaded for offline access and searching across the complete code set. The PDFs can also be maintained as an electronic archive. Several NFPA codes are now also available in redline editions which, through the use of color, identify changes in the code from one edition to the next.

The PDF format allows users to access an electronic version of the codes after a one-time purchase and a single download. Documents are searchable through the advanced search feature, which allows the matching of words and phrases. Having these materials in PDF allows users to access all of the codes anytime and anywhere, without an Internet connection. All text, tables and images within the documents can be copied for reuse, and annex material is available through embedded links.

HOK/Vanderweil team wins national competition

BOSTON — HOK and Vanderweil Engineers recently won a design competition with a proposal for a visionary, net-zero retrofit of a 1960s federal building in Los Angeles. The Washington, D.C.-based team, which worked on a volunteer basis for three months to create the winning submittal, offered a fully integrated design solution highlighted by solar collection, photovoltaic production and the breakthrough use of an onsite microalgae bioreactor system.

The HOK/Vanderweil team's proposal, "Process Zero: Retrofit Resolution" demonstrates how an aging downtown office building, owned by the U.S. General Services Administration (GSA), could yield an 84% reduction in overall energy demand through energy conservation and renewal strategies. Onsite energy generation would supply the remaining 16% needed to achieve the net zero goal.

The team's recommendation of the use of an energy-producing envelope system —highlighted by a modular system of algae tubes along the building's façade — was among the many strategies that appealed to the Next Generation jury. The tubes would absorb the sun's radiation to produce lipids for onsite fuel production, while also shading interior office spaces within the 1.2 million square-foot building. The 25,000-square-foot microalgae bioreactor system would generate 9% of the building's power supply following the retrofit.

"Harvesting algae to generate energy is a new concept for building applications, but it shows a lot of promise," says Brandon Harwick, PE, who led the design team, along with HOK's Sean Quinn. "Urban buildings would be especially suitable, given the carbon dioxide levels found in city environments. As design professionals, we need to remember that nature has a lot to offer."

The 15-person team "put in a lot of weekends and long nights" says Harwick. "It was many hours of research, design and number crunching, but we also tried to be as creative as possible and to bring a lot of ideas to the table. We wanted to demonstrate an approach that not only reflects the latest in design and technology but also calls for a whole new mindset, one that engages and involves tenants as well."

Highlights of the retrofit proposal include the following:

• A thin film photovoltaic façade solar shading system
• Rooftop photovoltaic panels
• Integrated solar-thermal and photovoltaic rooftop panels for space and domestic water heating
• An algae bioreactor system
• A cloud computing system that contributes to an 80% reduction in office equipment energy use
• Radiant floor heating
• Geothermal cooling
• Rainwater harvesting
• Energy recovery mechanical ventilation
• A central atria for daylighting and natural ventilization
• Phase-changing insulation material in ceilings to help extend natural ventilation periods
• Daylight controls that reduce artificial lighting energy consumption by 75%

NIBCO holds open house for plant expansion and distribution center

ELKHART, IND. — NIBCO held a ribbon-cutting ceremony and open house on June 9, 2011, to mark the official completion of its iron valve plant expansion and grand opening

of its new distribution center at 4747 State Highway 151, Blytheville, Ark. The event was well attended by a large group of customers, city and state officials, business leaders and NIBCO executives.

"The NIBCO brand stands for quality products, pride in workmanship and service excellence," said NIBCO chairman of the board and CEO Rex Martin. "Due to the growing demand for NIBCO valves in the international and domestic markets, this facility reflects our strategic commitment to keep manufacturing and distribution in Blytheville, while increasing our production capacity to meet our customers' needs. The new distribution center right here at the point of manufacture allows for even faster customer service."

Attendees toured the 281,500-square-foot iron valve manufacturing facility and new distribution center to learn more about the company's best practices, including lean manufacturing, and its commitment to safety, quality and service.

More Industry News on page 62

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EPA administrator Lisa Jackson takes a closer look at the inner workings of one of Moen's WaterSense-certified showerheads.

Moen commemorates fifth anniversary of WaterSense® program

NORTH OLMSTED, OHIO — Moen, the 2010 WaterSense® Manufacturer Partner of the Year, welcomed U.S. Environmental Protection Agency (EPA) administrator Lisa P. Jackson to its global headquarters on Friday, June 17, 2011. Mike Bauer, president of Moen's U.S. businesses, facilitated a tour of its facility, including its design reliability lab, to commemorate the fifth anniversary of the WaterSense® program and to highlight the company's products, programs, manufacturing processes and testing methods for its WaterSense-certified products.

"At Moen, we realize that everything we do has a dramatic impact on future generations, and that includes how we use our precious natural resources, particularly water," said Bauer. "On the fifth anniversary of the WaterSense program, Moen is very pleased to be a partner that not only assists consumers and protects these resources but is also committed to developing stylish, reliable products that save water without sacrificing performance."

Leonard Valve releases building management interface for mixing valves

CRANSTON, R.I. — The new Building Management System Interface (BMSI) from Leonard Valve Company allows real-time temperature monitoring of water temperature mixing valves and communication to facility building management systems.

Through the use of a point-of-use connection with integrated building management software, BMSI gives real-time, accurate temperature readings in order to monitor tempered water to the domestic hot water system. The water temperature system can be integrated with existing installations or new designs.

BMSI verifies accurate temperature readings with a MODBUS TCP/IP protocol. The temperature is displayed on the digital readout and can be monitored remotely using the CAT-5E Ethernet connection. ■

Industry Movers

Fluidmaster announces new president

SAN JUAN CAPISTRANO, CALIF. — Fluidmaster® Inc. selected Todd Talbot to lead its global operations as company president. Talbot brings to Fluidmaster almost 30 years of building products industry experience, most recently as a principal partner since 2009 of MegaWestern Sales, a privately held firm representing manufacturers in the plumbing industry. After launching his career in 1982 as a sales representative for Hoyt Water Heater Company, Talbot moved to Masco Corporation in 1988, where he served in a number of leadership roles over 19 years. Talbot became president of Alsons and later was president of both the Alsons and BrassCraft business units.

Dewberry names department manager

Dewberry promoted Shahidul H. Joarder, PE to department manager of mechanical, electrical and plumbing (MEP) services in the New York City office. In his new position, Joarder will manage daily operations of the MEP department.

PMI names technical director

ROLLING MEADOWS, ILL. — Plumbing Manufacturers International (PMI) announced the appointment of Len Swatkowski as technical director.

Most recently, Swatkowski was a program manager for Jarden Consumer Solutions in Boca Raton, Fla., where he directed the U.S. and Asian staff in the completion of numerous projects contributing to the home environment segment. During the 1990s, he spent a decade in an executive technical role for the Association of Home Appliance Manufacturers (AHAM) in Chicago, before the organization relocated to Washington, D.C.

In his new position, Swatkowski will be responsible for analyzing and reporting proposed code and standard changes, maintaining and managing effective relationships with PMI members, certification agencies and industry peers and representing PMI at various industry meetings.

Designer's Guide

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facturers have specialized programs for figuring the size of the source equipment.

Dental compressed air is sized based on 3 SCFM per DTR (including dental treatment and oral surgery) with some diversity depending on the number of rooms. To this flow rate, you must add the demand of the lab and sterilizers, if the compressors are serving this need. Flow rates are a function of the kind of equipment served, so some research is required here. A 50% diversity is frequently applied, since the equipment is not used continuously.

Sizing of the other medical gases, when they are required for surgical treatment, oral surgery and recovery, is done much the same as for any hospital. These are all critical areas, so care must be taken to treat them as such, with generous diversities and dedicated zone valve boxes as you would provide for any OR and recovery area. ■

TimothyAllinson 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.

Hydronic systems

Continued from page 41

degrees, a 25% difference. And with only one zone calling, the delta-T drops to 12 degrees, a whopping 40% difference."

"Solve the dilemma of dropping Delta-Ts by using a fixed delta-T, variable-speed circ," he says. "You may never have to worry again about over-sizing a circ."

Rather than searching for the point where the system curve intersects the pump curve, let the pump curve self-adjust every moment and every day of the heating season.

Variable speed circs are easy to set up. Simply dial in the required delta-T. "The simplicity of it — pump choice, installation and performance — is a huge asset for us," concluded Pollets. "We know exactly what pumps to apply and how to finesse hydronic flow . . . like dialing in comfort for our customers."

And so the efficiency equation all comes back to the sum of many parts. If the system's many components are designed to work in concert with one another, the high efficiency grail can be achieved. ■

John Vastyan, a journalist whose work focuses on the plumbing and mechanical and radiant heat industries, owns Common Ground, a trade communications firm based in Manheim, Pa. He can be reached at 717/664-0535 or cground@ptd.net.

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A TME Publication

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☐ Sprinkler/Fire Protection (d) ☐ Plumbing (e)

4 I am employed by one of the following:
☐ Architectural/Engineer (a) ☐ Mechanical Engineer (b) ☐ Building Owner/Engineer (c) ☐ Consulting Engineer (d) ☐ Contractor (e) ☐ Design–Construct Engineer (f) ☐ Architect (g) ☐ Manufacturer (h) ☐ Manufacturers Rep (i) ☐ Government (j)
☐ Mechanical Contracting (k) ☐ Other (x) _____

5 My title is: ☐ Construction Manager (c) ☐ Engineer (e) ☐ Owner (o) ☐ President (p) ☐ Specifier/Design (s) ☐ Vice President (v)
☐ Other _____

6 Do you design and specify products? ☐ Yes ☐ No

7 I belong to the following professional organizations:
☐ ASPE (a) ☐ ASSE (b) ☐ ASHRAE (c) ☐ NSPE (d) ☐ Other (e)

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August 2011

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Letters to the Editor

Ron,

Very interesting article and something I preach day in and day out, as you can see by the name of my company. One of the unintended consequences not realized by many designers is that boiler manufacturers happily point out that they have flue temperature limiters installed in their boilers, but they fail to pass on to the designer (or the designers don't do the math) that when a boiler is set up for reset or traditional

> Unfortunately, these lean times and the government's recent efficiency requirements for funding are sparking many misapplications without the proper guidelines for safety and proper operation.

radiation apps, the potential for 180 – 90 degree water temps (+200 flue temps) are most definitely the requirement for the load. Forget the obvious safety concerns of control failure or scaling, this is an intended application and thus could lead to unintended shutdown or modulation of the burner when the higher water temps are needed. No heat, wrong boilers and wrong flue material!

Obviously, I have a couple of horses in the race on this subject, but we try to inform and do our projects right, no matter what the manufacturer says. Unfortunately, these lean times and the government's recent efficiency requirements for funding are sparking many misapplications without the proper guidelines for safety and proper operation. What good is a 90%+ boiler if it is short cycling due to a safety control? I've lost two recent projects due to PVC and modcom residential style boilers, both federally funded.

I fear there will be more incidents (You can not rightfully call them accidents.) like the Aspen deaths, but all we can do is educate.

Thank you again for the information!

Sincerely,

Michael T. Geagan

Midwest Boiler & Draft

Hi Timothy,

You may not remember, but I believe we met once in Singapore, when I was still with Meinhardt, designing the Sheraton Towers Jakarta. You were still with JB&B in New York. I have since moved to San Diego and have been working since February with TSquared Engineers.

To address the possibility of Legionella growth in the hot water systems, I designed a UV disinfection system at the incoming cold water system for a university student housing project when I was with a previous employer. The university's existing medical center had the copper-silver ionization system in some areas when they found Legionella growth in some of their sinks/lavs.

The UV system will eliminate the bacteria already inherent in the incoming cold water system. With the water already treated, it is deemed that bacteria are no longer present when hot water is produced. Since the water is not exposed until it comes out of the faucets, there is little possibility of introduction of new bacteria, except possibly through leaks.

Have you done something like this, and what are your thoughts about its effectiveness?

Thank you,

Vicky Manuzon

Plumbing Designer

T-Squared Professional Engineers Inc.

Hi Vicky,

Lovely to hear from you. I have many fond memories of my travels around the world during my JB&B days, Singapore in particular. Are you here permanently in the U.S.?

Anyway, yes, UV and Ozone are both viable options for Legionella control. The project in my article has an atmospheric water storage tank, so UV might not be the best option. I sent articles on Ozone to our client; it works well for atmospheric tanks, as it creates a protective blanket of ozone on top of the water, but the client, the federal government, was adamant about sticking with Cu-Ag, and you can't argue with the federal government, even here in the U.S., LOL!

Best regards and please stay in touch.

Tim

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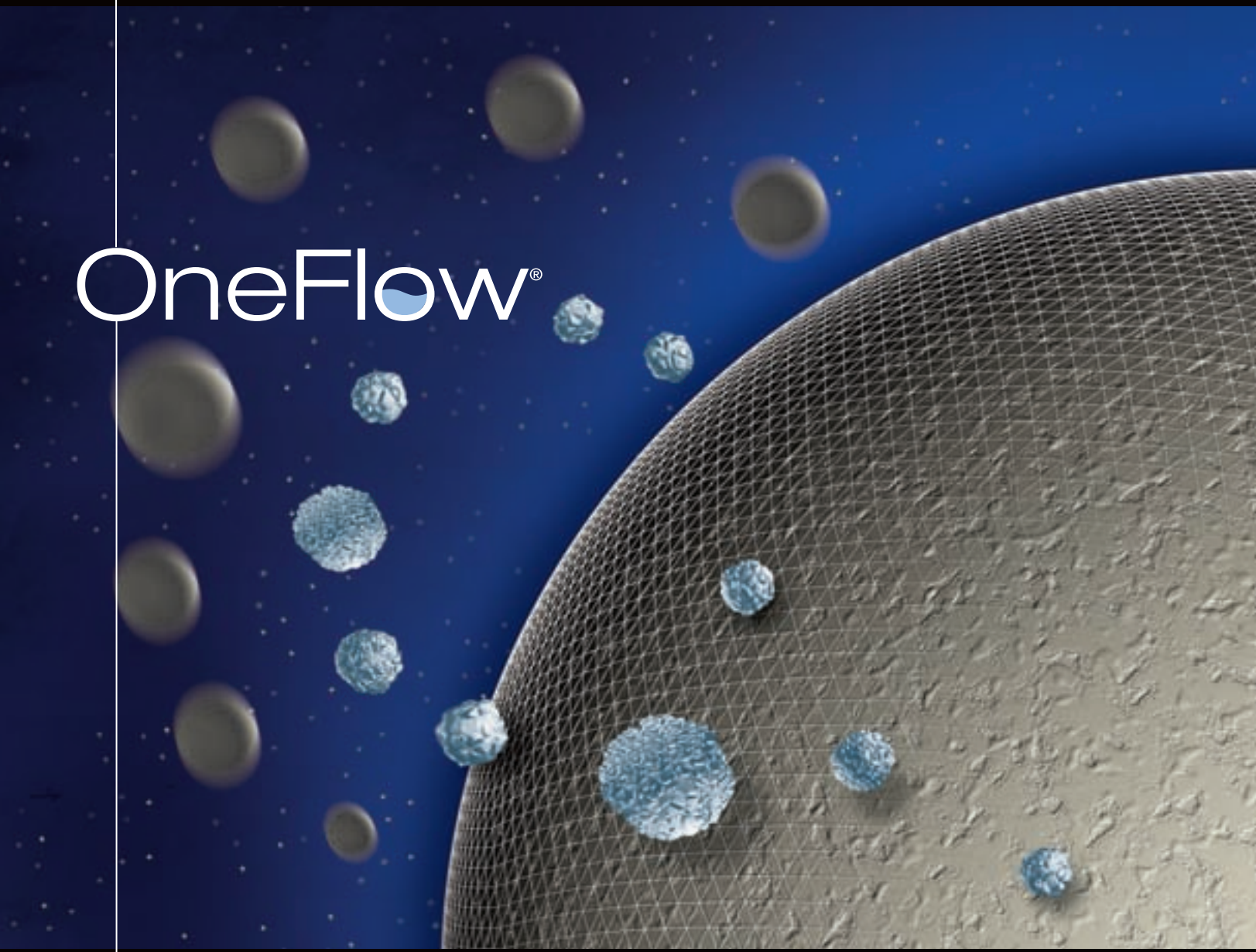

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1899

Franz-Anselm Viegener starts Viega Co. with the first brass beer tap.

1901

1963

Viega starts producing copper solder fittings.

Viega starts manufacturing plumbing fittings.

1980

The first PEX radiant floor heating in the U.S., the ProRadiant™ system, is introduced.

1996

Production of plastic tubing, PureFlow® PEX products begins.

1999

Viega's copper press technology launches in the U.S., the ProPress® system.

2008

Viega ProPress for stainless press technology launches in the U.S.

2009

Viega opens the largest PEX Manufacturing and Distribution Center of its kind in McPherson, KS.

2010

Viega opens new Distribution Center in Atlanta, GA.

Viega's heritage of innovation and quality began in Attendorn, Germany in 1899 when Franz-Anselm Viegener introduced a new design in brass beer taps. By 1901, the company evolved and began manufacturing home plumbing products.

Nearly a century later, the Viega North American story begins. In 1999, the family-owned company decided to offer a selection of Viega products in the United States. In the same year, Viega started to market a totally new system of ProPress fittings and valves to connect copper pipe, opening the door to the future of the plumbing industry.

The new century saw rapid growth in Viega innovations, including PureFlow – the first PEX press plumbing technology, ProPressG™ for solderless fuel gas applications, combination technology to connect copper to PEX, the Smart Connect® feature to quickly identify unpressed fittings and several innovations in the Viega ProRadiant line.

From Franz-Anselm Viegener's first product introduction in 1899, Viega's family heritage of innovation, quality and service still flows through all Viega products and the people who design, make, sell and support them. It is this heritage of better ideas that allows Viega to extend its reach to exceed customer expectations around the globe.

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