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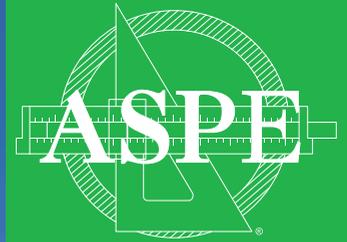
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November 2012



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INSIDE THIS ISSUE:

- Rainwater Harvesting System Design Basics
- It's the Little Things That Count in Good Plumbing System Design
- Greenbuild 2012 Show Preview



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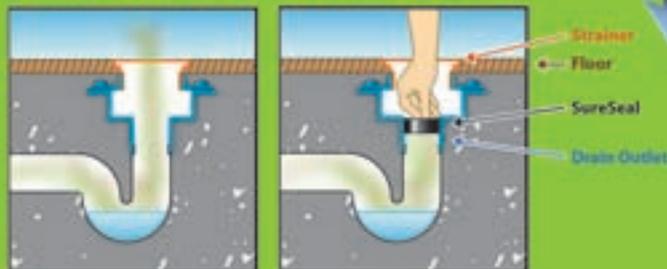


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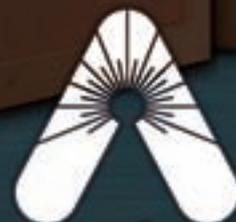
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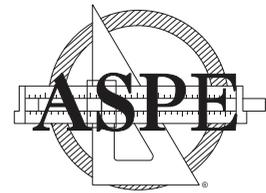
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Editor's Letter

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



Conservation nation

Last month, I had the opportunity to attend the launch of an exciting new event. The Hydronics Roundtable took place in Providence, R.I., and was hosted by the Radiant and Hydronics Council (RHC) of the Air Conditioning Contractors of America (ACCA). It was well attended by a good cross-section of industry experts, contractors and assorted "wet-heads." For me, still being somewhat new to the industry, it was a great introduction to hydronics. More accurately, it was something of a crash course in radiant technology and techniques.

The folks at ACCA and RHC were pleased with the results too. Looking back on the Hydronics Roundtable, ACCA's president and CEO Paul T. Stalknecht said, "The inaugural Hydronics Roundtable was a great success. We were thrilled with the attendance and the support we received from the industry through sponsorships. Everyone in Providence was excited about getting together and learning about trends in the hydronics market and getting new ideas from each other, so they can grow their business. We can only expect this to continue to grow as ACCA becomes more involved with the hydronics market segment."

Dan Foley, a columnist with *Plumbing Engineer's* sister publication, *Phc News*, was very involved in the program. Foley was one of the speakers; he also moderated a great panel discussion at the conclusion of the event. I enjoyed all the presentations and programs, but one that really stands out in my mind was the keynote address by Richard Trethewey, a 4th generation HVAC/R contractor who rose to national prominence on the long-running PBS show, "This Old House." An early supporter of hydronics and radiant heat, Trethewey spoke passionately about the need to conserve energy resources and laid out the vast growth potential for hydronics, as well as the potential for contractors who understand the technology.

Trethewey's mantra was that, no matter what your politics or thoughts about sustainability, the need to conserve energy in the way we heat and cool our buildings in the U.S. is absolutely vital to our interests. As he put it, the fuel we drill or hydrofrack out of the ground is a finite resource. As global demand continues to rise, prices will only go up, no matter how much we take out. The best way to combat this rise is simply to use less; our industry offers many ways to achieve that.

Conservation and sustainability is a big focus in this issue of *Plumbing Engineer*. The Greenbuild International Conference and Expo takes place this month in San Francisco, Nov. 14 – 6. The U.S. Green Building Council's annual event has become one of the biggest shows in the design and construction industry; we have special coverage of this year's Greenbuild in our news section on page 8. In addition, we address rainwater capture in a feature on page 54 and a number of our columnists discuss sustainability concepts throughout the issue. As you read through these articles, it's important to remember that green and sustainability aren't just buzzwords or marketing tools. Concepts such as energy and resource efficiency and doing more with less are just good business and can help generate real bottom-line savings. ■

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San Francisco to host USGBC's annual green building show

As sustainability has grown to become an integral part of the way buildings are designed, constructed and operated, the U.S. Green Building Council's Greenbuild International Conference and Expo has risen to prominence. It is the world's largest conference and expo dedicated to green building. This year's event takes place November 14-16 in San Francisco at the Moscone Convention Center. It is expected to draw a record attendance of 35,000 architects, building owners and others involved in the construction, maintenance and operation of commercial and residential buildings.

"We are thrilled to bring the energy of Greenbuild to San Francisco, home to some of the world's leading minds in both sustainability and technology," said Kimberly Lewis, USGBC's Senior Vice President, Community Advancement, Conferences and Events. "Greenbuild is the nexus of the sustainability movement where we celebrate collective successes, share our knowledge with one another, and challenge the status quo."

Mika Brzezinski and Joe Scarborough, co-hosts of MSNBC's weekday morning show "Morning Joe," and Twitter co-founder Biz Stone will headline Greenbuild's opening plenary on Wednesday, Nov. 14. Previous keynote speakers have included Thomas Friedman, Cokie Roberts, Retired General Colin Powell, Archbishop Desmond Tutu, Al Gore and President Bill Clinton.

Greenbuild 2012 will feature three days of networking, educational sessions, green building tours, master speakers and plenary events. The expo hall is expected to be the biggest in Greenbuild's 11-year history, with three floors and more than 1,000 exhibitors and 2,000 booths featuring the latest technological innovations and cut-

ting-edge products. This year's show will celebrate bringing technology and sustainability together in the global green movement.

Concurrent with the conference and expo, USGBC will co-host the National Affordable Green Homes and Sustainable Communities Summit with the Institute for Professional and Executive Development (IPED), an affiliate of Nixon Peabody LLP and Enterprise Community Partners, Inc. (Enterprise). This two-day summit will take place November 13-14 at Greenbuild.

The summit will feature a keynote presentation and



various educational sessions focused on successfully planning, financing, developing and managing green affordable housing projects, and how this urgently important work addresses the needs of stakeholders, the environment, and community resilience.

"Greening the affordable housing sector is a critical priority in our mission of transforming the built environment, and over half of all LEED-certified homes are affordable housing," said Nate Kredich, USGBC's Vice President, Residential Market Development. "The Summit will be educational and inspiring for those who are new to the sector, and to those who are already heavily engaged."

"IPED's collaboration at Greenbuild reflects our shared commitment to providing professionals with knowledge, tools and inspiration to achieve a sustainable future," said Jeffrey Lesk, IPED Board Member. "It's a unique opportunity to connect green development with community development. By showcasing thought leaders in both of these industries, we can present the most innovative ideas and best examples of achieving cost-efficient, energy-saving green affordable housing and community development."

Greenbuild is the three-time recipient of IMEX Green Meetings Award. Last year's conference in Toronto, Ontario, Canada, drew more than 23,000 attendees and featured a sold out exhibit hall floor with more than 1,700 booths. For more information, visit greenbuildexpo.org and follow the show on Twitter @Greenbuild, and Facebook at facebook.com/Greenbuild.



Courtesy of USGBC

More industry news on page 10

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ARCOSA, IAPMO sign MOU

ONTARIO, CALIF. — IAPMO® and the American Rainwater Catchment Systems Association (ARCOSA) have entered into a Memorandum of Understanding (MOU) to enhance the well being of people everywhere through the provision of safe, efficient and affordable rainwater harvesting and plumbing systems and equipment.

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

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

- Assigning technical representatives to support and actively participate in the development of each organization’s respective codes and standards that are of mutual benefit.
- Collaborating and working jointly to advocate sound policy on city, state and federal governmental levels for the adoption of code, legislation and regulations benefit-

ing both organizations.

- Exploring opportunities for ARCOSA to collaborate with IAPMO in World Plumbing Council projects.

SolarLogic wins two awards at RPA conference

SCHAUMBURG, ILL. — SolarLogic LLC, a New Mexico solar heating technology company, was recently awarded first place in two categories at the annual Radiant Professionals Alliance (RPA) conference for a solar hydronic heating and cooling system designed for and installed at the Los Alamos Solid Waste Transfer Division. The system, designed by *Plumbing Engineer* columnist and SolarLogic chief technology officer, Bristol Stickney, features SolarLogic’s SLIC integrated system control.

The 2012 System Showcase awards for “Most Innovative System” and “Best Radiant Cooling System” were presented to SolarLogic at the RPA’s national conference. The Los Alamos system supplies heat to radiant floors and produces domestic hot water with both solar and high-efficiency boiler heat sources. It also provides cooling of the radi-



Bristol Stickney
SolarLogic

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ant floors via night-sky radiant cooling (NSRC), which uses the solar collectors at night to shed heat to the sky. This technology was pioneered by SolarLogic, based on studies done previously by Stickney.

“Before SolarLogic, a system such as the one installed in Los Alamos would require many individual controllers to operate or a very sophisticated and customized expensive solution. Our SLIC is affordable, operates the entire system by itself and enables Los Alamos maintenance professionals to monitor and adjust operation over the Internet,” said Stickney.

Harold Anthony Strain, construction/project manager for Los Alamos County, remarked that, “The SLIC has proven quite remarkable.” Increased efficiency, radiant night-sky cooling and remote access to 250 data points are some of the many system features Strain appreciates.

In addition to working with solar heating, the SLIC is compatible with ground-source heat pump systems, wood boilers and other renewable energy heating and cooling sources. It requires no programming or customization, so it is much easier to specify and install than previous solutions.

“We’re very proud to be recognized by a prestigious national industry organization such as the RPA,” commented SolarLogic CEO Fred Milder. “The system installed at the Los Alamos County Building is sophisti-

cated but uses the same technology and our SLIC controller as would a typical radiant-heated home. The cooling comes practically for free. That is why our products are being embraced as the new standard in renewable energy heating.”

SolarLogic previously made headlines in 2008 when it was awarded a grant from the City of Santa Fe to construct its laboratory for the development of its innovative products and for subsequent patents awarded and product launches. In addition to the SLIC controller, SolarLogic provides a free, solar heating design website called the SLASH-D for system designers and specifiers. The SLIC is available for purchase by solar and radiant heating professionals and is being marketed through a series of live and recorded webinars and training. SLIC and Slash-D trainings qualify for Continuing Education credits from the North American Board of Certified Energy Practitioners.

Renewable energy geothermal heat pump bill signed into law

SACRAMENTO, CALIF. — CaliforniaGeo applauded Governor Brown’s recent signing of AB 2339 (Williams)

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Energy Geothermal Technologies, www.ab2339.org, into law on September 27, 2012, directing the California Energy Commission to lead an evaluation of policies and implementation strategies to promote widespread deployment of geothermal heat pump and geothermal ground loop technologies as a key component of a clean California energy future.

AB 2339 is part of California's renewed emphasis on a technology that has long been called the most effective method of heating and cooling buildings.

- The California Public Utilities Commission (CPUC) went on record stating geothermal heat pump (GHP) technology qualified as both an energy efficiency technology and a distributed generation technology and that the industry would be welcome in the Commission's DG and EE proceedings.

- The Department of Water Resources (DWR) initiated a program on July 1, 2012 to establish borehole standards replacing the 1999 draft standard that has caused so much confusion. The DWR program is scheduled to complete and issue the Standard by June 30, 2013.

- Geothermal heat pumps and geothermal ground loop technologies will be included, for the first time, in the California Energy Commission's (CEC) 2013 Integrated Energy Policy Report (IEPR).

Newly-formed CaliforniaGeo (officially the California

Geothermal Heat Pump Association) sponsored AB 2339, whose passage was made possible by the efforts of a committed group of volunteers led by Phil Henry and Lisa Meline, with assistance from California geo heat pump industry leaders Meline Engineering, Gaia Geothermal, Air Connection and All Year, along with industry stakeholders throughout the U.S. Organizations including Environment California, Planning and Conservation League, Sierra Club and Plumas-Sierra Rural Electric Cooperative also supported the effort.

MESTEK purchases DADANCO-MESTEK JV

WESTFIELD, MASS. — MESTEK Inc. has acquired 100 percent ownership of DADANCO- MESTEK JV by concluding an agreement to buy the shares previously owned by DADANCO Pty Ltd. Together with the acquisition of remaining interest, MESTEK has acquired critical intellectual property, including DADANCO nozzle technology. This investment is a significant step in maintaining DADANCO's dominant position in providing low energy HVAC solutions and MESTEK's continued expansion of its green product portfolio.

MESTEK is a manufacturing concern headquartered in

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Industry News

Continued from page 12

Westfield, Mass., with annual sales of approximately \$375 million and 2,000 employees worldwide. MESTEK's principal activities include HVAC, architectural products and metal-forming machinery.

DADANCO is also headquartered in Westfield, Mass.; its principal activities include manufacturing of active chilled beams, induction units and induction diffusers.

With its current management in place, DADANCO is a valuable addition to the Mestek family of companies with strong product focus on sustainability, including RBI and Hydrotherm condensing boilers, Airtherm ECM fan coils and Mestex evaporative air handling units.

To mark the acquisition of DADANCO-MESTEK JV as a wholly owned subsidiary of MESTEK Inc, an agreement has been reached for the major refurbishment of offices to house DADANCO along with new construction of comprehensive demonstration and scenario test facilities, all to be based in Westfield.

Eco Smart Energy LLC installs solar heating system at local YMCA

DALLAS — The team at Eco Smart Energy LLC and Blackall Mechanical Inc. worked together to perfect a solution to generate an eco-friendly hot water system called Sun Equinox for the YMCA Town North in Dallas. The project began in September 2011 and was completed in October 2011.

John Blackall states, "We selected the Sun Equinox system based on the following criteria: equipment life longevity, reliability, its solar capabilities and energy efficiency. The system was a perfect solution for this application. There is no other hot water system on the market today that offers 97 percent efficiency with a 40-year life and has the ability to handle hydronic heat, domestic hot water and a pool loop with one system."

This project utilized the Sun Equinox system's "eco smart energy" that will allow the YMCA to eliminate the need for an annual state boil-

er permit and will result in a reduction in their insurance premiums. The system will also reduce their water usage by 27 percent."

Other benefits of this eco-friendly system are:

- 43 percent projected reduction in gas consumption
- Reduction in carbon footprint
- Cost of ownership cut by 50 percent over 20 years (double the lifespan of a conventional boiler, reducing maintenance costs and eliminating repair costs.)

Joe Lanier, YMCA director of facilities, stated that, "Our current steam boiler was 19 years old and was not energy efficient. Instead of sinking a lot of money into a new unit, we decided to go with a more green option that would be cost efficient; solar seemed the way to go. Our gas consumption is down and there is little maintenance. We went from 4.2 million Btu to an average of 1.6 million Btu with the new unit."

John Blackall says, "The system's design consists of what Sun Equinox calls a 5-8-15 system: Five three-circuit heat exchangers, eight 93 percent efficient Noritz tankless heaters and fifteen Apricus AP-30 solar panels. The majority of all piping was pre-fabricated in the factory and shipped with the system for reassembly on the jobsite. The solar field is controlled by a DDC unitary controller integrated into the design of the system and pre-programmed at the factory, making field installation that much easier."

Willoughby consolidates operation in new facility

INDIANAPOLIS — Willoughby Industries' operations have been consolidated in a new 250,000-square-foot facility in Indianapolis. This new facility brings together administration, engineering, manufacturing, testing and shipping under one roof, with space for future growth.

In the plant area, a systematic manufacturing facility design process was employed to achieve both process and labor efficiencies. Willoughby

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Continued from page 14

focused on high-cost impact areas, including in-process material flow patterns, versatile manufacturing cell layouts and activity relationship-based floor planning. They sought to blend their time-proven manufacturing practices with textbook, plant layout principles. The end goal was a workplace able to efficiently produce a broad variety of high-quality finished products.

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Heat Trace Products receives award

LEOMINSTER, MASS. — Heat Trace Products LLC received the Exporter of the Year Award for 2012 from ThinkGlobal Inc., publisher of *Commercial News USA*, the official export promotion magazine of the U.S. Department of Commerce. The company was one of 12 recipients of this award from across the United States.

Heat Trace Products sells a full line of self-regulating heater cables to a broad range of industrial and commercial customers worldwide through distributors, representa-

tives and OEMs. The cables are used in chemical and food processing, mining, oil and gas refining, pulp and paper, utilities and water treatment facilities and in commercial and residential buildings. Featuring the only FM (Factory Mutual) approved 25- and 30-watt self-regulating heater cables on the market today, the firm conducts business in over 30 countries.

According to Wayne Canty, president and CEO, "Over 65 percent of our business is international. Back in 2000, we recognized the potential for exporting, especially in emerging markets. Self-regulating heater cables automatically supply heat where needed; this cuts operating costs significantly." ■



Greg Sandler (left), president of ThinkGlobal Inc., presents the Exporter of the Year Award to Wayne Canty, president and CEO of Heat Trace Products LLC.

More Industry News on page 78

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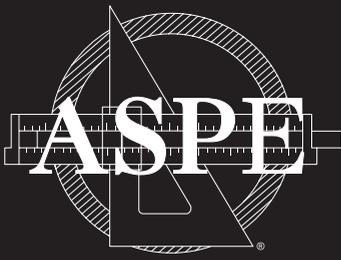
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THIRD

ASPE REPORT

AMERICAN SOCIETY OF PLUMBING ENGINEERS

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From the President's Pen



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

You might be expecting a report on the 2012 ASPE Convention & Exposition; however, due to printing schedules, the highlights will be published in the December issue, including an introduction of the 2012–2014 ASPE board of directors.

I cannot believe that two years have gone by as president of the American Society of Plumbing Engineers. It seems like only yesterday that I was presenting my acceptance speech to the attendees of the 2010 Banquet in Philadelphia.

The last two years were difficult for many of our members due to company layoffs and a decreased number of new construction projects. The ASPE board of directors was not immune to the depressed economy. In fact, the July 2012 board meeting was the first time in two years that every ASPE board member was fully employed. The board is anticipating a big improvement in the economy next year so all of our members can return to work and the Society can once again begin to grow. This will be our opportunity to build on the foundation of financial stability and create programs that will move ASPE forward. The board seeks the support, help, and cooperation of ASPE chapters and members during this time of growth. Your input is vital to help ASPE become a leading voice in the plumbing engineering industry, as well as to help the Society create quality programs and educational tools for our members' professional development.

Following are some of the accomplishments of which the 2010–2012 ASPE board is proud.

Despite the difficult economy of the past two years, ASPE expanded into new areas with the chartering of the Long Island Chapter and the creation of new satellite chapters in Oklahoma City and Evansville, Indiana. ASPE also visited with the Philippines Society of Plumbing Engineers and discussed the potential of forming our first international chapter in Manila.

The decision to cease publication of ASPE's Plumbing Systems & Design magazine and join with TMB Publishing was the result of a deliberate and carefully thought-out process. The partnership is providing us with the opportunity to promote ASPE to plumbing engineers, designers, specifiers, and others within the industry who are not members of the Society. It also provides greater exposure of our organization and our quality technical content to other individuals and organizations within the industry.

By now you probably have heard that ASPE sold our office building in Des Plaines, Illinois. Because of this, I can proudly say that for the first time since 1995, ASPE has a positive net worth. The board has been committed to achieving two basic but critical financial goals for the Society: 1) have available financial reserves of at least 50 percent of our annual operating expenses and 2) have additional funds available to support the long-term strategic goals of the Society. We have a ways to go to achieve these two goals, but selling the building has allowed us to take a significant step forward and has placed us in a much more sound financial position.

The board is continuing our commitment to provide members with updates on what is happening in ASPE because communication is the most important part of running a society. ASPE is part of the social network, and you can find us on Facebook, Twitter, and LinkedIn. We are continually expanding our communications vehicles and becoming part of the worldwide network.

In the last two years we signed seven MOUs and collaborated with many other organizations within the industry. These collaborative efforts and our continued dedication to building bridges



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with other organizations have provided us with significant opportunities.

- » We worked with Plumbing Manufacturers International (PMI) and the International Association of Plumbing and Mechanical Officials (IAPMO) to bring together plumbing association leaders for the first meeting of the Plumbing Industry Leadership Coalition.
- » We collaborated with the American Society of Sanitary Engineering (ASSE) to merge the ASSE and ASPE plumbing dictionaries into one joint publication.
- » Executive Director/CEO Jim Kendzel, MPH, CAE, participated in industry panel discussions at the IAPMO/WPC Emerging Technology Symposium and the PMI Annual Conference.
- » We helped publish a significant research study on the impact of low-flow devices on drainline carry through the Plumbing Efficiency Research Coalition (PERC), of which ASPE is a member.
- » We are developing a proposed new American National Standard for rainwater catchment system design in partnership with the American Rainwater Catchment Systems Association (ARCSA).
- » We developed a Green Plumbing Design certificate program in partnership with IAPMO.
- » At the request of the Plumbing-Heating-Cooling Contractors Association Education Foundation, we became a member of the Get the Lead Out of Plumbing Consortium, which is focused on educating the industry on the federal lead-free legislation.
- » We partnered with UCLA Extension in the development of a 16-credit online course for plumbing engineering and design. Thanks go to ASPE member Haig Demergian, PE, CPD, FASPE, for being the driver for this project! The first offering achieved full capacity in registrations.
- » In collaboration with the City College of San Francisco, ASPE was awarded a three-year grant from the National Science Foundation to fund the development of a two-year associate degree curriculum for plumbing design followed by a certification program for plumbing design technicians.

Thank You Staff

I cannot overstate the dedication and work ethic of the ASPE staff. They continue to do an outstanding job for the Society. With the limited number of personnel, the amount of work that is accomplished for all of our programs is phenomenal. Whenever you have the opportunity, please thank the staff for a job well done. I also want to take this opportunity to say thank you to them for all of their hard work during the last two years. We demand a lot from the staff, and they deliver. **ASPE**

New ASPE Members

British Columbia Chapter

Zhe Jia Zhang, P.Eng.

Buffalo-Niagara Chapter

Sherif Mohamed Elmaddah, GE

Central Florida Chapter

Garrett Bohl

Central Indiana Chapter

David Michael Brown
Michael James Shipe

Central Texas Chapter

Richard James Bright

Charlotte Chapter

Ricky Lee Kissel Sr.

Chicago Chapter

Giovanni Diaz
Charles Peter Eggert, PE, GE,
LEED AP, DCEP
Arturo Gonzalez
Elizabeth Renee Hausheer, EIT
Jonelle M. Jn-Baptiste
Henry Lenzen
Michael John Mallaney
Frank Lind Morris
Patrick Ryan O'Boyle, PE
Eddie Paulino
Fernando Alonso Rocamora, GE
Inna R. Vagner

Columbia Chapter

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Dallas/Ft. Worth Chapter

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Bozie Wells

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Clifford Dee Holmes, PE

Long Island Chapter

John Alimo
Gregory Andrew Rathe

Los Angeles Chapter

Mike David Callison
Rossi R. La Vonda

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Jack Costner
Ronald M. Flucker
Brayan Emed Gomez
Drew Mitchell Maines, GE
Sornam Manisekaran

Miami Chapter

Jorge Luis Miranda, GE

Minnesota Chapter

Dean Corrigan
Charles Joseph Hauck, PE
Karen Mellott-Foshier

Montreal Chapter

Patrick Chavarie
Benoit Claude Fortin, GE
Brendan O'Neill, P.Eng.
Michel Poirier

New Orleans Chapter

Daniel Richard Sallinger

New York City Chapter

Julio Crespo, GE
Terry Mayhew
Don Schink

Omaha Chapter

Russell Dean Meyer

Orange County Chapter

Bill Bowers

Overseas Chapter

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Mark John Manza Magaan, GE

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Western Michigan Chapter

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2012 ASPE WEBINAR SERIES



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December 5 at 2:00 pm EST

Registration will open in late November

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Evansville Satellite Chapter Celebrates Inaugural Banquet

On Saturday, September 29, ASPE's Central Indiana Chapter sponsored a banquet at Angelo's Italian Restaurant in downtown Evansville, Indiana, to swear in their satellite chapter's first board of directors: President Larry Fox, CPD, Vice President Technical Sam Schenk, CPD, Vice President Membership Jim Wakelam, Treasurer Brian Lowe, and Secretary Chadd Preske. Each board member received a Certificate of Appreciation from Central Indiana Chapter President Jim Rodgers, CPD.

In addition to Central Indiana Chapter board members, ASPE Executive Director/CEO Jim Kendzel, MHP, CAE, and approximately 30 local contractors, engineers, wholesale suppliers, and vendors attended the event.

"This was a very special evening, not only for me, but also for all of the ASPE members from the Evansville area," says Larry. "I have been a member of the Central Indiana Chapter for more than 20 years, but I was never able to attend any meetings because of the distance between Evansville and Indianapolis where their meetings are held. Now that we have our own satellite chapter, we will work hard to promote ASPE in southern Indiana and western Kentucky as well."

For more information on joining the Evansville Satellite Chapter, contact Chapter President Larry Fox at LFox@dvpe.net.



The first Evansville Satellite Chapter Board of Directors takes the oath of office: (from left) Vice President, Membership Jim Wakelam, Vice President, Technical Sam Schenk, CPD, President Larry Fox, CPD, Treasurer Brian Lowe, and Secretary Chadd Preske.

Central Indiana Chapter President Jim Rodgers, CPD (right), presents a Certificate of Appreciation to new Evansville Satellite Chapter President Larry Fox, CPD.

ASPE Joins Industry Leaders to Help Get the Lead Out

At the invitation of the Plumbing-Heating-Cooling Contractors Association (PHCC) Educational Foundation, ASPE joined numerous plumbing manufacturers and industry associations at the kickoff meeting of a consortium assembled to develop strategies to alert and prepare industry constituents for upcoming changes in the allowable level of lead in plumbing products.

The mission of the consortium is to provide widespread education about the manufacture, distribution, and installation of lead-free plumbing products. (Lead-free refers to the wetted surface of pipe, fittings, and fixtures in potable water systems that have a weighted average lead content less than or equal to 0.25 percent per the Safe Drinking Water Act amended in January 2011 and other equivalent state regulations.) Contractors/apprentices, distributors, plumbing engineers, and code officials are the targets of the comprehensive communications plan. The multi-pronged outreach strategy includes industry trade press events, a website, training programs, support materials including a Frequently Asked Questions guide, and educational events at various industry conventions. In addition to compliance guidelines, the outreach program will focus on business and legal implications of the new legislation. **ASPE**

2012 ASPE WEBINAR SERIES 

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- » The different types of roof drains on the market
- » The roles of primary and secondary roof drains
- » Selection and specification of roof drains and their accessories
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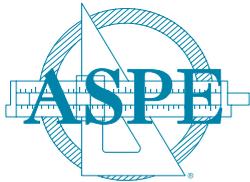
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“These relationships give our engineers another avenue to discuss problems and ideas, which opens their minds to think outside the box. This type of thinking is what generates **better system designs** and, in the end, **better products and services for our clients.**”

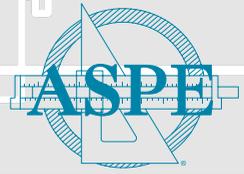
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From the Executive's Desk



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

I am writing this column two weeks prior to the 2012 ASPE Convention & Exposition in Charlotte, North Carolina. Since you will read it after the event, I want to say thanks to everyone who participated in the largest North American plumbing event specifically devoted to the needs of the plumbing engineering community. Based on the preregistration numbers, this will be the most successful Convention & Exposition we have held to date. Stay tuned for a full post-event update in the next issue of *Plumbing Engineer*.

Additional Thoughts on Our Profession

In my last column I discussed the plumbing engineering profession and the lack of respect for plumbing engineers sometimes displayed by others within the industry and the general public. I recently had the distinct pleasure of participating in a panel discussion at the Plumbing Manufacturers International (PMI) Fall Conference. The discussion covered current perceptions of the plumbing industry, how those perceptions impact our profession, and what we can do to improve those perceptions. The panel was comprised of individuals representing contractors, labor, education, engineering manufacturers, and government relations. The catalyst for the panel discussion was one of the action items resulting from the inaugural meeting of the Plumbing Industry Leadership Coalition, of which ASPE is a member, earlier this year.

As you can imagine, the discussions were lively and very productive. Everyone agreed that the stakeholder communities served by the plumbing industry today take the service we provide for granted and do not have a high regard for the important role we play in protecting public health and safety. These perceptions significantly impact our ability to attract young people to the profession as well as have a strong voice in legislative activities.

The results of the discussion provided some potential action items that all center on the need for us—labor, contractors, engineers, manufacturers, and plumbing code inspectors—to work together to advance the profession. The key objectives coming out of the discussion were:

- » Develop a “brand” for the plumbing industry, with brand being defined as the purpose and function of why the plumb-

ing industry exists. Another way to look at it is the promise we make and fulfill to the stakeholders we serve.

- » Promote and instill the brand throughout our collective memberships, building a culture that fulfills the promise set forth in the brand and increasing the level of esteem each of us has in our profession and what we do to protect public health and safety.
- » Develop cross-training programs among labor, engineers, and code officials to help bridge the gaps of experience and knowledge and eliminate the misunderstandings and misperceptions that sometimes exist between the various sectors of our industry.
- » Work with trade schools and community colleges to develop an increased level of understanding of the importance of providing plumbing-related programs and the career opportunities that exist.

To fulfill these objectives, a strong coalition of all organizations representing the plumbing industry is needed, and the Plumbing Industry Leadership Coalition is exactly the type of group to move the objectives forward.

I want to thank Executive Director of PMI, Barb Higgins, and the PMI board of directors for keeping this very important conversation going forward and helping the plumbing profession get one step closer to shining a light on the significant role we play on a daily basis in serving the public good. **ASPE**

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



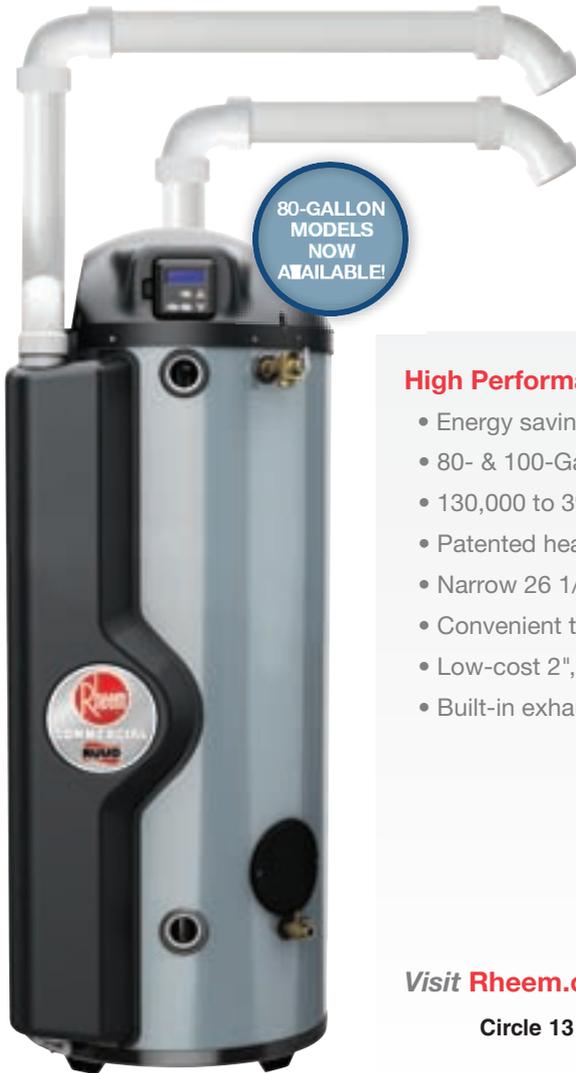
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Designer's Guide

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



Industry collaboration

Here in So Cal, as in most large cities, we have several important government agencies and private organizations that are pivotal to the operation of the design and construction industry. In our case, most jobs in the City of Los Angeles fall under the auspices of the LADBS (Los Angeles Department of Building and Safety). Exceptions include hospital work, which falls under OSHPD (Office of Statewide Health Planning and Development); public education, which falls under DSA (Division of the State Architect) and public housing, which falls under HCD (Housing and Community Development). There are some other boutique agencies as well, but those mentioned are the main entities.

Two of the more important private organizations that have influence in what we do are the CPMCA (California Plumbing and Mechanical Contractors Association) and P.I.P.E. (Piping Industry Progress and Education Trust). Both of these organizations provide training for the union tradesmen and facilitate communication between union labor and management.

If you are a consulting engineer, these latter two organizations might be of little interest to you, even if you work in Southern California. But for a design-build mechanical contractor, the trade associations take on great importance (and I'm not the only one who thinks so).

Recently, I represented my company at a meeting initiated by P.I.P.E. that was held at the LADBS offices. CPMCA was in attendance, as were representatives from most of the larger design-build plumbing contractors in the greater Los Angeles area. The meeting was a "state of the industry" general affair, as well as an opportunity to spend a little "face time" with each other, ask questions, table issues and so on.

After an introduction by P.I.P.E., followed by self-introductions, we heard first from the LADBS, their general manager, chief mechanical engineer, plan checkers and inspectors. It is always interesting to hear from the AHJ about their issues and concerns.

I believe Los Angeles is fairly unique in the thorough nature of their plan review process (called Plan Check). The plan checkers thoroughly review submitted engineering documents, particularly riser diagrams. They literally check every single pipe size on all the riser diagrams in painstaking detail. This is vastly different from New York City, my former stomping ground and an interesting basis of contrast.

Sometimes a project requires that the design engineer sit shoulder to shoulder with the plan checker, reviewing all the riser diagrams, providing clarity or correction where required. On one large project, this process culminated in a month of Tuesday and Thursday afternoons of quality time with the city's mechanical engineer before I received approval.

After plan check is complete and the permit is issued,

the inspector reviews the field installation against the approved plan check set; the two must agree or a red tag will be issued. If any changes are made to the documents between the plan check approval and the field installation, the revised drawings must be resubmitted to the city or a red tag will be issued in the field.

This tight control process is very different than the process in New York City. Unless it has changed since I last worked there a dozen years ago, submitted drawings receive only a cursory review by the city, which looks for glaring code violations. Drawing submittals were predominantly intended to document the number of plumbing fixtures in order to determine the permit fee on the project. The field inspection process was even more lenient due to the creation of the self-certification process, a process necessitated by corruption discovered at the field inspection level.

Back in the mid 1990s the FBI performed a sting operation: They provided NYC cars to the plumbing inspectors, who were unaware that their cars were outfitted with video recording devices. For a period of two years, the FBI gathered evidence that proved that 19 of the 20 plumbing inspectors were accepting and/or extorting bribes. The amazing part of this story is that only a year or two prior, the elevator inspectors had been busted for the very same thing, so what made the plumbing inspectors assume that they wouldn't get caught is hard to imagine.

After this corruption was discovered, the city instituted the self-certification process. For self-certification, a licensed plumbing contractor would alert the city that their project was ready for inspection. On the scheduled inspection date, there was a 5 percent chance that the city inspector would show up. If not, the installation was self-certified on the good faith of the contractor. This process reflected a shift in perspective that occurred in New York, the belief that the contractors were more trustworthy than the inspectors.

Why a major city like Los Angeles has not had this problem with inspection corruption is hard to say. Certainly, the LADBS inspectors are intelligent and credible, and they are surely paid commensurate with their abilities and integrity. As a side note, I heard on the news this morning that employees with the DPW (Department of Public Works) are the highest paid city employees, with an average income of \$95,000 annually. Plus, they receive a lifetime pension. Surely the salaries of the LADBS staff can't be far behind, so it stands to reason that they would not put their careers in jeopardy with the temptation of graft.

This bicoastal comparison has caused me to digress from my initial subject of industry collaboration and the LADBS meeting. To continue, the general manager presented some graphs that showed how the construction

Continued on page 26

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Designer's Guide

continued from page 24

industry in Los Angeles has been on the rebound for two years. It bottomed out two years ago when all the metrics, including number of permit applications, revenue from permits and plan check fees and number of employees all hit a dramatic low after a two-year slide. For the past two years all of these metrics have been on the upswing, and the city is in the process of hiring 70 new employees for the LADBS. That's good news for our industry.

It was interesting to hear as well from the plan checkers and inspectors. One of the prime complaints of the plan checkers was about the submission of drawings in 3D Revit format. Revit drawings are not annotated in a manner familiar to the plan checkers, and since design engineers have started submitting 3D Revit perspectives rather than traditional 2D riser diagrams, plan checkers have been struggling to make sense of the drawing submissions.

On the inspection side, the two main complaints were fixtures installed without the required IAPMO approval stamp visible anywhere to the inspector, and that often, in the field, it is apparent that the approved plan check drawings are not provided to the detailers in preparing their shop drawings, since handwritten comments on the approved set don't make it to the final shop drawings.

There was also a brief discussion about modular toilet

rooms, since they have just begun to appear in Los Angeles; a Marriott Hotel is the first such case. The city, P.I.P.E. and CPMCA all have concerns about union issues and loss of state revenue associated with the pods, but all three entities are cooperating to every extent possible, since it seems clear to all that modular construction is growing within our industry, and it is unfair to hamper that growth.

You may have similar industry collaboration occurring within your jurisdiction. I encourage you to get involved; it is an eye-opening experience that builds strong relationships. Interestingly, there were no consulting engineers present at this particular meeting, just design-build contractors. This was surely because the meeting was initiated by P.I.P.E., rather than by an engineering society such as ASPE. You should encourage your local ASPE chapter to instigate similar meetings in your area. ■

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

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



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Code Classroom

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Piping accessories

Piping accessories are critical for diagnosing what is happening in a piping system. Although generally not required by code, they are essential for system performance and diagnostics. Piping accessories include pressure gauges, gauge cocks, pressure snubbers, temperature gauges, thermometer wells, flow switches, flow meters, pressure switches, temperature sensors, liquid level sensors, liquid level gauges, unions, check valves, gate valves, ball valves, globe valves, butterfly valves, plug valves, pressure reducing valves, etc. In other words, they constitute everything in the piping system except the equipment, piping, fittings and pipe hangers.

Under pressure to provide proposals for work in a competitive bidding process, many engineers have started looking at ways to minimize their costs and time working on a project. The owner needs to understand that he will get what he pays for and that if you don't pay for engineering and construction administrative services, you won't get those services. The field engineer or construction administrator can oversee the construction and assure that the systems are being installed in accordance with the plans and specifications.

The competitive market has led to a trend to show less information on the drawings and to cover piping accessory items in the specifications. Many engineering firms have resorted to showing the piping as a single line to a piece of equipment as general routing without showing valves, gauges, fittings or other accessories. While this saves time for the engineer, it creates confusion during the bidding and construction. It is very difficult for a contractor to get an accurate count of isolation valves, pressure gauges and other accessories.

Some engineering firms produce flow diagrams that show the complete piping system and all of the components. If the plans do not show piping accessories, the flow diagram is a good place to do this. I still prefer to see everything drawn on the plans. In order to get this level of detail in the drawings, an owner must pay a little more for the design services. Mechanical and plumbing contractors are often faced with adding valves, strainers, pressure gauges, thermometers and many other accessories after the piping system is installed. When these components are not covered in the plans and specifications, bids will be lower. This means that, often, the low bidder will add these items as extras at a premium price.

Not showing accessories on the plans leaves many details subject to interpretation. Engineers have been known to include catch-all notes that call for isolation valves to be located "in an accessible location near all branch takeoffs from piping mains." The problem is that only the engineer knows where the "accessible" location is; accessible to the contractor may mean accessible from a ladder, accessible to the engineer or owner may be three

feet from the ground. If piping accessories are shown on the plans, there is no question where they go. When the drawings are not clear, the contractor should fill out a Request for Information (RFI) form. If questions are answered during the bidding phase, the contractor can bid on the correct information. If questions remain after bids are received, there can be problems.

When an owner does not request and pay for field representative services during construction, these accessories often are omitted and not noticed or missed until something goes wrong. It is also a good idea for an owner to ask the architect and the engineer to provide sets of drawings from a few similar projects. This will help the owner understand what kind of work to expect from a firm and to see which firms produce quality work.

Pumps

Pumps should have accessible isolation valves on suction and discharge pipes with pressure gauges between the pump and the shutoff valves. Pressure gauge specifications should include information about the size of the dial face; at floor level it can be three inches; however, if the gauge is mounted 10 feet above the floor, the dial face should be larger so that the pressure can be read from the floor without using a ladder.

Gauge cocks and snubbers should be installed on pressure gauges to prevent pulsations from the pump impellers from vibrating the gauge needle and damaging the bourdon tube inside the gauge. Snubbers or impulse dampeners make reading the pump easier and can extend the life of the gauges. Oil-filled gauges minimize the movement of the needle in the gauge.

Base-mounted pumps often need flow straighteners or suction diffusers, because elbows close to the pump create turbulence that can reduce pump efficiency or performance. Flow straighteners create laminar flow at the pump suction and improve pumping efficiency. Many base-mounted pumps have suction diffusers with strainers built in. Flexible connections with inertia pads and vibration isolator springs should be used on all pumps and rotating equipment with motors that can vibrate and transfer the sound or vibration to the building.

The discharge pipe should have a check valve and, in some cases, a throttling valve, for flow control. In the case of larger pumps, a triple-duty valve can serve as a combination check valve, throttling valve and shutoff valve on the discharge of the pump. Smaller in-line pumps should have unions or flanges on each side of the pump to allow for removal for servicing. Larger pumps should have mechanical or flanged connections.

Consideration should be given to pump location for maintenance. Clearance requirements for motors and con-

Continued on page 30

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Code Classroom

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trol panels are spelled out in the National Electric Code, published by the National Fire Protection Association (NFPA). Motor and control panel voltages determine the clearance required around a pump and control panel.

Pumps typically have reduced size end connections because the water velocity is very high at the pump. It is common to see reducers on the suction and discharge side of a pump. An eccentric reducer (straight on one side and angled on the other side) should be installed on the suction side of a pump, with the flat side of the reducer on the top of the pipe. This is done so that during down-time, low flow periods or if there is a surge in flow a pocket of air or gas bubbles cannot accumulate on the suction side of the pump and be drawn into the pump at startup. Introducing a large quantity of air into the suction of a pump can allow a bubble of air or cavity to develop in the eye of a pump impeller causing a loss of pumping efficiency. Air bubbles can allow water to slap around in the eye of the impeller and can eventually erode it away. Some larger pump casings have a thermal relief valve and an air vent valve on top of the pump to bleed off air in the pump housing.

Water heaters and heat exchangers

Water heaters, boilers and heat exchangers should have isolation valves to allow for maintenance, unions or flanges to allow for removal of the equipment without cut-

ting and reworking the piping and thermometers on the inlet, and outlet to see how the equipment is performing. Pressure and temperature relief valves sized in accordance with the rated capacities of the equipment should be installed on all heating equipment in accordance with ASME standards. When recirculating pumps are connected to water heaters or boilers, verify that there are check valves to prevent reversal of flow.

Pressure gauges should be located on the inlet and outlet of heat exchangers to indicate clogging or fouling of the heat exchanger tubes. They can also show pressure increases associated with thermal expansion. Water heaters and heat exchangers should have expansion tanks to absorb thermal expansion.

Specifications

I find that many engineers are still using the old division 15 mechanical specification that were updated by CSI Master Spec in 2004 to a new numbering scheme. The old specification section for piping accessories was titled, "15120 Piping Specialties." The new specification moved the piping specialties to within each specification division so that they appear in each contractor's specification for their trade or specialty.

When specifying pressure gauges, be sure to give the

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Aircraft hangar fire protection (Navy style), Part 1

In 2011, I wrote a few columns about how the Air Force protects aircraft hangars using high-expansion foam. Having recently had the opportunity to work on a renovation of a Marine Corps hangar, I would now like to report on the Navy/Marine Corps requirements for hangar fire protection.

The criteria used for the fire protection of U.S. Navy/Marine Corps hangars is found in UFC 4-211-01N dated 16 December 2009, Aircraft Maintenance Hangars: Type I, Type II and Type III. Of note is that the fire protection requirements from this document are not referenced by UFC 3-600-01, since the most recent edition of 3-600-01 is dated 14 July 2009. UFC 3-600-01 refers to Interim Technical Guidance (ITG) FY05-01, Design Criteria for the Fire Protection of Navy and Marine Corps Aircraft Hangars dated 19 January 2005. This ITG was updated and incorporated into UFC 4-211-01N. Also, note that the “N” at the end of the document no., UFC 4-211-01N, identifies this UFC as a document that applies to the Navy or, in this case, Navy and Marine Corps hangars.

Other codes and standards addressing the fire protection systems used in hangars include NFPA 11 Standard for Low-, Medium-, and High-Expansion Foam, NFPA 409 Aircraft Hangars, and NFPA 101 The Life Safety Code

Whereas the Air Force ETL 02-15 addresses protection criteria for Air Force hangars in which fueled aircraft are located, the Navy criteria applies to hangars regardless of whether or not the aircraft is fueled. Also, the Navy considers all hangars as Group I hangars per NFPA 101. The suppression system components required for Navy hangars consist of the following:

- Wet pipe or preaction sprinklers
- Low expansion (AFFF) foam system
- Foam concentrate
- Foam proportioning
- Foam solution discharge device

Notes

The Society of Fire Protection Engineers is in the final stages of developing a new engineering guide, entitled *Fire Safety for Very Tall Buildings*. The next step is for the task group to finalize the document and submit to the technical steering committee for approval, with a goal of being published in early 2013. The document is a joint effort of SFPE and the International Code Council (ICC). SFPE believes this guide will be a very useful reference document for designers, owners, authorities and other stakeholders. For more information about this new guide, visit <http://magazine.sfpe.org/issue-60-september-2012-new-guide-fire-safety-very-tall-buildings>.

- Trench system
- Detection and control
- Water supply

Aircraft hangars need several other features of fire protection, including minimum construction requirements, internal fire separations, allowable floor area, building separations, draft curtains, floor and ramp slope, fire hydrants, foam-water retention systems, egress requirements, accessibility for firefighting, fire alarm system and hazardous location electrical. This article will focus on the fire suppression systems.

The fire suppression system requirements of UFC 4-211-10N are relatively consistent with NFPA 409 requirements for Group I Aircraft Hangars. One option permitted by NFPA 409 is to provide automatic sprinkler protection with low-expansion foam for supplementary or low level protection. That option is the basic requirement of UFC 4-211-10N. A “low level protection system” is a system that provides protection for under-fuselage and under-wing areas of aircraft in the event of a fuel spill and fire. Low level low expansion foam systems are normally provided by either fixed or oscillating foam monitor nozzles or, as in the case of the Navy, floor-mounted grate nozzles.

Sprinkler system. It is generally understood that the ceiling/roof level automatic sprinkler system is to provide protection for the hangar structure only and consists of wet pipe sprinklers, unless freezing temperatures are an issue, in which case a preaction sprinkler system activated by a heat detection system is provided. Sprinklers must be upright, quick-response type with a temperature rating of 175 F unless ambient conditions warrant a higher temperature. Preaction sprinklers systems are to be activated by rate-compensated heat detectors with a temperature rating ranging from 160 to 170 F.

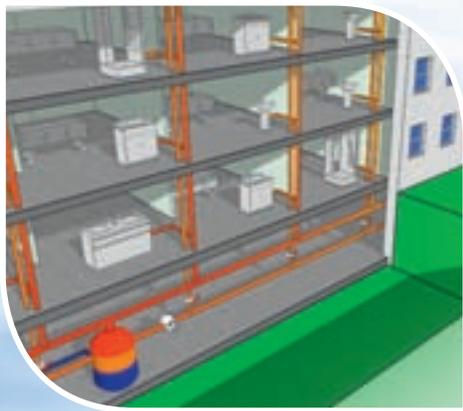
The sprinkler system must be hydraulically designed to deliver a minimum design density of 0.17 gpm/square foot over a 7,500 square-foot remote area. This is a departure from NFPA 409, which requires a 15,000 square-foot design area. UFC 4-211-10N does not require increase in design area for severely sloped roofs. A 500 gpm outside hose stream allowance must also be included. Draft curtains are required to subdivide the ceiling sprinkler systems into maximum 7,500 square-foot areas.

Foam system. By definition, low expansion foam systems produce foam with a solution-to-foam ratio of 1:20 or less. The foam concentrate required by UFC -4211-10N is Mil-Spec 3 percent aqueous film forming foam (AFFF). The amount of foam concentrate required must be enough to provide for a 10-minute discharge. A 3.9 percent foam solution rate is used to account for inductor variations. As required by NFPA 409, the flow rate of foam solution used to determine the concentrate quantity must be based on a

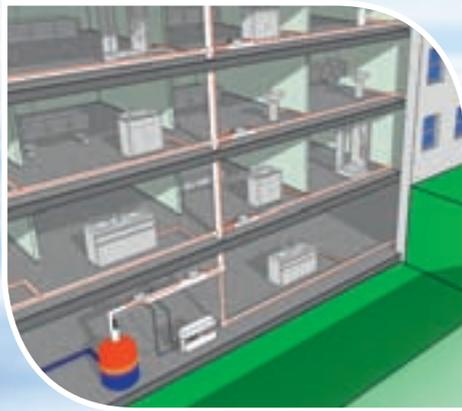
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FPE Corner

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Photo 1

supply hydraulic calculation. Similar to ETL 02-15, a reserve supply of foam concentration is not required.

Foam concentrate piping must be stainless steel. Also note that NFPA 409 requires that a hydraulic calculation using the supply calculation method be performed for the purposes of determining the quantity of foam concentrate required. The UFC 4-211-10N system performance criteria require foam solution to discharge from the most remote grate nozzle within 30 seconds after system actuation.

Foam concentrate. The foam concentrate must be stored in a horizontal, closed cell polyethylene storage tank. The tank must be listed and compatible with the concentrate.

Foam proportioning shall be accomplished using a single



Photo 2

foam inductor taking suction through the top of the tank (See Photo 1). The term inductor is also often referred to as an eductor. Proportioning using bladder tanks of foam concentrate pumps is prohibited without approval from the NAVFAC chief fire protection engineer. The induction point must be located to minimize the length of foam concentrate piping from the tank to this point. For this reason, it seems best to locate the inductor at an elevator near the top of the tank. This also makes it easier to provide the required minimum diameter of straight piping runs before and after the inductor.

The inductor is located downstream of the deluge valve. The deluge valve must be of the flow control type (See Photo 2). There are two reasons for this: First, the flow control valve can function as an adjustable pressure regulating valve allowing the water supply to be adjusted to provide the required pressures at the grate nozzles. The other reason is that the flow control valve can be arranged to automatically shut down the flow of water during a discharge through the use of an abort switch arranged to cause the foam control panel to de-energize the solenoid valve used to close the flow control valve.

Grate nozzles. The Navy hangar requires that foam be discharged using flush- to floor-mounted grate nozzles located to deliver foam over the entire aircraft hangar floor area. The grate nozzle is a proprietary device manufactured by The Viking Corporation (See Photo 3). The nozzles come with a 360-, 180-, or 90-degree spray pattern. They are capable of withstanding a load of 30,000 pounds, in the event an aircraft tire is parked on one. The nozzle is mounted in a standard trench grate section available in widths of 20 or 26 inches.

Trench system. A critical feature of this fire suppression system is the required trench drainage system. In addition to supporting the grate nozzles, the trench system functions to hold the nozzle supply piping and to drain spilled combustible fuel quickly away from any exposed aircraft. The grate nozzles and their supply piping are located in a system of trenches that are arranged to run lengthwise across the front and back of the hangar and perpendicular to this along the hangar door opening 50 feet on center. The grate nozzle pressures based on this layout must be in the range of 40 to 45 psi to meet the UFC requirements.

Based on my observations of the system, the floor must be relatively flat or only slightly sloping, as the system relies on flow away from the nozzle to provide complete hangar floor coverage. The nozzles do not lay the foam down with a lot of energy; excessive slopes may cause gravity to lead foam away from areas needing coverage. Excellent diagrams and details of the trenches can be found online at www.vikinggroupinc.com/databook/foam/discharge%20devices/111406.pdf.

Water supply. The water supply must be provided in accordance with NFPA 409. Normally, municipal or military base water supply systems are not capable of meeting the total demand of the hangar fire suppression system; an onsite storage/fire pump system is required. Two equal-size water tanks are required, each sized to support one-half the maximum demand for a period of 45 minutes. The purpose

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FPE Corner

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of two tanks is to permit the fire protection system to be operational with one tank out of service for maintenance.

One redundant fire pump must be provided, i.e., the system must be capable of meeting the largest water demand with the largest fire pump out of service. It is noted that pumps must be automatically started from a pressure drop in the system. NFPA 409 also recommends that fire pumps be arranged to start via an electrical start signal from the fire suppression control panel. An analysis is required to determine if surge suppressor (expansion) tanks are also required.

Photo 3



Detection and controls. The low expansion foam system will have its own fire suppression control panel. The activation of foam system discharge is initiated by manual release stations and optical flame detectors. UFC 4-211-10N permits only one make of infrared (IR) optical detector, the triple IR flame detector, Det-Tronics X3301 Multispectrum IR Flame Detector. The foam system controls also include an abort station, which acts as a dead man switch and will stop the discharge of foam solution. Sprinkler system water flow switches and thermal detectors used for preaction systems are not arranged to actuate the foam system.

In a future article, I will discuss the specific fire suppression system design features of a recent project with Navy-style hangar fire protection. ■

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

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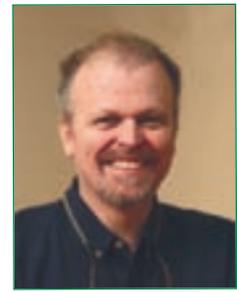
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Sustainable Design

By Winston Huff, CPD, LEED AP BD+C



Developing a water-efficiency plan with solutions

Water managers are concerned about water efficiency. It does not matter whether they are responsible for a very large plumbing system in New York City or whether they are homeowners managing small residential plumbing systems. They all want a plan that is right for their particular situation and will result in real solutions. To develop a plan, a water manager must know the local water issues and available strategies to formulate a solution.

Know the water issues

A long list of issues can drive an owner to address water efficiency. Some must be settled immediately, while others must be addressed to prepare for inevitable problems. It is important to know the particular issues for each system.

Domestic water: Our culture has developed to a point where it is expected that more than 100 gallons of drinkable-quality water will be available per person on a 24/7 basis. This water must be available in all possible weather and economic situations. However, buildings are constructed with little or no water backup storage onsite. As a

A long list of issues can drive an owner to address water efficiency. Some must be settled immediately, while others must be addressed to prepare for inevitable problems. It is important to know the particular issues for each system.

result, the distribution system must be capable of providing the peak amount of water to a building at all times.

For example, water supply systems in arenas or stadiums can be susceptible to failure during sporting events. When the crowd uses the toilet facilities all at once during halftime, the domestic water pressure can fall, causing the flushometer on a toilet to stay open. When this occurs, the water pressure drops, and the fixture cannot shut off. This can cause a chain reaction in which other fixtures do not shut off and continue to flush as well, which creates many problems: Toilet rooms can flood, toilet rooms are closed, and less water pressure and supply are available to feed the fire protection system.

Wastewater: The other half of the domestic water system is the wastewater system. One major problem occurs when the waste piping cannot handle the capacity of the system. Waste overflows or manhole surcharges can damage the piping system and create health problems.

Stormwater: The standard practice for treating

stormwater is to move it away as quickly as possible. Roof, parking, site and road systems are designed to move water away from the site. In locations with a significant amount of hard surface areas, this can be a problem. The municipal system cannot keep up with the demand, which can cause flooding even in low rainfall events.

Energy: Energy is sometimes overlooked in water efficiency, but in many municipal electrical systems, water and wastewater treatment suppliers are the top energy consumers. Energy is needed to pump water, and pumps can account for some of the largest electrical loads in a facility's energy system. Fluctuations in water demand result in oversized pumping systems; the end result is that 20 to 30 percent of the electrical power to a water system is wasted with inefficient equipment.

Combined sewer and rainwater: Some areas still have problems with combined sewer overflows, which occur when the stormwater and waste systems are combined into one piped system. The problem with these systems is that, during rain events, untreated wastewater can flow into natural waterways.

Greenhouse gases: This can be a twofold issue. Some electrical energy systems create greenhouse gases to generate electricity. Treating the waste in the wastewater treatment system also creates greenhouse gas emissions. For example, in New York City approximately 17 percent of the greenhouse gas emissions from city-operated facilities are from the water distribution and waste treatment systems.

Fire protection: Large amounts of water must be available 24/7 for fire protection systems. In reality, the full flow of water in a system may never be used, but the system must be designed and maintained to be ready to provide the water when it is needed. Water storage is usually not onsite, and in some cases the water is located miles away.

Drought preparation: Many systems now require more than 100 gallons per person per day of drinkable water as a baseline, but this amount of water is difficult to maintain during droughts.

Industry: During times of drought and low water supplies, industry can be compromised. For example, a few years ago, when the city of Atlanta was facing drought problems, the beverage bottling industry was impacted. This industry provides many jobs, and it was important that the bottling facilities remain open. The city had to decide whether to keep the bottling industry in operation or to restrict citizens' water consumption.

Emergency preparedness: During times of emergency such as floods or hurricanes, water, stormwater and waste systems have to remain in operation. In New York City during Hurricane Irene, storm surge levels in some areas were within one foot of overflowing into municipal areas,

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Sustainable Design

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which would have flooded subway tunnels, utility tunnels and basements.

Know the strategies

Many strategies can be used to address the issues discussed above. Before starting to develop a strategy, the system's problems should be listed in order of importance. Using expensive solutions to address a low-priority problem can strain limited budgets and frustrate operations staff.

Education: One of the first steps is to educate owners and users on the water-efficiency problems that must be addressed. Focusing on the major problems can keep everyone aware of the issues and looking for solutions. For example, accounting and budgeting staff can help find funding opportunities to address these problems if they know the issues.

Creating facility standards can be done with little added cost. For example, a building owner could mandate the use of low-flow fixtures when renovations are made. This can be done at a municipal level as well. Some cities now require new urinals to be 0.5 gpf or less and water closets to be 1.28 gpf or less.

Audits: Conducting a water audit helps develop a data baseline to measure future water-efficiency efforts and also identifies opportunities and priorities that can be addressed in a water-efficiency plan. Some municipal systems encourage water audits by offering rewards to customers who conduct audits. Rewards can include giveaway items such as low-flow showerheads or low-flow faucet aerators.

Standards: Creating facility standards can be done with little added cost. For example, a building owner could mandate the use of low-flow fixtures when renovations are made. This can be done at a municipal level as well. Some cities now require new urinals to be 0.5 gpf or less and water closets to be 1.28 gpf or less.

Metering: When customers pay for their own water and waste systems, they usually use less of each. Installing meters and including a program to track water usage can reduce water use.

Incentives: Incentive programs can go a long way towards reducing water usage, and they can be low cost. For example, if stormwater is a problem, a developer can include water retention, cisterns, or permeable paving on the site to receive lower code review fees or an expedited code review. Other areas offer financial incentives for replacing old, inefficient plumbing fixtures with new ones.

Utility connection fees: In some areas, utility connection fees do not depend on where a facility connects to the utility system. For example, in urban areas where utility

infrastructure and capacity are already in place, it costs little for the municipal system to provide utility services to a facility. However, a facility in a suburban area far away from the infrastructure pays the same connection fee for water and wastewater treatment as a building in the city. The remote facility may require four or more pumping stations to get the waste to the wastewater treatment facility, while the building next to the wastewater treatment plant requires no pumping stations. Providing a balanced fee structure can reduce expensive infrastructure upgrades.

Landscape irrigation: Some building codes still require irrigation. These codes should be reviewed and changed, or incentives such as using WaterSense irrigation systems or sensor-operated systems should be offered.

Leak Detection: Systems should be used to detect leaks in new facilities or retrofits, and the maintenance staff should be notified when problems occur. For example, some water heater manufacturers offer leak detection systems in their equipment at low or sometimes no added cost.

Hose connections: One simple solution is requiring trigger connections or local meters on water hoses used for washdown. When the hose is not in use, the water is not being wasted.

Onsite water: Incentives should be offered for facilities that use rainwater harvesting systems or onsite backup water storage.

Cooling towers: Incentives for efficient cooling tower operation meeting ASHRAE or LEED standards, as well as installing water meters, can help reduce potable water usage in cooling towers.

LEED certification: Many municipalities provide incentives and rewards when buildings achieve LEED certification.

Recognition programs: Many municipalities also have recognition programs for facilities that have conducted water audits and reduced their water usage, including building signage and recognition on the city's website.

Public data access: Access to public building water usage should be made available. This will encourage politicians and operators to maintain efficient building operations.

There are many reasons to design and operate water-efficient buildings, and, fortunately, many solutions are available to help buildings operate efficiently. ■

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

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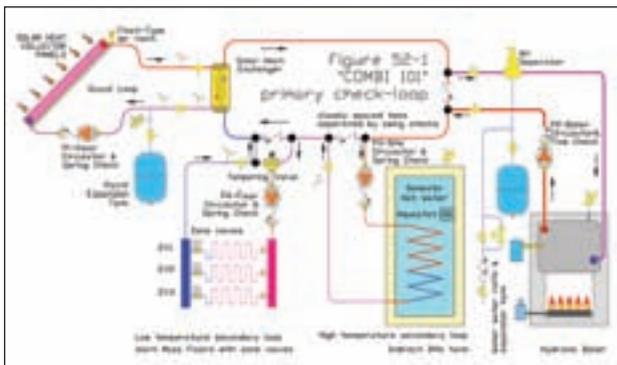


Bristol's Six Principles for Good Solar Hydronic Design

#52: Glycol versus drainback; a comparison

For solar heated buildings, our focus in this column has been mostly on combisystems composed of a standard primary loop piping configuration as seen in Figure 52-1. Our past discussion has been mostly about glycol systems like this one, but drainback solar piping can be substituted when needed. Both closed loop glycol and drainback systems can provide decades of reliable service when properly installed. The choice is dependent on many factors; some of the most important ones are presented in the comparison below.

There are a number of common variations used when building drainback systems. The discussion presented here is limited to the single type of drainback system that (I believe) best embodies the “solar prime directive” and principles of good design that were reviewed in some detail in last month’s column. This type of drainback design is seen in Figure 52-2, which shows the piping details required to use it as a “plug-in” replacement for the glycol solar loop seen in Figure 52-1. It uses a closed plumbing system with a drainback water tank that is initially filled with water at atmospheric pressure and then sealed with a captive air space above the water level. A heat exchanger coil is immersed in the drainback tank and connected to the pressured boiler fluid in the standard primary loop. Following is a comparison of the relative merits and limitations of these two solar heating contenders.



Summary

Glycol: The glycol closed loop system (Fig. 52-1) uses a pressurized heat transfer fluid (HTF), a mixture of water and non-toxic propylene glycol. The glycol mixture remains in the solar loop and collectors at all times under pressure, commonly 12 – 25 psi. This is a closed system made of all-metal tubing filled with glycol mixture and completely purged of air so there is no oxygen to support corrosion.

Drainback: The drainback system is filled with non-pressurized water, typically mineral-free and de-ionized. This water is recirculated through the solar panels and drains back to a drainback reservoir tank. Captive air fills the collectors when they are drained (e.g. at night) and the

air moves into the top of the drainback tank when the water is pumped through the collectors by day.

Freeze protection

Glycol: Glycol provides freeze protection to very low temperatures, depending on mix concentration. This allows collectors and supply pipes outdoors to remain full of liquid at all times without freezing.

Drainback: The HTF (water) drains by gravity down both supply pipes to the drainback tank indoors whenever the system shuts off. Air from the drainback tank takes the place of the water that protects the panels and pipes outdoors from freeze damage. Panels and supply pipes must drain quickly and completely to prevent freeze breakage. Serpentine collector tubing must not be used.

Overheat protection

Glycol: Glycol systems must be designed to prevent overheating in the collectors. Stagnation and fluid-boiling can occur due to daytime pump failure or loss of electrical power. Repeated overheating can cause propylene glycol to break down and become acidic. The choice of collector tilt, control of thermal storage mass and expansion tank sizing can mitigate overheating events. A heat dump loop is often employed to prevent overheating of the HTF. PV powered cooling circulators, night cooling of the thermal storage and thermosyphon collector cooling are proven methods for overheat control.

Drainback: A high limit set-point control can be used to assure that the water drains from the collectors back to the drainback tank when the system is close to overheating. Since fluid is not in the collector, fluid overheating (boiling) cannot occur when the circulator pump is off. Collectors and adjacent components must be chosen that can tolerate continuous dry stagnation. Pump failure or loss of electrical power will not cause immediate damage to the system components.

Thermal shock

Glycol: Glycol systems are less likely to be damaged by thermal shock, since the collectors are constantly exposed to HTF coolant that is pumped any time the collectors are warm. This tends to keep rapid temperature swings to a minimum, which protects the metal tubing and joints from extreme rapid expansion and contraction.

Drainback: Drainback collectors may experience thermal shock frequently during certain times of the year when they shut off and drain themselves during the sunny part of the day and then restart. An empty panel can stagnate at temperatures in excess of 300 F. If the circulator pump turns on during dry daytime stagnation, the first water to reach the hot panel will cause steam hammering and extremely rapid temperature change. This may cause pre-

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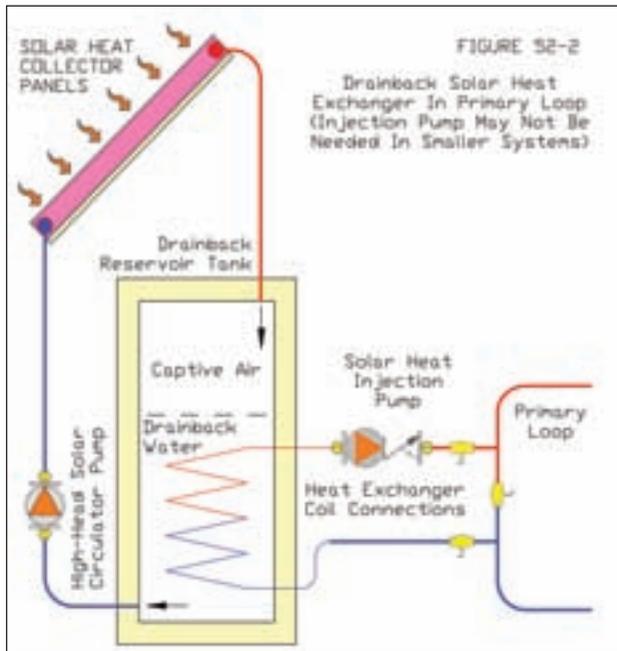
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mature failure of metal joints in the collector tubing over time.

System maintenance

Glycol: It is a good idea to check the glycol pressure, its concentration, pH, and strength of the other inhibitors or additives every year or so. When the pH drops below 7, it becomes acidic and must be replaced. Systems that are allowed to overheat regularly may need new glycol every 5 to 10 years. Glycol that is well protected from overheating will last much longer. Test kits can be obtained from glycol makers. Data recording and continuous remote Internet monitoring are now available as well.

Drainback: A properly installed drainback closed-system should need very little attention. The water level in the drainback tank should be checked every year along with the solar pumps and controls. (The annual checkup on any solar heating system may also include a check for leaks, a test of proper pump operations, control functions, pressure in the rest of the system.) Remote monitoring may be used here as well.

Power consumption

Glycol: In a closed loop, the pump is required only for circulation and needs only to overcome the resistance of friction inside the plumbing loop. Low-head pumps may be used for this with low electrical power consumption. Solar-powered PV circulators are sometimes installed, rated as low as 20 to 40 watts. A typical AC circulator used for this job may be rated at 60 to 87 watts. Circulation of the HTF to avoid stagnation will increase pump run time.

Drainback: Drainback systems require a higher head pump that uses more power because the HTF (water) must be lifted to the top of the collectors every day to replace the air. A typical single pump used for this job is rated at 140 to 205 watts. To save on pumping energy, two pumps can be used on startup and one turned off after flow is estab-

lished. Also, variable speed pumping can be used. Pump operation is not required during vacation periods or to prevent stagnation.

Pumps

Glycol: Continuous-duty, high-temperature, low-head hydronic circulators are used in closed loop solar glycol systems. Both AC and DC (PV) circulators are used. Cast iron pump-bodies are acceptable since there is no oxygen in the fluid to cause rust.

Drainback: Continuous-duty, high-temperature, high-head hydronic circulators are used in drainback systems. AC pumps are the most common standard. Bronze or stainless steel pumps are recommended, since captured air is required within the collector loop.

Noise

Glycol: AC hydronic circulators are virtually silent when installed in a closed loop that is purged of air and mounted properly. DC (PV) circulators are not always silent, making moaning, whirring or grinding noises that are not loud but can be persistent and generate complaints. Any pump (AC or DC) mounted with a direct connection to a hollow wall can reverberate with a louder volume, so always consider soundproofing and acoustical isolation.

Drainback: Drainback systems make a noise like a coffee percolator when they are running. This is because the top of the drainback tank fills with air, and the hot water returning from the collector falls through the air, splashing into the reservoir below. So, install with the same precautions to reduce pump noise, but also insulate, isolate and soundproof the tank from the living space.

Installation

Glycol: A glycol solar loop has a few more components, so may seem more complex to install. A spring check valve near the pump, air vents at the high points, diaphragm expansion tank, pressure gauge and fill/purge valve assembly are needed in a glycol loop but not for drainback. By using a prefabricated solar pump module, the extra work of assembling most of these components can be eliminated.

Drainback: The drainback system may seem less complex to install with one exception; collectors and piping must be carefully sloped at least ¼ inch per foot to provide proper drainage for freeze protection. Also, the piping must be large enough and properly sloped to allow air to easily return from the drainback tank to the collectors each day without delay. Collectors and pipes that are slow to drain may freeze and break.

Collector location

Glycol: Pressurized closed-loop glycol systems offer wide flexibility in collector mounting locations. Collectors may be mounted above, below or to one side of the boiler room. It is not uncommon for glycol collectors to be ground-mounted, beside or below the building and 50 to 100 feet or more away.

Drainback: Drainback systems provide limited flexibility when mounting the solar panels. Collectors must be

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Solar Solutions

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above the drainback tank and all supply pipes must slope downhill. The drainback tank must be indoors, typically in the boiler room, for freeze protection.

Cost

Glycol: Installed costs are similar for installations of comparable size

complexity.

Drainback: Installed costs are similar for installations of comparable size complexity.

Final notes

These articles are targeted toward residential and commercial buildings smaller than 10,000 square feet.

Brand names, organizations, suppliers and manufacturers are mentioned only to provide examples for illustration and discussion and do not constitute any recommendation or endorsement. Back issues of this column can be found in the archives at the TMB Publishing and SolarLogic LLC web-sites. ■

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The Prime Directive for Solar Heating

Always design and install solar heating equipment that is at least as reliable and trouble-free as the conventional system it replaces. Whenever possible, provide performance, longevity and controls that surpass the conventional alternatives. To meet the prime directive, try following these Six Principles:

- **Reliability.** Make it reliable.
- **Effectiveness.** Think user satisfaction.
- **Compatibility.** Make it compatible in every possible way.
- **Elegance.** Use less to do more.
- **Serviceability.** Make it easy to install, repair and adjust.
- **Efficiency.** Build in thermal and electrical efficiency.

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Modern Hydronics

By Bob "Hot Rod" Rohr, Radiant Expert



Two associations now serve the hydronics industry

If you are involved in the hydronics industry in any way, you are no doubt aware of the RPA. Formerly the Radiant Panel Association, it has now been relabeled the Radiant Professional Association. With great foresight, this association was formed back in 1994. A few progressive manufacturers stepped up with their checkbooks, and the ball was rolling. I became a member as soon as I found out about its formation.

I attended the first Expo in the old Thunderbird Hotel in Minneapolis. My son Max and I had a booth showing our Smart Parts for Neat Heat. I knew some of the manufacturers and other members from installing their products. We, like many contractors, embraced and jumped on the radiant bandwagon as it gathered steam (pun intended) in the early 1990s.

The RPA was a fun gathering for industry players. We (Ellen and Max and I) looked forward to the yearly get together. Lifetime friends were made; networking lines established. Life was good in the industry. My main area of interest was the design and installation side of the business. At the time, we had a small contracting business in the mountains of Utah. We were, by all accounts, in "prime" radiant country. There was no lack of customers in the early days. The decision between forced air and radiant was easy for homebuilders and potential buyers. Certainly in the 7,000-foot elevations we served, air conditioning was not on the radar at all back in the early days.

The association grew and flourished. Membership increased steadily, trade shows expanded, and all was well. Keep in mind, hydronics was always a small segment of the industry. Over the years, I have heard that anywhere from 5 to, maybe, 10 percent of the heating industry was "water" based. I recall that the RPA grew to around 900 members at the high point.

All associations seem to flourish in the early days, maybe for five years or more; it came as no surprise when membership started to dwindle. One challenge is to keep a group fresh and interesting. As the membership evolved, the early adopters were interested in the newest products and technology.

I think the association went through a perfect storm. The economy and housing starts started a big decline, and early members were looking for more advanced seminars and products. The third factor was the resurgence of heat pumps and GEO. More and more builders and customers want cooling, even in the mountain resort towns. Forced air is best suited for cooling and, certainly in humid areas, air movement is a must. The HP and GEO started promoting heating, cooling and DHW from one source. So, for a builder or consumer, the choice was a \$50,000 radiant-only system or the same dollars for a forced air, high efficiency HP. The second becomes a pretty attractive option. Combine that with the marketing machine and dollars the

HVAC manufacturers can dump into the market.

As we try to breathe some life back into the hydronics industry, we are presented with another question. Currently, two groups vie for the hydronics association market. The former RPA has been purchased by IAMPO. At nearly the same time, the Air Conditioning Contractors of America (ACCA) started the Radiant Hydronics Council (RHC). This presents questions for all former and potential members: Can a contractor, manufacturer, wholesaler or designer support two different groups providing basically the same experience? Can the groups be freshened and made attractive enough to bring either or both groups back to a workable size and product offering?

The RHC group, being attached to ACCA, is a contractor member group. ACCA is the birthplace of the Manual J, D, N. B, S, etc., and also of the NATE Essentials. The membership and product is all contractor-based. The IAMPO/RPA seems more of an industry group, driven by standards and code development. Some manufacturers pay to have their products listed via IAMPO. So, paying to belong to the RPA, part of IAMPO, feels somewhat like a "double taxation." Are we paying for the same lobbying, staff, etc., with RPA dues?

Both have lobby presence on "The Hill." Can the two groups work together towards a common goal? What is the goal? Every member has a different definition of the direction the association should take. Contractors like the seminars, training and the show floor, along with the networking opportunities. Manufacturers and wholesalers want increases in sales and awareness. That may be true for contractors also, as in these times most have multiple disciplines to help provide a livelihood. A radiant- or hydronic-specific contractor is becoming rare.

Will the industry as a whole be willing to belong to two groups, attend multiple shows that cater to the same market, with twice the membership dues, travel, sponsorship, and seminar presentations? Keep in mind that the associations(s) should, and need to, be profitable to flourish.

Is this the wet head's "Sophie's Choice?" Must we pick one over the other? Is there room and the need for both? Or could we hope that the groups find common ground and mutual benefit from working together? What do you think? Email me at hotrodradiant@mac.com. ■

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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The business of sustainability

During the BP oil spill in the Gulf of Mexico in 2010, an estimated 4.9 million barrels of oil gushed into the ocean. In 2011, the U.S. used an average of 18.8 million barrels of petroleum products per day. When you calculate that, the amount of oil that gushed out of the ground over three months into the Gulf of Mexico would have powered the U.S. for only six hours and fifteen minutes (*Popular Mechanics*, EIA).

We are a thirsty nation. As a superpower, we require a lot of energy to power our economy. The energy policy we have employed up to this point is to try to gobble up all the oil and gas we can throughout the world to keep our economy growing. This means we have to protect and transport a liquid from all corners of the earth and are at the mercy of the particular oil cartel in charge. An alternative we have is to dig and drill more in our own country. This eliminates the transportation and protection issues but doesn't address our outrageous thirst. Wouldn't reducing our consumption ease the strain on how we acquire energy?

The Carbon Disclosure Project is a group that asked the biggest companies in the world to disclose their emissions. At first, only a few companies responded. However, the group gained traction, and more and more companies started to report in. By 2007, they found a pattern. "Globally, 76 percent of the companies said they had instituted targets and plans to reduce emissions, yet only 29 percent of American respondents had implemented greenhouse gas reduction programs with timelines and specific targets" (CDP 2007).

We are lagging behind in energy innovation because we have been lulled to sleep with our low energy prices. The short-term comfort of low energy costs is going to leave us floundering as oil starts to run out, whenever that may be. Countries that have had to worry about the price of energy for the last few decades had to start working on a plan B earlier. They did this partially to be green but mostly to survive as industrialized nations.

In 1997, at a summit in Kyoto, Japan, the United Nations put together a new global standard to reduce energy use. Some call the Kyoto Protocol an inconvenience and a job killer that overregulates industry. Some call it a reasonable benchmark that will do an enormous amount of good for our planet, without damaging industry. Of the nations in the world, 191 have ratified this protocol. The U.S., Canada, Afghanistan, Andorra and South Sudan are the only nations not to ratify. The protocol would have required the U.S. to reduce its emissions by 7 percent from our 1990 levels by 2012.

The rest of the countries in the world have shaken off the cobwebs of energy business as usual and have started innovating. As Americans, we have not kept up in the last few decades, but it hasn't slowed us down drastically. However, we won't be able to drill or muscle our way back into the energy innovation race. There are not sufficient amounts of oil or gas under American soil to keep us glob-

ally competitive forever.

Innovation doesn't have to be hard or to involve lots of cultural changes. Americans waste \$2.8 billion dollars a year by leaving computers on when nobody is using them (2009 IE PC Energy Report). 30 to 60 percent of electricity used to light spaces is unnecessary or redundant (*National Geographic*). Reducing energy waste isn't a concept that is detrimental to business; it is actually a great business practice.

The 2011 book *Climate Capitalism* includes the following case study: the DuPont Company pledged to cut their carbon emissions to 65 percent below their 1990 levels by 2010. The reason they did this? To increase the value of their stock.

"The value of DuPont stock increased 340 percent, while the company reduced its global emissions by 67 percent. The company's climate protection program showed that it costs less to implement energy savings measures than it does to buy and burn fuel. In short, DuPont was solving the problem at a profit. In 1999, DuPont estimated that every ton of carbon it no longer emitted saved its shareholders \$6. By 2007, DuPont's efforts to squeeze out waste were saving the company \$2.2 billion a year. The company's profits that year? 2.2 billion."

Waste is the common enemy for both business and environmentalists. DuPont found a way to turn promises into action and reaped the financial benefits.

The Carbon Disclosure Project releases an annual report giving grades to companies that report their energy data. Some of the other companies receiving an A grade for 2011 were: Molson Coors Brewing, Bank of America, Morgan Stanley, CSX, Lockheed Martin, Cisco, Clorox and Consolidated Edison (CDP 2011). This is encouraging news: DuPont isn't a one-in-a million success story. Not only are some of the biggest companies in the U.S. participating and planning, they are also excelling.

Another company detailed in *Climate Capitalism* took a very drastic approach. In 2005, the decision makers of this company set lofty goals — to supply 100 percent of their energy from renewables, to create zero waste and to sell sustainable products going forward. They got to work by replacing light bulbs, started to build hybrid-electric truck fleets, reduced packaging used in their products and demanded that their suppliers step up their energy efficiency in production. They made big promises and have backed them up with action. That business that isn't the new frozen yogurt place downtown; it is Walmart. They saved \$11 billion dollars in two years by reducing packaging. The energy they reduced in lighting their stores more effectively could power the city of Philadelphia. The biggest win for Walmart is that they were one of two Dow Jones Industrial Average companies in 2008 to have stock prices to go up — by 18 percent.

The interesting trend is that dreadlock-sporting

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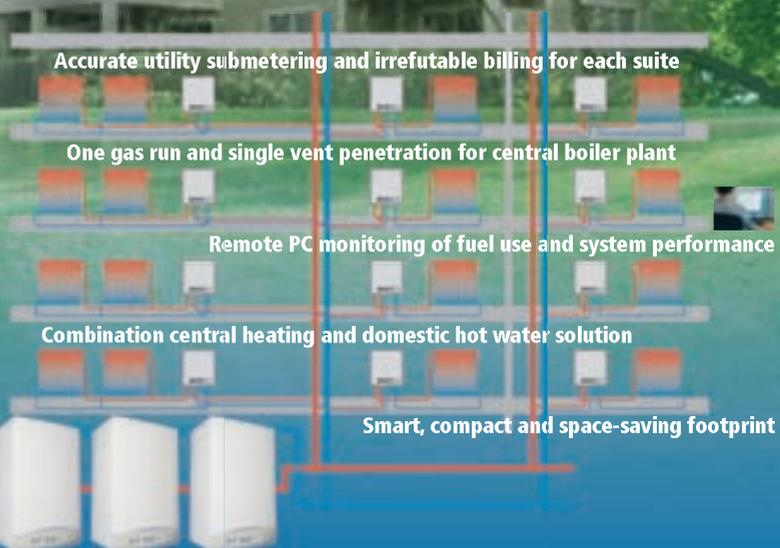
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Green Systems

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Greenpeace activists and hard-nosed, Fortune 500 CEOs are arriving at the same energy strategy conclusions from completely separate paths: We need to reduce the amount of energy we are using. These energy waste conversations are not happening in the back of a VW bus at a Phish concert. They are happening in the boardrooms of billion dollar companies that want to be relevant for another 50 years.

Energy development is my generation's space race. As of today, the metaphorical American energy spaceship is a wooden prop plane next to a bunch of high-tech rockets. Man your innovational battle stations, America! Insulate your buildings, go paperless at work, change your light bulbs, get an energy audit, support innovative businesses and reduce your energy consumption. Get creative or follow the lead of another innovator. There is no long-term business case for using all the energy we can find as fast as possible. We need to stop acting like a nation of procrastinators and more like the innovators we have been in the past and are capable of being again. ■

Max Rohr is a graduate of the University of Utah. He is currently an outside salesperson at Shamrock Sales in Denver. He has worked in the hydronics and solar industry for the last 10 years in the installation, sales and marketing sectors. Max is a LEED Green Associate and a BPI

Building Analyst and is passionate about green technology. He can be reached at max.rohr@mac.com.

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Rainwater Harvesting System Design Basics

by Timothy C. Hessler, CSM

Water cannot be created or destroyed. The same amount of water is on Earth today as when dinosaurs walked the planet. Man and nature can only alter the physical state of water, pollute it, or clean it up.

The bulk of Earth's water is saltwater, approximately 97 percent, and unusable for human consumption without costly desalination treatment. Of the less than 3 percent remaining, two-thirds of this freshwater is locked up in ice caps and glaciers. The majority of the balance is coursing beneath the surface as groundwater, soil moisture, or in aquifers. That leaves 0.3 percent of the planet's freshwater, or approximately 0.007 percent of all water on Earth, accessible for human needs. This water has to be shared for use in irrigation, household and municipal water use, manufacturing, and industrial applications. Obviously, water is a precious commodity that should be conserved and valued.

Rainwater, otherwise stated as storm water, is highly regulated. The Clean Water Act of 1972 began placing requirements on discharges into the waters of the United States. From the EPA to state regulatory agencies and finally to municipalities, storm water regulations are written and enforced to control storm water runoff. This began first from a storm water quantity standpoint, but recently the quality of the storm water has become more of a concern of the regulators.

A handful of states have enacted laws concerning rainwater harvesting. Texas and Ohio have a considerable amount of legislation in support of this issue, even allowing the practice for potable water uses. Texas offers sales tax exemptions on the purchase of rainwater harvesting equipment. On the opposite end of the spectrum, Colorado has outlawed the use of rainwater or

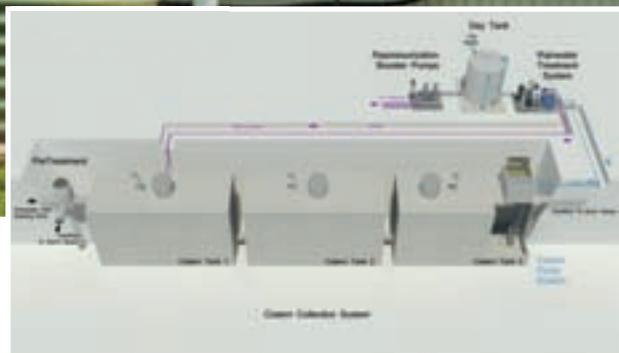


Figure 1. Large rainwater harvesting system with pre- and post-treatment

water collected from snow melt for irrigation and other uses. The law states that all precipitation that falls inside the borders of the state belongs to the state; this is proscribed from old water right laws. It is also illegal in Utah to divert rainwater without a valid water right.

The benefits of rainwater harvesting are numerous, and states currently restricting the practice are now considering pilot projects to re-evaluate the issue. It is obvious that collecting rainwater where it falls reduces the demand for new, treated water and eliminates the negative effects of storm water runoff.

Rainwater is thought to be pure, pH neutral, and soft (i.e., free from minerals such as calcium and magnesium). It is ideal for irrigation purposes and can be utilized for various water needs inside and outside a building, including water closets, laundries, mechanical systems, custodial uses, and for topping off swimming pools and break tanks. Toilets and urinals consume as much as 40–60 percent of water purchased for a typical office building. By supplementing or eliminating this wasteful use of potable water, green buildings not only reduce their municipal water bills, but also contribute to conserving a valuable, limited resource in our environment. Since rainwater is collected using existing structures (e.g., roofs and/or parking areas), rainwater harvesting has few negative environmental impacts.

Commercial rainwater harvesting systems are available for almost all types of buildings, including schools, hospitals, shopping centers, government buildings,

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Rainwater

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Figure 2. Precast concrete storage tank

office buildings, factories, warehouses, farms, and garden centers, and for a wide range of application complexities. They can be as simple as a 1,700-gallon plastic storage tank and pump for a remote cabin, using the rainwater to flush commodes, to a 50,000-gallon three-compartment underground concrete cistern with pre- and post-treatment filtration, ultraviolet light disinfection, a distribution system including an 800-gallon day-tank, and dye injection to identify the reclaimed water for nonpotable use, such as one ParkUSA supplied for a U.S. Coast Guard facility (see Figure 1).

The most efficient rainwater harvesting systems collect and store the rain near the area where it will be put in use. The catchment area can be as simple as the roof of a house to almost any impervious surface area such as a road, driveway, sidewalk, or parking lot.

When the rain is collected from rooftops, the first step is to remove as much debris as possible from the rainwater before it enters the system. Leaf screens, gutter guards, and downspout filters are utilized, as well as first-flush devices. Opinions vary on the volume of rainwater to divert in a first flush. Many variables determine the effectiveness of washing the contaminants off the collection surface, just as many variables determine the makeup of the contaminants themselves. For example, the slope and smoothness of the collection surface, intensity of the rain event, length of time between events (which adds to the amount of accumulated contaminants), and nature of the contaminants themselves add to the difficulty of determining just how much rain should be diverted during first flush.

Vortex filters and other more sophisticated methods are also used to clean the water in pretreatment. If the rain is captured from parking lots or roadways, pervious pavement can be installed. Pervious pavement is a permeable roadway surface usually with a stone reservoir beneath it. This best management practice also reduces runoff and eliminates some of the heavy metals that may be in the water. The rainwater can also be transmitted to underground storage tanks through biofilters, such as slow sand filters, to capture and biologically degrade pollutants.

Storage chambers, or cisterns, are designed in different configurations. Precast concrete storage tanks for underground installation (see Figure 2) provide the largest selection of tank sizes and configurations, while being the most economical of material choices. They can be equipped with liners to provide the desired level of water quality for a particular application. Steel tanks

(see Figure 3) are recommended for applications where the rainwater storage tanks are in a freestanding position (e.g., in a basement or on a slab). The tanks can be constructed from carbon steel, stainless steel, or galvanized steel. Rainwater storage tanks constructed of HDPE (high-density polyethylene) or fiberglass are available for underground installation in every size from 300 to 20,000 gallons. Above-ground tanks are freestanding and require a firm level base. Options include tie-downs (see Figure 4) and freeze protection. Finally, waterbags are available for basements as well as for remote or temporary storage of rainwater.

Large sites are designed with detention or retention ponds to control the quantity of storm water runoff for flood control as well as serving as cisterns for a rainwater harvesting system. The water is reclaimed for irrigation or other uses.

Depending on how the water will be stored and used, additional filtration may or may not be needed. Most small sediment will settle out of water stored in tanks, so no additional filtration is needed, especially for water used for site irrigation purposes where complete clarity is not necessary. However, if the rainwater is planned to be used as potable water for human consumption, then extensive treatment processes may be required. These methods may include micro-filtration, chemical disinfection, exposure to ultraviolet radiation, reverse osmosis, water softening, and chlorination.

Rainwater harvesting distribution systems may be as simple as scooping water from 55-gallon drums to water plants. Large sites may involve extensive multi-level lift stations and pump systems to move collected rainwater over acres of land. Often, day-tanks are utilized to provide a manageable volume of treated water instead of pumping water directly from a large cistern.

A best management practice for sizing any rainwater harvesting system is that the volume of water that can be captured and stored (the supply) must equal or exceed the volume of water used (the demand). If the expected demand cannot be met by the calculated supply, then careful water management will be required.

Some rainwater may be lost to first flush, evaporation, splash out or overshoot from the gutters in hard rains, and possible leaks in the system. Rough collection surfaces are less efficient at conveying water as water captured in pores tends to be lost to evaporation. Also impacting achievable efficiency is the inability of the system to capture all of the water during intense rainfall events. For instance, if the flow-through capacity of a filter-type roof washer is exceeded,



Figure 3. Steel storage tank

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Rainwater

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spillage may occur. Additionally, after storage tanks are full, rainwater can be lost as overflow.

The Rational Method is often used to calculate the potential supply of rainwater runoff. The rational method equation is $Q = CiA$.

- Q is the average monthly rainwater runoff rate in gallons from the drainage area. It's also called the average monthly supply.

- i is the average intensity of rainfall for the time of concentration, usually measured in inches/hour. Determining rainfall intensity, though most important to sizing a system, may be calculated utilizing various methods from complicated to simple. The simplest is dividing the area's annual rainfall by 12 to get the monthly rainfall. (Consider seasonal adjustments depending on the application.) Monthly precipitation is the key calculation to the rainwater harvest supply as it must equal or exceed the monthly demand for water usage. Deficiencies in monthly precipitation are typically made up by piping costly city water to the system. No one can outguess the weather month to month, so make-up water piping and associated valves are necessary in most systems. The trick is to minimize the use of make-up water through good planning during this phase of the sizing process. Undersizing a system defeats the purpose rainwater harvesting, and ultimately the owner will

realize limited savings from the investment.

- C is the runoff coefficient for the drainage area, that is, the fraction of rainfall on the drainage area that becomes storm water runoff. It is

dimensionless. Runoff coefficients, when averaged over the long term, range from as high as 0.80–0.85 for a well-constructed corrugated-iron roof to 0.10–0.20 for a compacted soil surface. The annual rainfall data is available from local and state agency websites. If the catchment area is comprised of a variety of different surfaces with different runoff coefficients, then a weighted average value should be calculated.

- A is the area that drains to the design point of interest (the drainage area) in square feet. A conversion factor of 7.48 gallons of water per 1 cubic foot of area will be necessary to change the final result from cubic feet to gallons.

Determining water demand is more scientific than attempting to outguess the variables of rainfall for the supply. Years of experience in plumbing design is found in a wealth of references from plumbing codes to association handbooks.

Indoor demand is a function of the number of people in the building, the number of hours per day the building is occupied, the numbers and types of toilets and/or urinals in place, etc. Design considerations would be the same as the demand from a freshwater supply line. The additional concern would be the creation of required water pressures and any pretreatment from the rainwater storage tank.

For outdoor demand, determine the volume of water to be used for irrigation of grasses and landscaping, water fountains or other water features, etc. Different types of vegetation have different water requirements. Research is required for the specific design features of the system in question.

When developing a rainwater harvesting system, the focus should be on what percentage of savings or reuse is created with the system design. People cannot comfortably depend on a variable like rainwater to be ready for use in all occasions. With careful planning and water management, a rainwater harvesting system will help preserve this natural resource while offering many benefits to the environment. ■

Timothy Hessler, CSM, is Product Development Manager for ParkUSA, a manufacturer of pre-engineered and pre-packaged solutions for water distribution and wastewater treatment challenges. He can be reached at thessler@park-usa.com.



Figure 4. Above-ground storage tank with tie-downs



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Controlling Scale in Water Systems Helps Prevent Legionella

By Jan De Baat Doelman
President, Scalewatcher North America Inc.

The Legionella bacterium, Legionella Pneumophila (LP), the fundamental agent of Legionnaire's Disease, is a water-based organism that causes infection when inhaled in an aerosol form. Legionnaires' disease acquired its name in 1976 when an outbreak of pneumonia occurred among persons attending a convention of the American Legion in Philadelphia. Later, the bacterium causing the illness was named Legionella.

Managing the risks from Legionella in water systems requires a holistic approach and a suite of control measures underpinned by a suitable and sufficient risk assessment specific to the risk system in question.

Normally associated with cooling towers and evaporative condensers, mist machines, humidifiers, whirlpool spas and showers, the bacteria Legionella Pneumophila is most commonly associated with the disease outbreak (legionellosis), which travels by air and is caused by the inhalation of contaminated water under the form of aerosol spray that is smaller than 5µm. The Legionella bacteria thrive in stagnating water (tanks, reservoirs, dead legs in piping systems, poor flow areas). The bacteria require temperatures between 68 F and 113 F (under 68 F they survive; over 140 F they are

killed) and a supply of nutrients found in algae, rust, sludge and scale.

Prevention

Health agencies continually draw attention to the risks and good practice concerning cooling towers and evaporative condensers in cooling water treatment. Conditions that affect the proliferation of Legionella include:

1. The presence of scale deposits or algae growth in the water
2. Deadlegs in the pipework or stagnation due to very low use of outlets
3. Low temperature in potable hot water heaters and distribution systems
4. Stratification of water in water heaters
5. Inappropriate water treatment

LP may be able to colonize certain types of water fitting, pipework and materials used in the construction of water systems. The presence of such materials, and of large quantities of sediment, may provide nutrients for Legionella and can make eradication difficult. In practice, LP is found in many recirculating hot and cold water systems, particularly in larger, complex systems such as those found in hospitals, hotels, office blocks and factories.

Managing the risks from Legionella in water systems requires a holistic approach and a suite of control measures underpinned by a suitable and sufficient risk assessment specific to the risk system in question. In

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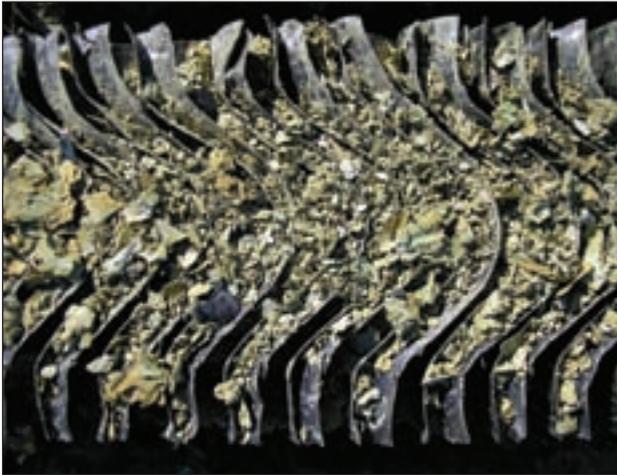


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Legionella

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Scale on heat exchange surfaces dramatically reduces the heat transfer efficiency and promotes corrosion in the calorifiers and pipework.

hard water areas, scale formation can be a problem unless properly managed and can increase the likelihood of Legionella persisting.

Scale

Scale, or lime-scale, is a hard, rock-like deposit of calcium or magnesium salts that forms in heat exchangers and cooling tower packing and other water-fed equipment as a result of heat and increased concentration factor. Scale formation impairs heat transfer, interferes with flow and cooling and can be a breeding ground for legionella bacteria. The scaling tendency of a water supply will depend on the hardness of the water, but if not adequately treated, even relatively soft waters can become highly scaling when concentrated by evaporation. Poor control not only puts your cooling process at risk but can also squander thousands of dollars in wasted energy, chemicals and water charges.

Scale is a major problem in both hot and cold water systems. Dripping taps can deposit scale in and around the tap and, with high ambient room temperatures, provide an ideal growth medium for LP. In hot systems, scale can trap Legionella and biofilms. This provides a perfect growth medium, which disinfectants cannot penetrate. Scale deposits colonized by Legionella can continuously re-contaminate a system, even after disinfection. Biofilms trapped are a source of nutrients for LP and can lead to taste and odor problems from the products of their metabolism.

Scale is a major cause of inefficiency in hot water systems. Scale on heat exchange surfaces dramatically reduces the heat transfer efficiency and promotes corrosion in the calorifiers and pipework. Descaling of a hot water system is time consuming and expensive. Water softeners can reduce scale, but there is growing concern over the increase to sometimes-high levels of sodium in the water.

Air conditioning and refrigeration water systems

Many air conditioning and refrigeration plant systems

are water-cooled. The heat generated by cooling coils is removed by water, which is passed through a water-cooling tower. These are recirculating systems, which operate at temperatures ideal for bacterial and algal growth and have plentiful supplies of nutrients. They have been highlighted as a major possible source of Legionnaires Disease, mainly because of the large number of people that can be affected.

In a tower that is well-designed and maintained, however, chances of problems with LP are greatly reduced. Most outbreaks have occurred in towers that were badly designed and had little or no maintenance. In cooling towers, temperature, water hardness, pH, scale and corrosion are all factors that increase the chance of biofilms, algae and Legionella colonization. Many agents are used to control these factors, including scale and corrosion inhibitors, dispersants and biocides. Water softeners are sometimes used for soft water, which can cause a problem with foaming.

Biofilms are a major problem in cooling towers. Biofilms and scale can reduce the efficiency of cooling systems to the point where the system no longer functions with regard to heat transfer.

Biofilms are a major problem in cooling towers. Biofilms and scale can reduce the efficiency of cooling systems to the point where the system no longer functions with regard to heat transfer. Health and safety officers recommend the periodic chlorination and descaling of cooling towers. However, chlorine is not always compatible with other treatment chemicals, such as corrosion inhibitors, is not effective in alkaline water and can itself cause corrosion. Some biocides are effective against LP if used in sufficient concentration. Strains of LP and other bacteria may become resistant to particular biocides, hence dual or alternating biocides are used.

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Legionella

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Alternatives

What is required in all the systems, cold, hot and process is a method of continuously controlling scale deposition and a water treatment regime that prevents the growth of biofilms, bacteria and, in particular, LP. This method is now available in the form of electronic

scale treatment of water to prevent scale deposition together with the chlorination of all water, both hot and cold supplied, to a building or factory.

Electronic water treatment

This involves the fitting of electronic water descaling equipment,

such as the patented Scalewatcher, at strategic points in the water system. Water treated by such systems will prevent scale from forming in pipework and on heat transfer surfaces and will also, over a period of time, remove existing scale deposits. There are many advantages to this non-intrusive engineering solution:

1. Energy use is greatly reduced, due to heat exchange surfaces

Scale is a major problem in both hot and cold water systems. Dripping taps can deposit scale in and around the tap and, with high ambient room temperatures, provide an ideal growth medium for LP. In hot systems, scale can trap Legionella and biofilms.

remaining free of scale deposits (just ¼ inch of scale increases energy costs by around 40 percent).

2. Corrosion caused by scale deposits is eliminated.

3. Extensive downtime and labor cost involved in descaling systems is eliminated.

4. A source of colonization by biofilms and LP is removed.

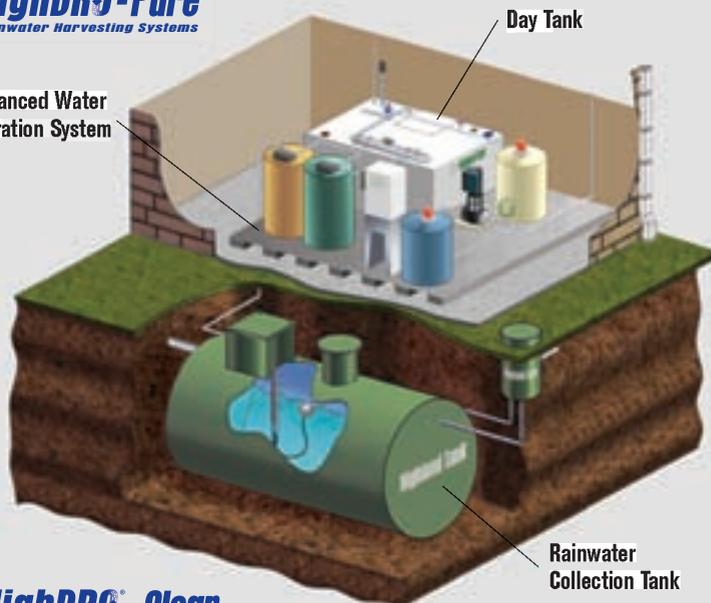
5. Water distribution efficiency and pressure is increased by removal of scale deposits, which can reduce pipe diameters considerably. ■

Scalewatcher North America has invested significant sums in the research of electronic systems in the U.S., Europe and Asia. The company's research has led to the implementation of an effective scale deposit-control strategy, directly reducing energy costs and removing a major breeding ground for LP. For more information visit www.scalewatcher.com.

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The Accelera[®] 300 heat pump draws only 500 watts, low enough that operation off-grid with PV is a viable option. Use the back-up element and grid-tie is probably necessary, but with a full tank of 140°F water, and a 78.6 gallon first hour rating, daily hot water needs may be satisfied without it. Sometimes solar thermal isn't a choice, and when it's not, now there's a renewable energy option.

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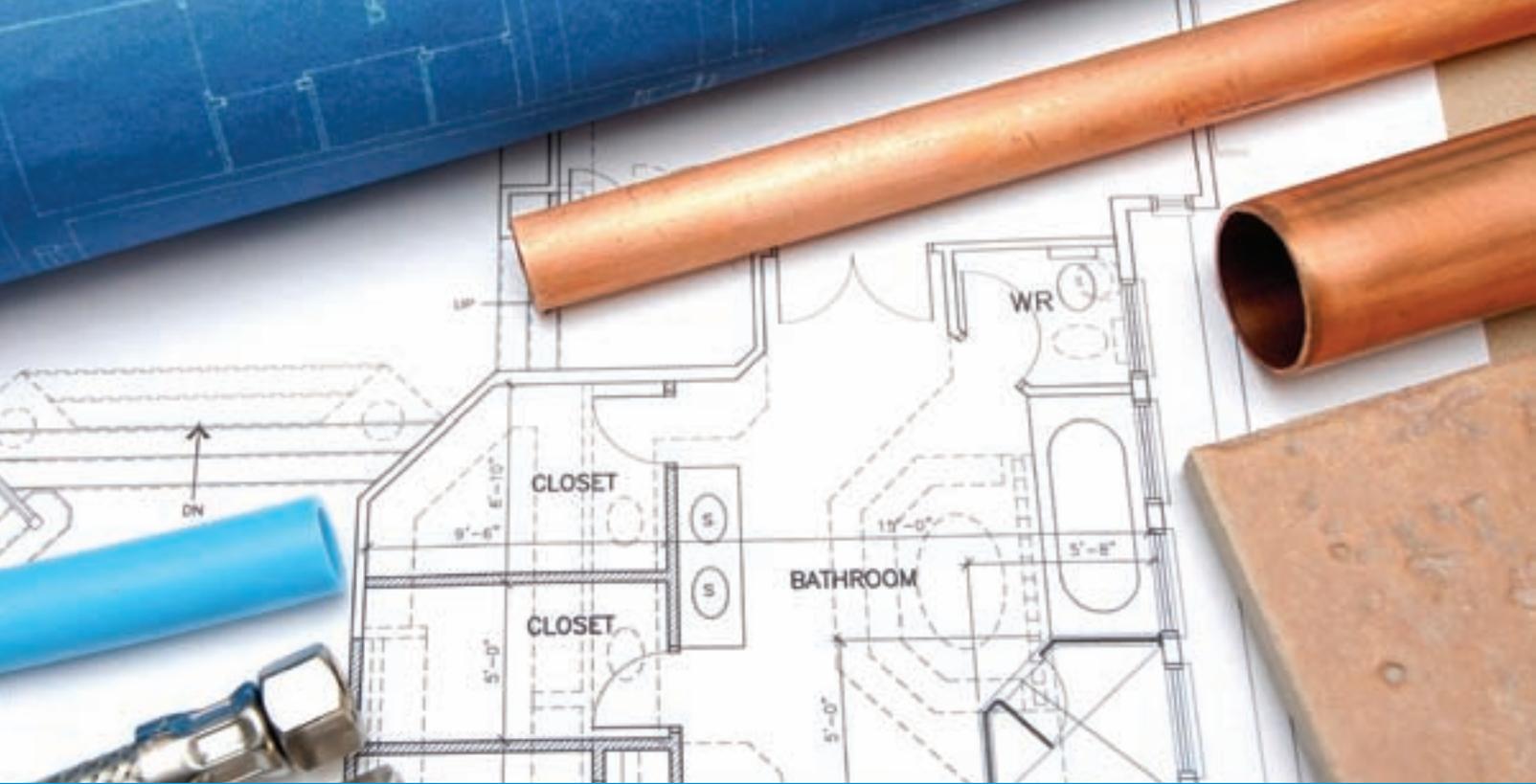
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It's the Little Things That Count in Good Plumbing System Designs

By John A. Clark, PE

In more than 40 years of designing mechanical and plumbing systems, I have become aware of many client complaints and comments relative to their constructed plumbing systems. Every time I use a restroom, visit my doctor in the clinic exam room, visit friends in a hospital room or enjoy coffee in an office break room I judge the fixtures that are provided. This article reflects my experiences based on client input and my own observations.

Toilets

Fixture manufacturers have gone to the 1.6 gpm flush units; these remove solid waste and, over time, have been redesigned to do a better job of cleaning the bowl wall. The comfort-height, elongated bowl is the best choice in today's world; higher fixture height is based on ergonomic studies. Remember, however, to select child height fixtures for day care centers and grade schools.

Dual flush units save water. As the public becomes more aware of the operation required to select the flush type, more water will be saved. Consider putting signs in restrooms describing how to select the flush choice.

When electronic sensor flush controls are used, be sure that the maintenance staff is aware of how to set the movement sensitivity. Sometimes, the movement of reaching for toilet paper activates the flush valve, causing an early flush. When this happens, solids are often left in the bowl.

Toilet selections include floor mount, wall mount or floor mount with back outlets. With obesity being an issue

today, consider a floor mount fixture or a wall mount with floor mount wall carrier. For back flush toilets, remember to provide 35 psi water supply vs. 25 psi for traditional toilets; the toilet will not flush with 25 psi water pressure. This is a problem in low-rise buildings over two stories.

In handicapped stalls, the flush handle for tank type units should be on the wide side of the stall. Although the flush handle is normally on the left side of the tank, right side models are also available. Two different fixture tank types are necessary when units are plumbed back to back. All handicapped stalls have grab bars; be aware of the potential height conflict between the grab bar and the flush valve. Consider mounting flush valves higher.

Urinals

Waterless urinal flushing has created a few new problems, such as lime-plugged drain lines and restroom odor complaints. Although it does save water, pure urine draining through a waterless urinal also causes odor. For one-pint units, the cost of the cartridges may outweigh the water savings. The memory rubber trap seal is one option that can be used in waterless units. Many building codes still require water to be used for urinal flush. If waterless units are approved, the code official may require that water be piped to the urinal area, in case the fixture is changed to a water flush type in the future.

Urinal odor is caused when water and urine are mixed; this happens in low flow one-pint units and washdown



Most breakrooms provide coffee makers, which may be connected to a cold water supply. If this is the case, be sure to provide a convenient stop valve for disconnecting the water when servicing the unit.

units. Use odor control cakes in these units to avoid complaints. Siphon jet flush units remove all the water/urine mixture from the fixture and just leave water in the bowl.

The size of the urinal fixture, its location in the restroom and its mounting height are all important considerations. If the restroom contains only one urinal, select a tall type fixture. Small siphon jet models mounted at ADA mounting heights result in urine being delivered to the top of the fixture or onto the floor. To minimize this problem in restrooms with multiple urinals, locate the ADA urinal at the far end of the group.

Mineral deposits tend to build up in the urine waste line and will eventually plug the line. If possible, connect urinal lines downstream of the toilet waste lines, this will help flush out the minerals. Also consider a wall waste line cleanout in the handicapped stall at the beginning of the horizontal waste line.

Restroom sinks

With water saving as a goal, consider sensor operating faucets. Use point-of-use water heaters either under the sink counter or in a nearby space and provide tempered water to the sensor faucet. Do not use the 140-F kitchen water for the hot water source in food facilities' hand-washing sinks.

Sensitivity and available power is a staff maintenance issue that must be addressed. Waving their hands under the spout and getting no water is very frustrating for users.

When an 0.5 gpm low flow spout outlet is used with liquid soap, it takes a long time to clean the suds out of the sink, especially if the facility uses softened water. Consider using foam soap. The soap dispensing system should be selected, purchased and installed by the tenant.

Provide grid type strainers to avoid sink stoppage problems and for ease of cleaning and operational maintenance. Avoid the selection of black counter tops; the dark color shows water mineral spots and leaves the impression of a dirty restroom.

Healthcare clinic sinks

Most exam rooms have a cabinet-mounted counter sink. The prime purpose of this sink is for staff handwashing when dealing with patients. Most units use a gooseneck spout and four-inch long wrist blades. Consider using a single lever faucet with a minimum of a four-inch handle to help minimize the time and steps to achieve tempered water. Most single lever faucets are on the right side of the gooseneck.

Select 1.0 gpm outlets; with 0.5 gpm outlets it takes too long to clear the sink of soap suds. Soft flow outlets are not allowed in these sinks because of infection control. Arose spray outlet is also acceptable. The sink need not have an overflow outlet, which is a contamination source. Sensor faucets and tempered water are also possible choices.

Healthcare bedroom sinks

The patient room facility may have two sinks, an ADA-compliant fixture in the toilet room for handwashing use by the patient and a sink in the bed area that is used by the nursing staff. This sink may have the features noted for the exam room unit.

Breakroom plumbing connections

Most breakrooms provide coffee makers, which may be connected to a cold water supply. If this is the case, be sure to provide a convenient stop valve for disconnecting the water when servicing the unit. Some breakrooms are now also offering iced tea units, which may require a cold water connection to an ice maker. The ice maker will require a drain connection to the sink's dishwasher drain tailpiece. Most counter sinks in these rooms are stainless steel, single-compartment; this avoids the problem of users leaving dirty dishes in the sinks. The faucet should be a single level unit with a gooseneck.

If the breakroom contains an undercounter dishwasher, provide a hot water valve connection and a drain line to

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Most exam rooms have a cabinet-mounted counter sink. The prime purpose of this sink is for staff handwashing when dealing with patients.

Plumbing Design

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the dishwasher tailpiece. If the hot water piping run is long, consider an above-ceiling electric 12-gallon or less water heater. This will require a drain pan; the drain line should be piped into the dishwasher tailpiece.

Other architectural considerations

If a large office restroom is

designed to use paperless hand towels and electric hand dryers, work with the architect to have the room doors swing outward with no door latch. If the room is designed to have doors that swing in, provide paper towels and a trash container near the door as well as near the sinks.

If electric hand dryers are used,

verify that the men's room mounting height is higher than in the women's room. Also consider wall protection to minimize water stains on the wall under the dryers. Coordinate the mounting height with any wall wainscoting. Provide water and drain line ADA insulation on all sinks.

Any floor drains should have odor reduction consideration. For normal floor drains, have the maintenance staff add water to the drain regularly. Rubber seal floor drains are now available; these units do not use a water seal trap.

The soap system for the sinks should be provided, installed and maintained by the tenant to insure selection involvement and uniformity. To avoid backsplashing, all sink goosenecks should be the five-inch radius type.

Provide water filter units on electric water coolers. Use a triple water filter on a dedicated water cooler riser in a multistory building. To minimize the use of bottled water, include signage that explains that water has been filtered for taste, odor and mineral removal.

If the facility is in a new building with all low flow water fixtures, size the waste piping with greater pitch and smaller sizing to avoid drain blockage. Model building codes will allow the Stevens sizing method. Provide drain access panels to allow drain flushing if needed.

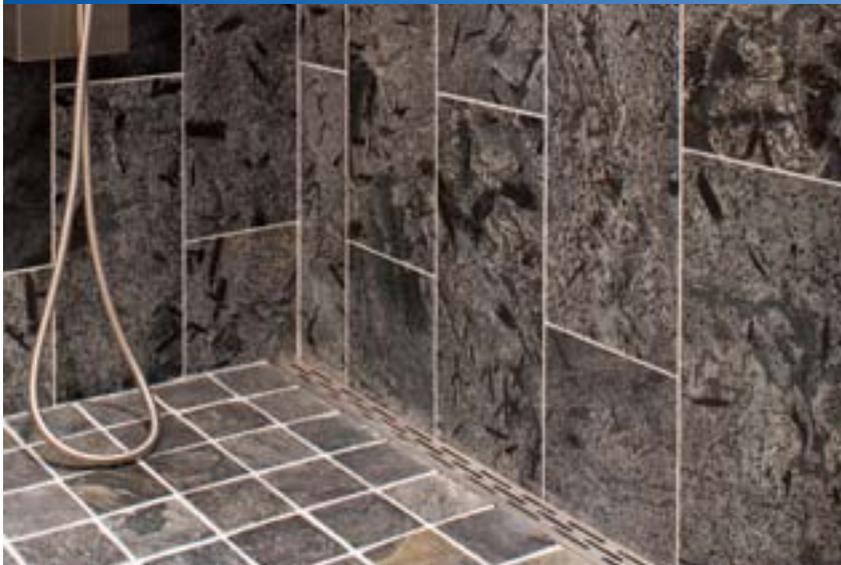
Conclusion

As part of the engineering design process, present the owner pictures or catalog cuts of all the fixture choices for their project. This can be part of the Owners Project Requirement (OPR) required for LEED certification. Once chosen, the fixtures can be defined in the project specifications for shop drawing review and approval. The final step is to work with the installing contractors and the facility maintenance staff to be sure that all is well. ■

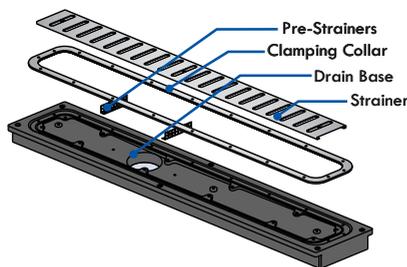
John A. Clark, PE, is Senior Engineer for Kauges-Falconbridge Inc., Engineers (KFI). He has been an ASPE member for more than 40 years.

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Corporate Report

Precision Plumbing Products — Building on success with third generation

By Jack Vilendre Special to *Plumbing Engineer*

Precision Plumbing Products was founded in the early 1960s as Tempera Valve Corporation. At that time Tempera Valve Corp. had developed and patented a pressure balancing valve and a Bac-2-Bac manifold, which was sold directly to the plumbing market in the Pacific Northwest. In 1968 a Plumbing Code Official from Washington State who had developed and patented a piston type Water Hammer Arrestor, a "pressure drop" activated floor drain Trap Primer, and a Distribution Unit, enquired with the three shareholders of Tempera Valve Corporation to see if there was an interest in marketing these items. All shareholders agreed that these new products should be added to the Tempera Valve Corporation product line.



At right is Jack Vilendre, owner of Precision Plumbing Products as part of J. L. Industries, Inc. since 2003, with his daughter Alison Amundson and her husband Tom, both of whom will take full control of business operations and continue to run the firm out of its Portland, Ore., facility.

Perrott and the beginning of PPP

Chuck Perrott was employed by Tempera Valve Corporation as their one and only salesman. It was his suggestion that they rename the company "Precision Plumbing Products Inc." in order to better define the new line of products. Chuck spent the next ten years traveling first through the Pacific Northwest, and then eventually expanding east calling on Plumbing Code Officials and engineers, slowly introducing the Water Hammer Arrestors and Trap Primers to their various jurisdictions. A number of independent plumbing representatives became interested in the products offered by Precision Plumbing and signed contracts with Mr. Perrott to help him in the wholesale distribution and specification of our specialty product line.

The company began to grow and in 1982 Chuck's CPA presented an opportunity to acquire the business and pay back the shareholders that had originally founded Tempera Valve Corporation. It was important to Chuck to give the shareholders a return on their investment and thank them for giving him his start. Chuck was 65 when he decided to

put his house on the line to fund the buyout and acquire Precision Plumbing Products, Inc.

Chuck hired me in 1984. We worked together to grow the business over the years and in the fall of 2003, I was given the opportunity to present a business plan to the Board of Directors of C.H. Perrott, Inc. for the purpose of purchasing control of Chuck's company. I was successful in a shareholder buyout plan and in October 2003, I formed the new parent company, J. L. Industries, Inc. with five operating divisions.

The second generation

In 1975, after spending three years in the military and graduating from Portland State University with a degree in International Marketing, Omark Industries Inc., a construction fastening manufacturer in Portland, Oregon, gave me the opportunity to take an outside sales position. This new opportunity moved my family to Omaha, Neb. I successfully worked as a manufacturer's representative in the construction business for five years. Omark was acquired by ITT Corporation in 1980 and offered me a position of Product Line Manager for their Construction Fastening operation in Portland, Oregon. Putting my international marketing education to work, two years later we successfully launched a European fastening manufacturing and marketing product line. I had gained a great deal of manufacturing and marketing experience from my time at Omark Industries and ITT Corporation. Then in 1984, Mr. Perrott asked me to join him at Precision Plumbing Products. I was to now prepare for a new challenge, only this time it was all about family.

Early marketing plans for growth

I joined Precision Plumbing Products (PPP) in October 1984. The remainder of that year, Chuck and I worked in the plant on my product orientation and planning for the following year. The company to that point had been engaged primarily with the annual ASA and PHCC trade show. There was no product advertising in any of the trade journals and we had a very limited catalog. After spending several months looking at the number of variations of products sold, cataloging a broader product line became my first priority. I hired a photographer and we went to work expanding our catalog. At the same time I designed an ad program featuring all of our products in full color.

The new catalog added a much larger product display. We then expanded PPP's trade show schedule, which attracted a lot of attention for Precision Plumbing Products and also gave me the opportunity to reorganize our sales force over the following two years. When hiring our sales representatives, I stressed product specification and stepped up the focus on the engineering community. Educating the plumbing contractors was important in designing a needed

Corporate Report

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sales pull through incentive for wholesale distribution. I wanted to see “PPP” in the master spec, and the contractor asking for us by name. Branding our product line as “PPP” was most instrumental in the sustained growth of our business in North America.

At the same time I was working on the North American marketing plan we were getting quite a number of inquires to represent our product line in Asia and the Middle East. I had placed our catalogs with a number of marketing groups specializing in companies wanting to expand their foreign sales activities. Adding representation in key markets has been a very interesting process and yielded not only amazing growth but lasting friendships.

During these early years at PPP, I felt it was very important to become closely associated with the plumbing codes and standards organizations that propel our industry forward. I acted as an advocate to promote public health and safety through the adoption of various ASSE standards. I attended many code meetings and also supported the code officials by attending their annual meetings, purchase booth space and sponsoring elements of their events. I spent a number of years as a member of various ASSE working groups developing standards, and eventually was asked to join the ASSE Standards Committee. We continue to serve as a manufacturing member of this group. In 2005, the Oregon Governor’s commission appointed me as a member of the Oregon State Plumbing Board, where I am currently serving a second term.

Facility size and operation

J. L. Industries, Inc. is comprised of five operating divisions:

- Precision Plumbing Products (PPP)
- Northwest Automated Machining (NAM)
- Cascade Precision Molding (CPM)
- Precision Hydronic Products (PHP)
- Precision Metal Brazing (PMB)

Our manufacturing facilities are all located in Portland, Oregon and we produce nearly all of the parts necessary to support PPP and PHP at our facility. We have experienced steady growth and expansion since 1985, but with these tough economic times we have been forced to “tighten the belt,” but still remain strong and optimistic.



Tom Amundson visits with an employee as she assembles PPP products.



On the factory floor, Jack, Tom and Alison discuss production with an employee who begins turning raw copper tube into finished products.

The importance of wholesale distribution

Our long-standing relationship with our plumbing wholesalers has been a key element to our success. The importance that we have placed on these relationships is key to the success of the distribution of our product line in North America. We are not the company that would pursue “Big Box” distribution channels. Instead, our loyalty has always been with our plumbing wholesale distributors. Their staff gets the job done when the licensed plumbing contractor has questions regarding the right product for the application.

Because “PPP” is a highly engineered product line, we need sales expertise provided by our distributors to insure the right product gets to the job every time. Our representatives have worked hard to help brand the product line so the plumbing contractors know to ask for “PPP” when purchasing specialty plumbing items over the counter. I have developed a number of incentive plans to improve the wholesale profitability and therefore improve the flow of product across their shelves. In the long term, and as my company transitions into the next generation, our relationship with the plumbing wholesaler will remain a key part of our continued success.

Branding the “PPP” logo/brand goes hand in hand with product recognition. But, I think we are best known for consistency in regards to the quality of our products. The outstanding growth element in our product line by far has been the Floor Drain Trap Primer. Forty different valve models provide potable water, making the floor drain trap seal. In my opinion, Precision Plumbing set the standard and without a doubt when you ask, “What valve do you most often use for your Trap Priming needs?” Licensed plumbing contractors will say, “PPP”. We hold many patents in this field and Precision Plumbing Products was the first company to develop and market a Piston type Water Hammer Arrestor. We continue our inventive processes and pay close attention to manufacturing a quality product, and getting it to the market on time.

Transition for the future

Like the man said: “You’re not getting any younger”! The transition was a decision my wife and I made jointly to begin to wind down my participation at J.L. Industries,

and look forward to spending more time together traveling and spoiling the grandkids.

I had been doing a lot of research on succession planning and of course there are many examples of success and some significant examples how not to proceed. Since I had family members already working in the company, and a very dedicated work force, I was not in favor of selling the business. A better plan, in my view, was to pass it through to a third generation. I told my advisors that we needed to work on a plan that will be embraced by the entire family. It took some time to structure a plan that made good business sense, but also satisfied those family members who would not be directly involved in the business going forward.

After meeting first with those family members who would not be directly involved in the day to day business, and gaining their unanimous support, I was free to move forward. Therefore I am pleased to announce that 100 percent of J. L. Industries, Inc. stock will pass directly through to a third generation of family members.

Tom and Alison Amundson will take full control of business operations and continue to operate J. L. Industries, Inc. out of our Portland, Ore., manufacturing facilities. Alison (my daughter) has been a full-time employee for 10 years, starting as my marketing assistant, and interfacing with our sales representative on a number of levels. Currently she operates my Heating & OEM divisions. Alison performs all of the customer service functions while managing purchasing and inventory control activities for both Precision Hydronic Products and Precision Metal Brazing. Over Alison's term of employment she has become very familiar with the overall operations, and recently joined the Board of Directors.

Tom (my son-in-law) joined the company two years ago as Product Line Manager. Prior to taking the job, Tom had obtained three undergraduate degrees from Portland State University. Tom worked independently in the financial service industry for five years and during that time showed me that he was a man that could be successful and perform well under very difficult circumstances.

Tom started at Precision Plumbing by working in my machining and product assembly operations as his initiation into the business. I felt it was very important that he start in the business the same way I had from the ground up. After six months in the plant handling a variety of jobs he joined me in the office. Tom started picking up technical calls while performing other product line management duties. Tom is also a member of a number of standing committees and is Chairman of the Product Cost Reduction Committee. Most recently, I have assigned Tom the responsibility of managing the JLI, Inc. Purchasing and Inventory Control Department. Over the next few years both Alison and Tom will be groomed to lead our family enterprise providing Leslie and I a stress-free retirement.

In conclusion, Leslie and I are very comfortable in our decision to pass J. L. Industries, Inc. through to our third generation. This decision has had a very positive effect on my entire employee base — providing them a sense of security in a very difficult economic environment. We also



Jack Vilendre has been with Precision Plumbing Product since 1984 and bought the company in 2003. His daughter Alison Amundson has been with the company for 10 years, starting as a marketing assistant and learning as she moved up.

made a similar announcement to our manufacturing representatives, which were met with unqualified support. Tom and Alison look forward, with confidence, to the challenges and opportunities that lay ahead and I am reassured that the company remains in good hands. ■

Jack Vilendre is president of J.L. Industries, Inc. For more information, visit www.pppinc.net.



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Product Application

A Custom Solution Touchdown in Green Bay

When one of the Nation's most storied football stadiums needed a custom linear drainage solution, they turned to a leading engineered water solutions provider – Zurn Industries.

Lambeau Field opened its doors in 1957 as home to Green Bay's iconic football team, welcoming more than 73,000 fans through the gates for every game day. In 2011, the organization decided there was room for growth and announced plans to add four elevated decks with 6,600 seats above the south end zone, as well as a new rooftop-viewing platform above the north end zone. While this expansion would make Lambeau Field one of



the league's largest stadiums, it also presented significant challenges in how to handle water runoff during the occasionally severe Green Bay weather.

The opponent

Winter snowfalls of 8 to 12 inches are not uncommon in Green Bay, and the new expanded seating areas are designed with heated bleachers to melt snow as it falls. While this feature has advantages, it also ensures considerable water runoff. The new concourses are constructed of concrete, and the vulnerability of cracking during the lifecycle of the concrete creates the potential for leaks to occur. As these concourses leading up to the new, elevated decks will be built just above "living spaces" such as private suites, offices, concession areas and restrooms, containing the water is critical.

This means that the concourse drainage systems used within the elevated platform installation must be watertight to avoid rain and melting snow from leaking on game-goers below, and most linear drainage systems are less than 100 percent watertight. This also means that the drainage system must be light enough to be installed in

the upper levels of the stadium. With the primary concern of protecting fans located below the proposed new decks, project managers went in search of a solution they could trust for decades to come.

The game plan

The play clock seemed to be winding down as reviewed vendors were repeatedly unable to guarantee a leak-less system. Carefully considering the stadium's unique conditions and demands, Zurn engineers designed a two-part drainage system with a waterproof membrane to collect any water that leaks through the concourse floor. The initial design paired a Z883 shallow trench drain with a Z415 drain body. A waterproofing membrane would then attach to a subsurface collar located between the Z883 and the Z415, making a watertight seal above the drain body. The membrane itself would lay beneath the surface layer of concrete and extend six feet past each side of the trench drain, stopping any water leaking through the concrete and redirecting it to the Z415 drain body through seepage holes in the collar. Though a crucial keystone in the overall success of the system, waterproofing membranes are delicate and require careful and concise installation to avoid puncturing the seal.

The proposed system will utilize high-density polyethylene (HDPE) components, which are extremely lightweight compared to conventional drainage systems. Many drainage systems are made of polymer concrete, which is heavy and often so brittle that it breaks from rough handling on the jobsite. The HDPE system is lightweight and easier to handle, yet durable enough to withstand a high volume of foot traffic.

Installation in three steps

After reviewing the initial design and custom installation proposal, project managers decided that a customized drain was the correct path to take. The installation will take place over a three-step process, designed to fit the schedule of the overall project build.

1. The Z415 drain body is plumbed to the four-inch outlet pipe using a Neolock Gasket, which can be applied to either PVC or cast iron pipes. Once pushed onto the pipe, the Neolock Gasket is virtually impossible to move, securing the lay of the land. A subsurface layer of concrete is then poured up to the collar of the Z415 drain body. The collar acts as a transition between the four-

Product Application

inch outlet pipe down to the three-inch PVC pipe of the trench drain.

2. Next, the waterproof membrane is laid above the subsurface layer of concrete extending four to six feet on all sides of the drain. The membrane is then attached to the collar of the Z415 with a three-inch membrane clamp. Next, a top layer of concrete is poured from the Z415 collar up to the floor surface leaving a four-inch margin around the collar so that the trench drain can be installed.

3. Finally, the trench drain is plumbed onto the collar of the drain body. Although the initial design called for a Z883 shallow drain with 3½ inches of depth, project coordinators opted for the Z886, which drains larger volumes with its depth of just under 7 inches. The Z886 varies in length from 3 to 6 feet. During installation, the drain is attached to a wooden suspension bracket that spans the gap left by the second concrete pour and prevents the it from moving during the final pour.

All joints in the drainage system are HDPE fusion welded, ensuring a watertight, yet lightweight connection. The expansion joints between the second and third concrete pours were also specified by Zurn engineers to accommodate for the drastic changes in temperature and varying loads of foot traffic the concourses would inevitably endure throughout the year.

Final score

When a unique problem calls for an as-yet non-existent solution, it takes dedication and expertise to provide a customized design to make it work. In the case of Lambeau Field, a watertight flow-through system was tailor-engineered to meet the demands of one of pro football's most historic franchises.

The flexibility and attention to detail displayed during the Lambeau Field project is integral to its success. It stems from a willingness to consider any potential application and adapt to any unique circumstance to develop a personalized solution to accommodate a customer's needs. Just because a solution can't be found in a catalogue doesn't mean there isn't a way to

make it work.

Currently, 95 sections of the custom drains are being installed in lengths of 3 to 6 feet at Lambeau Field. The new concourses, rooftop viewing area and the four elevated seating decks are scheduled for completion by the start of the 2013/2014

season. When the doors open to the enlarged stadium, fans can rest assured that nothing will fall through the cracks in the new, elevated decks thanks to a custom designed, double drainage system. Fans will hope the same things can be said for the team's offensive line. ■

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Product Application

Innovative Submetering of Integrated Hydronic Heating System

Conservation energy practices produce 30 percent more savings

Construction of multifamily housing is leading the U.S. building industry again this year, and smaller dorm-size suites are becoming the new norm for apartments in larger metropolitan areas. Property owners are looking for accurate and fair ways to ensure that each apartment suite owner or tenant pays for their actual energy use. Europeans have, fortunately, pioneered the residential building trend toward “less is more” for more than four decades.

The opportunity to explore tried and true energy-saving, green building innovations drew an entourage of North American engineers and HVAC equipment distribution partners to northern Italy earlier this year. Organized by Marathon International, the exclusive distributor of Baxi heating and renewable energy products in North America, the group’s mission was specifically to study an integrated HVAC system with a submetering network installed at condominium apartment buildings near Milan.

One of the inspection opportunities was a recently-completed apartment building in San Giuliano Milanese, located southeast of Milan, where the size of the 72 suites did not exceed 750 square feet. Because of the small suite sizes, the condominium community installed a central high efficiency hydronic heating plant of three modulating, condensing Baxi wall-hung boilers, cascading with a staging controller.

Baxi Luna SAT integrated HVAC submetering system

Baxi, a leading European manufacturer and global exporter of heating and renewable energy products, is introducing an integrated heating, air conditioning, solar water heating, hot and cold water system with submetering solution to the United States and Canada. A comprehensive and compact system, Baxi Luna SAT features high efficiency HVAC equipment and renewable energy components, which collectively produce substantial savings in energy use, freeing up living space, especially in properties with smaller apartment sizes. The remote submetering network, with meters located outside each unit, eliminates guesswork from the arduous task of energy use measurement and accurate bill sharing for apartment complexes. Submetering facilitates bills for actual energy consumption, further inspiring energy conservation.



A cascade of three Baxi Luna HT 1.100 models fully modulating, condensing boilers serves the entire complex.

High efficiency hydronic and solar water heating system

The boilers share a common vent system, meaning that there is just one vent terminal penetration in the entire complex. Also, there are no natural gas lines running throughout the complex, where radiators provide ample heating for each suite. With a heat output modulation range of 348 M Btu/hr down to 106 M Btu/hr each, the boilers achieve up to 98 percent energy efficiency and emit 90 percent less NOx and CO2 emissions than conventional heating systems.

The apartment building’s hot water is provided largely by a solar water heating system, with one Baxi solar panel for each apartment, adding further energy efficiency. On the day the North American group visited the San Giuliano Milanese apartments, the building’s solar panels were delivering 106 C (223 F) domestic hot water to two 2,000-liter (525-gallon) storage tanks.

Submetering network with Btu and water meters

Submetering boxes containing the Btu and cold and hot water meters for six adjacent apartment suites are located in a common hallway throughout the complex. The meters in a Baxi Luna SAT submeter box are visible to tenants; they can view up-to-the minute readings of their actual energy consumption.

Transmitters and receivers allow for remote data transmission and collection, meaning that a property manager has 24/7 computer access to all of the system data, including overall building, as well as individual suite, energy consumption data. In addition, the data can be transmitted to smart phones or tablets. Importantly, locating a Baxi Luna SAT meter box outside of apartment suites facilitates 24/7 service and maintenance, without any disruption to the tenants.

Product Application

New energy conservation habits

Stringent energy management legislation in Italy and elsewhere in Europe requires that any new multifamily building meets at least 50 percent of the buildings combined total demand for domestic hot water with renewable energy solutions. Moreover, legislation in Germany, Austria and Denmark has mandated submetering of hydronic heating systems in new multifamily building construction for more than 40 years.

Baxi engineers have found that, on top of the significant savings generated by high efficiency heating equipment and solar water heating, Baxi Luna SAT installations in Italy are helping to generate an additional 25 to 30 percent in energy conservation and related utility cost savings above high efficiency HVAC equipment.

“Property managers and tenants appreciate precise utility billing for each suite, knowing they only pay for their actual energy consumption. Submetering of integrated, heating, cooling, hot and cold water consumption also promotes better energy conservation practices among property owners and tenants in apartment buildings,” says Samuele Nichele, Baxi Systems application engineer in Bassano, Italy. “Centralized hydronic heating and submetering help to achieve the targets of energy efficiency, conservation and low greenhouse gas emissions, particularly



The BTU and water meters in a Baxi Luna SAT submeter box accurately measure each suite's energy consumption for heating and cooling, as well as hot and cold water.

in apartment properties.”

As building costs per square foot continue to soar in parts of North America, notably in larger metropolitan areas such as New York, Los Angeles and Chicago, there is an growing move toward building smaller apartment suites. In this multifamily housing building environment, where “less is more” is proving to be greener and more affordable, an energy and space-saving system such as the Baxi Luna SAT integrated HVAC system with submetering could emerge as a viable solution. ■

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Product News

Plumbing Engineer's Product of the Month

Macerating toilet



Ascent II macerating toilet system features a 1.28 gpf high efficiency toilet. RazorCut™ technology provides improved maceration of waste and a removable service panel provides quick access to the cutter area without disconnecting the plumbing. Other features include ISTTM solid state switching, a built-in alarm, LED lights with external touchpad for alarm silence and manual override. The toilets, available in round front and elongated, have improved flush performance and carry the WaterSense™ mark. Both models feature insulated tanks to eliminate sweating.

Liberty Pumps.

Circle 100 on Reader Reply Form on page 81

Condensing boiler

1.5 to 3.5 million Btu/hr models of the CREST® condensing boiler now offer a dual fuel gas train; keypad switch on the front panel allows for conversion from natural gas to propane. Five million Btu/hr (FBN5000) and four million Btu/hr (FBN4000) models are now available and will soon be offered with dual fuel. To increase CREST's perfor-



mance in high altitudes, the line offers lower derate numbers. On 1.5 to 3.5 million Btu/hr models, the derate is less than two percent per 1,000 square feet above sea level. 4.0 and 5.0 models do not experience derate at high altitudes. **Lochinvar.**

Circle 102 on Reader Reply Form on page 81



On/Off zone valve

The Snap Zone Valve is a compact four-wire thermoelectrically operated on/off zone valve designed heating and cooling systems. Featuring an innovative compact design and an adapter ring that allows for the actuators to be installed in any 360-degree position, the Snap Zone Valve can fit under baseboards or in other tight spaces. A push-button actuator facilitates one-handed installation and permits wiring in any direction. A visual indicator provides quick and easy recognition of which valves are energized and a replaceable plunger assembly allows for internal removal without removing the valve from the system. **Xylem, Inc.**

Circle 103 on Reader Reply Form on page 81



Indirect fired water heater

The AHRI-certified Aqua Plus is extremely easy to install and operate, saving time and money with features that include thermostat connections already installed for quick and easy wiring and temperature and pressure relief valves as standard equipment. Other features include: a stainless steel tank and coil design, superior first hour ratings and a magnesium anode rod, for protection against corrosive water conditions. Available in five sizes to suit any application, the Aqua Plus indirect fired water heater comes available with a limited lifetime warranty. **Weil-McLain.**

Circle 101 on Reader Reply Form on page 81



Plastic cartridge check valves

Check valves for OEM applications are pre-assembled and 100 percent tested to provide durable drip tight operation. Available in 12 OD sizes between 3/8 and 2 inches for applications up to 200 F and 230 psi. Selected models (CV14FR and CV15FR) come combined with a pressure compensating flow regulator (0.5 to 4 gpm). All units are certified to ANSI/NSF 61. **NEOPERL Inc.**

Circle 104 on Reader Reply Form on page 81

Steam radiator heating valves

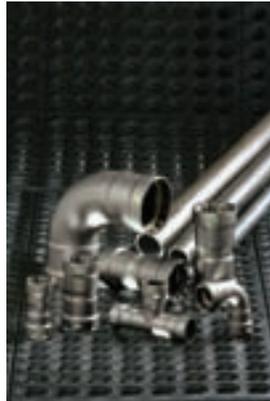
Gate valves include brass SGV radiator supply valves and bronze steam radiator BSGV valves with connections x male unions. Both SGV and BSGV valves have a working steam pressure of 125 to 200 WOG. Sizes range from 1 to 1 1/4 inches for SGV and 3/4 to 1 1/2 inches for BSGV valves. Steam radiator angle valves include heavy pattern bronze BARV and heavy pattern brass BARVY valves, again with female iron pipe connections x male unions. BARV and BARVY valves have a working steam pressure of 15 to 60 WOG maximum steam pressure. Sizes range from 1/2 to 1 1/2 inches for BARV valves and 1/2 to 2 inches for BARVY valves. **Matco-Norca.**



Circle 105 on Reader Reply Form on page 81

Plumbing Engineer's Product of the Month

Pipe pressing systems



MegaPress and MegaPressG systems for installing Schedule 5 to Schedule 40 1/2 to 2 inch black iron pipe make secure watertight and airtight connections in under seven seconds. Ideal for hydronic heat, chilled water, compressed air, fire sprinkler systems, low pressure steam and vacuum lines. MegaPressG is designed for use in fuel oil and natural gas applications. Over 200 fittings available, including elbows, couplings, reducers, tees, reducing tees, threaded adapters and unions. It is easy to use, flameless, environmentally friendly and leaves no joining material buildup, exposed threads or tarnish. Patented Smart Connect® feature makes it easy to identify connections that need pressing. **Viega.**

Circle 106 on Reader Reply Form on page 81

Control Panels

The WS Series control panels are advanced simplex and duplex systems controlled by SEEwater's "Smart Board" designed for wastewater and sewage pump applications. SEEwater's WS Series panels come standard with: NEMA 4X enclosure, pump run, pump fault, high liquid alarm and auxiliary contacts for accessing building management systems. Custom options are available upon request. All panels manufactured by SEEwater are 100 percent factory tested, made in the U.S., are ARRA certified and come with the SEEwater Signature 3 Year Warranty. **SEEwater.**



Circle 107 on Reader Reply Form on page 81



Boiler piping kits

Hydro-Core Flex is a new expanded lineup of complete near boiler piping kits designed for wall hung boilers with integral pumps. Each kit includes a Hydro-Core double ball drain manifold and flexible stainless steel supply/return lines outfitted with connections for your specific boiler. Compatible with over 30 different boiler models from 11 different manufacturers. Designed specifically for hydraulic separation and purging the near boiler piping or secondary circuit loops. Guaranteed to save time, space and leak paths. **Webstone.**

Circle 108 on Reader Reply Form on page 81



Commercial Plumbing Piping

PEX-a Pipe Support is a steel channel that provides continuous support of crosslinked polyethylene (PEX-a) tubing in suspended piping applications, enabling hanger spacing equal to that of copper. Available in 9-foot lengths for 1-, 1 1/4-, 1 1/2- and 2-inch PEX-a pipe sizes; it can be used in commercial plumbing and hydronic distribution systems. EP Multi-port tees feature 1-inch ProPEX® inlet with 1/2-inch ProPEX branch outlets in seven- or eight-outlet configurations. Ideal parallel-piping solution for multifamily and hospitality applications, allowing header termination and water distribution to lavatories with one fitting. Multi-ports offer up to 60 percent fewer connections and 78 percent less combined length than individual tees. **Uponor Inc.**

Circle 109 on Reader Reply Form on page 81

Giant Factories partners with Rinnai

MONTREAL, QUÉBEC — Giant Factories and Rinnai America Corporation have formed a partnership to market and develop new energy-efficient products.

“The Giant name has long been synonymous with quality products and energy efficiency,” said Phil Weeks, general manager and chief operating officer at Rinnai America Corporation. “We look forward to working with them closely to bring a new level of energy-efficient technologies to the Canadian market.”

“We are delighted to work with Rinnai, as our partnership will lead to an even greater energy-efficient product offering for our customers and the industry as a whole,” said Jean-Claude Lesage, vice president of Giant Factories.

A. O. Smith donates water heaters to help rebuild Joplin

ASHLAND CITY, TENN. — In May 2011, tornados ravaged Joplin, Mo., killing 161, destroying one-third of the city and affecting 7,000 households. Since then, Habitat for Humanity has completed 20 homes for displaced families, with an additional 40 under construction.

A. O. Smith has donated 40 water heaters to be used in those 40 homes. So far, 13 A. O. Smith ProMax® 50-gallon electric water heaters have been installed.



“Our hearts go out to our neighbors in Joplin,” said Paul W. Jones, A. O. Smith chairman and chief executive officer. “A. O. Smith stands by Habitat for Humanity’s mission to provide safe housing for all and is honored to provide Joplin’s storm victims with the best water heating technology available.”

A. O. Smith has made past donations to various Habitat for Humanity chapters. This year’s Joplin donation is among the largest, matched only by one other 40-heater donation in 2011 to the Milwaukee Habitat for Humanity.

Centrotherm systems approved by Amana/Goodman

ALBANY, N. Y. — Centrotherm Eco Systems®

InnoFlue® polypropylene flue gas vent systems are now approved by Amana®/Goodman® on their 90 percent+ high efficiency condensing furnaces. This is the first UL-1738 and ULC-S636 approved polymeric venting option for Amana/Goodman customers.

Beginning May 1, 2013, the Department of Energy mandated that 30 northern states enforce a minimum AFLUE rating of 90 percent on gas furnaces. Amana/Goodman’s approval provides its installers an option to reuse existing B-Vent flues in combination with InnoFlue Flex. This option eliminates the need to remove and reroute the exhaust.

Anvil Intn’l Acquires North Alabama Pipe

PORTSMOUTH, N.H. — Anvil International, one of the largest and most complete manufacturers of pipe fittings, pipe hangers and piping support systems in the world, announced that it has acquired substantially all of the assets of North Alabama Pipe Corporation (NAP), a leading provider of pipe fabrication equipment and fire protection fabrication equipment. This acquisition enhances Anvil International’s product lines to offer state-of-the-art fabrication equipment.

“The acquisition of NAP strengthens Anvil’s product offerings,” said Tom Fish, president of Anvil International. “We look forward to providing our customers with a single-source solution for pipe joining products and pipe fabrication equipment.”

Founded in 1983, NAP is a manufacturer of fire sprinkler fabrication equipment, including automatic welders, plasma cut-off equipment, hole cutting equipment, make-on machines and pipe threaders. NAP also manufactures outlets for the fire sprinkler market.

“Customers will continue to receive the highest level of quality products and customer service they have come to expect from Anvil and North Alabama Pipe. This acquisition will allow NAP, which will continue to operate under that name, to offer its fabrication equipment to markets other than fire protection,” said Dean Taylor, vice president of Sales and Marketing for Anvil International.

Headquartered in Guntersville, Alabama, with 23 employees, NAP first made a name for itself when it developed the innovative “Hole System” that allows a plasma cutter to make holes in pipe — a process that has become the industry standard.

Anvil International is a division of Mueller Water Products, Inc. (NYSE:MWA), a leading North American manufacturer and marketer of products and services that are used in the transmission, distribution and measurement of water.

For customer inquiries about Anvil International’s product offerings, please visit anvilintl.com or call 800-301-2701.

For customer inquiries about North Alabama Pipe Corporation, please visit nalapipe.com or call 603-422-8028.

WaterSense announces 2012 Partners of the Year



WASHINGTON, D.C. — Products with the WaterSense label have helped Americans save 287 billion gallons of water and \$4.7 billion in energy and water bills since 2006. The U.S. Environmental Protection Agency (EPA) recognized

five WaterSense Partners of the Year at the WaterSmart Innovations Conference in Las Vegas for their leadership in promoting WaterSense-labeled products and homes:

- American Standard Brands earned a Manufacturer Partner of the Year Award for developing a WaterSense-labeled toilet model that can be installed without tools. American Standard also toured the country with a display that demonstrates WaterSense-labeled faucets, toilets and showerheads.

- Kohler Co., now a three-time WaterSense Manufacturer Partner of the Year, introduced its most water-efficient dual-flush toilet in 2011. Kohler also more than doubled its WaterSense-labeled showerhead offerings last year and supported the "Wasting Water Is Weird" consumer education campaign.

- Lowe's Companies Inc. became a three-time WaterSense Retailer Partner of the Year by supporting the "Wasting Water Is Weird" campaign and training its sales associates with messages about WaterSense-labeled products in order to help customers save about four billion gallons of water in 2011.

- Colorado Springs Utilities was named the WaterSense Promotional Partner of the year for helping a local builder create the first WaterSense-labeled home in Colorado. The utility also encouraged commercial kitchens in the area to try high-efficiency sprayers that helped save more than 20 million gallons of water.

- KB Home, now a two-time WaterSense Builder Partner of the Year, built nearly 100 WaterSense-labeled homes in 2011 and pushed the limits of sustainable building with a concept home designed to achieve net-zero energy use and the highest levels of water and other resource efficiency.

WaterSense also honored the following Excellence Award winners: Arizona Municipal Water Users Association and New Mexico Office of the State Engineer for innovative "Fix a Leak Week" activities; American Water for outstanding education and outreach; Alliance for Water Efficiency for effective strategic collaboration and The Home Depot for achievements in employee education. To learn more about WaterSense 2012 Partners of the Year and Excellence Award winners, visit epa.gov/watersense/partners/watersense_awards.html.

Cerro Flow tackles renovation project at Rose Bowl Stadium

SAUGET, ILL. — Cerro Flow Products' Advantage press tube was selected to be used in the renovation of the famous Rose Bowl Stadium in Pasadena, Calif. The only copper tube of its kind, Advantage press tube features an integral press end that speeds installation by allowing contractors to join each length of tube with one quick press connection, with no separate fittings needed.

Longtime Southern California contractor, Moe Plumbing, performed the plumbing work on the project. When the company's purchasing manager saw a video demonstration of Advantage press tube on the Cerro website, he was sold. The side-by-side comparison showed how the product could be installed in less than half the time of conventional copper tube and press fittings, using standard press tools.

The patented one-piece design of Advantage press tube includes the integral press end, complete with an O-ring and a built-in stop, resulting in half the press connections of conventional tube and press fittings. The opposite end is pre-deburred at the factory, so it can be installed with no preparation, saving even more time in the field. In addition, the tube's perfect-fit design means straighter runs and a better overall appearance.

According to Mike Davis, president of Moe Plumbing, the use of Advantage press tube on the Rose Bowl renovation project was a clear success, which he plans to repeat on future projects.

Spirax Sarco announces incentive programs and rebates

BLYTHEWOOD, S.C. — Spirax Sarco is helping its customers to optimize production capacity, reduce energy costs and emissions, improve product quality and enhance the safety of their operations. In continuing their efforts, Spirax Sarco is sharing their knowledge to help companies improve their steam system performance and processes and maximize their return on investment.

"Improving steam plant efficiency reduces energy consumption in buildings and industrial processes, resulting in financial savings. As a business faces new challenges in today's economy, Spirax Sarco is committed to guiding steam users in all industries to achieve sustainability goals. Many state and local utility incentive and rebate programs are available for businesses to implement energy efficiencies and assist with their goals," said Stephen Gow, director of marketing for Spirax Sarco.

There are many incentive and rebate programs opportunities for companies to upgrade their steam systems to highly efficient ones through state and local utility programs. Spirax Sarco has compiled a list of websites that may be of interest. Visit www.spiraxsarco.com/us for more information.

Classifieds



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November 2012

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Code Classroom

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expected pressure range and/or vacuum range. If the system can see a negative pressure or vacuum, a compound gauge would be appropriate. The system's normal operating pressure should be in the gauge's mid-range. For example, if the system pressure is to be 15 pounds per square

inch (psi) a 300 psi pressure gauge would be inappropriate; the needle would barely be off the zero- pressure indicator. Ideally, a 30 psi gauge would work best; the needle will be pointed at the middle of the pressure gauge range. If the system pressure can fluctuate between a high pressure

and a low pressure, choose a gauge range that allows the pressure to read in the middle range. The size of the gauge face should be specified so it can be read easily from the mechanical room floor. As a general rule of thumb, the larger the dial face the more expensive the gauge.

When specifying temperature gauges or thermometers, make sure there are thermometer if needed and make sure that the sensing bulb is inserted into the fluid being sensed.

When specifying temperature gauges or thermometers, make sure there are thermometer if needed and make sure that the sensing bulb is inserted into the fluid being sensed. Often a tee is used for thermometers or temperature gauges to allow the temperature sensing element to be inserted into the flow of fluid.

Often a tee is used for thermometers or temperature gauges to allow the temperature sensing element to be inserted into the flow of fluid. Also specify the type of thermometer; liquid-filled glass bulb or dial. Specify the temperature range for the thermometer so that it will read in the middle of the thermometer and cover the expected high and low temperatures in the system.

Following these suggestions should provide for a better system design and more competitive bids on your projects. ■

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

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

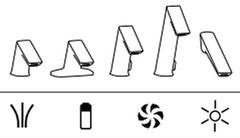
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