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November 2008



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- End of year PVF market analysis
- Rainwater catchment systems

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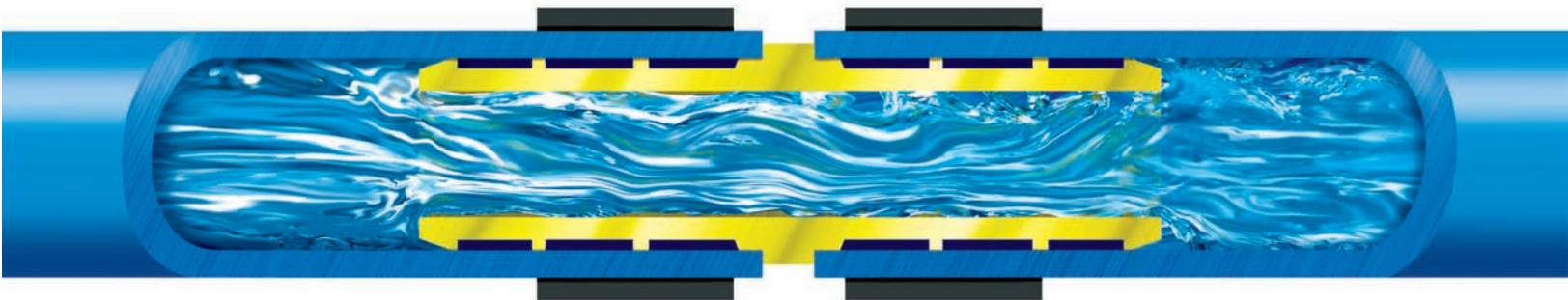
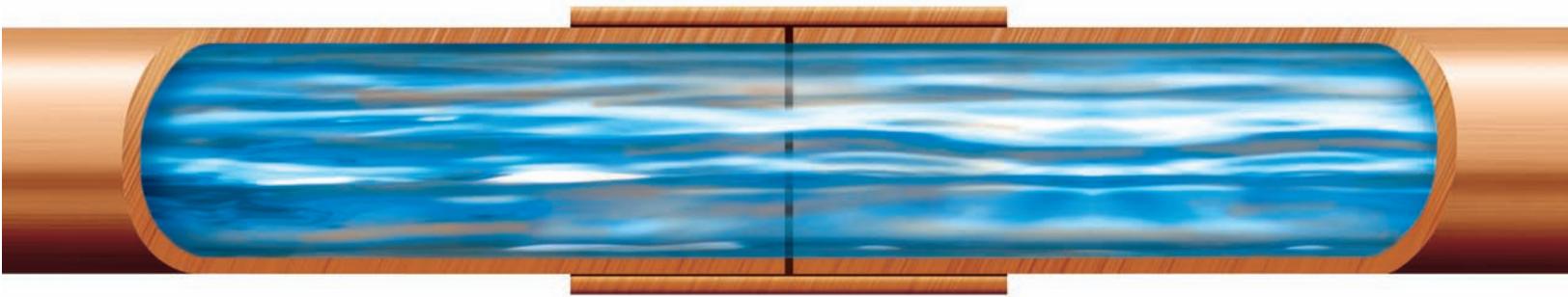
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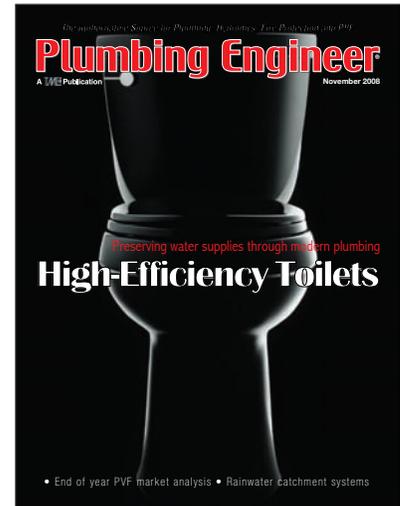
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Cover image courtesy of Kohler Co.

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The advertisement is for Webstone Company, Inc. and features 'The Isolator EX-P' water heater service valves. The background is dark with a blue wave graphic. The text reads: 'THE ONLY WAY TO INSTALL ANY TANKLESS WATER HEATER PATENTS PENDING'. The Webstone logo is in the top right. Below the main text, it says 'The Isolator EX-P' and 'A PERFECT FIT FOR INSTALLATION IN RECESSED BOXES OR OTHER TIGHT QUARTERS'. There are several images of the valves, some in gold and some in silver. At the bottom left, there is contact information: 'www.webstonevalves.com', 'One Appian Way Worcester, MA 01610', 'Tel: (800) 225-9529', and 'Fax: (800) 336-5133'. At the bottom right, it says 'Compact version of our original Isolator EX-P™ with an adjustable pressure relief valve outlet'. At the very bottom, it says 'The Original tankless water heater service valves'.

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Editor's Letter

John Mesenbrink, Editorial Director



The successful trade show? Part II

“If you build it, they will come.” I’m not sure that was working for ISH North America in Atlanta. Trying to make lemonade out of lemons, positive spin making was in full effect. The post-show press from ISH NA stated, “Thousands of contractors, wholesalers, manufacturers’ reps and other attendees were able to see the latest product innovations from leading manufacturers in the exhibit hall, learn from industry leaders at the seminar program and network with peers during the many special events at the show.” Now I have to call it like I see it, and attendance was definitely down. In fact, a majority of the exhibitors I talked with had a negative view of the show in general. And you know things are tough when even the after-show hospitality parties were struggling to fill rooms.

“While the current economic downturn has impacted the industry, exhibitors and visitors remained upbeat about their future business development and strategies,” said Daniel McKinnon, executive vice president of Messe Frankfurt, the show’s organizer. Ironically, many on the show floor were quizzical, contemplating that perhaps it was the economy that was hurting attendance figures.

It is my goal to bolster the plumbing and hydronic industry, so it is not my intention here to quash ISH, but instead try to understand how to solve its malaise and make it a better show for exhibitors and attendees alike. So it does beg the question, why were numbers down — the economy, trade show saturation, etc.? These are topics that ISH needs to address now for a successful 2010 show. Perhaps trade show consolidation will be the new buzzword.

Niche shows, like the recent ASPE/EPE convention in Long Beach, Calif., had a generally positive feel from both exhibitors and attendees. I believe the show succeeded in what it set out to do.

Now we set our sights to 2009. What trade shows will be beneficial to you? The AHR Expo is right around the corner — January 26-28, 2009. I recently received a letter from Tim Ward, H+A International, AHR’s organizer, in which he stated, “Saw the Editor’s Letter in the September issue of *PE* and I couldn’t agree with Dan Chiles any better when he stated, ‘There will be a shakeout in the trade show business and the good ones will survive.’ While I’m a bit biased, I am confident that the AHR Show will remain one of the industry’s leading shows.”

The AHR Expo is a comprehensive and hands-on event, attracting thousands of visitors from every facet of the industry. It provides a unique opportunity to network with engineers and contractors, building managers and owners, system designers and installers, systems integrators and automation specialists and technicians.

A special emphasis also will be placed on ‘green’ technologies and education during the 2009 Show. In addition to the hundreds of environmentally conscious products on display, numerous ‘green’ seminars and sessions will also be offered to attendees. The U.S. Environmental Protection Agency (EPA), the Partnership for Environmental Leadership, U.S. Green Building Council (USGBC), Green Mechanical Council (GMC) and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) will all offer educational opportunities for attendees to further their knowledge of this critical topic during the show. ■

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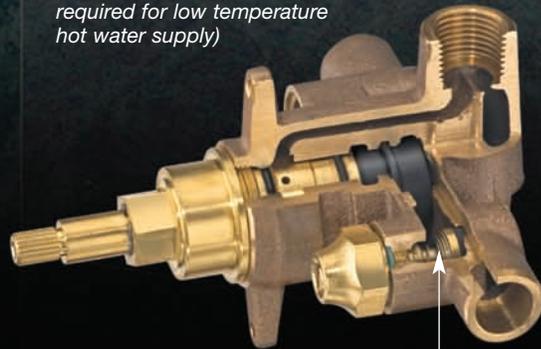
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Residential fire sprinkler market potential requires additional skilled workers

GILBERT, ARIZ. — A national market potential for the installation of residential fire sprinklers is examined in a new report authored by fire protection industry expert Russ Leavitt, SET, CFPS, with contributions by Steven Scandaliato, SET, and Ryan J. Smith. According to the report, the required installation of residential fire sprinklers in newly constructed one- and two-family houses has the potential to exceed \$3 billion annually.

Using three different methods of calculating market potential, results for installations in the United States ranged from \$2.9 billion to \$3.2 billion annually. Further, four types of labor were analyzed to project the number of additional positions needed as residential fire sprinkler requirements are adopted across the country.

“There’s no question that the recent passing of residential fire sprinkler requirements to the International

Residential Code (IRC) will change the industry in a breadth and timeline never experienced before,” said Russ Leavitt. “How the industry responds to the need for additional skilled labor will determine how quickly this market potential can be fully realized.”

The report considers the extent of design, installation and jurisdictional enforcement labor that will be needed to accommodate the residential fire sprinkler market growth.

Most staggering is the projected amount of sprinkler installation labor that will be required, as the conservative analysis calculates more than 7,000 additional positions.

The Residential Fire Sprinklers Market Growth and Labor Demand Analysis, published by Fire Smarts LLC, is available at www.ResidentialFireSprinklers.com.

TMB Publishing announces promotions

NORTHBROOK, ILL. — Representing a defining move in what can be described as positive strategic positioning for the future of TMB Publications, Tom M. Brown, Jr., owner, announced the promotions of Dave Schulte and Brad Burnside as publishers of *Phc News* and *Plumbing Engineer*, respectively.



Tom Brown



Dave Schulte



Brad Burnside

“I am delighted to announce Dave Schulte as publisher of *Phc News* and Brad Burnside of *Plumbing Engineer*. Dave and Brad have been extremely active in the marketplace; both are very customer and service oriented and each has done a remarkable sales job. I feel very comfortable turning over the reigns to them,” said Brown.

The promotions further strengthen TMB Publishing’s commitment to the plumbing, PVF and heating industry and ensure proper company leadership. “Our policy here at TMB Publishing is to have the best possible people in strategic positions, and to make smart, solid business investments,” said Brown.

Dave Schulte has been with TMB Publishing since 2000 as sales manager on all three TMB books — *Phc News*, *The Wholesaler* and *Plumbing Engineer*. Prior to TMB Publishing, Schulte worked inside sales for Cahners Publishing from 1995-1997 and as Midwest sales manager from 1997-1999. Dave prides himself on the fact that he has been involved with *Phc News* since its inception, nearly 10 years ago. “*Phc News* has come a long way in 10 years. As a leading publication in the industry, our investments in editorial and circulation further strengthen *Phc*

News as the No. 1 choice for the plumbing, hydronic and mechanical contractor,” said Schulte.

Schulte is a 1993 graduate of the University of Missouri, with a Bachelor of Arts in English/Political Science.

Brad Burnside has been with TMB Publishing for 2½ years. Before joining TMB Publishing, Burnside was vice president of sales for Gillis Associated Industries a div. of Leggett & Platt (Fortune 500 Company). Burnside is a 1991 graduate from Elon University, Burlington, N.C., with a double major business/history.

“The goal for *Plumbing Engineer* is to assist in making the publication the dominant magazine in the industry by delivering important and value-added information to the engineering community on a consistent basis,” Burnside said.

NIBCO unveils green micro site



ELKHART, IND. — The “greenest” addition to NIBCO Inc.’s Web site will make it easier for end users to specify and install NIBCO products in green construction projects. Visitors will have access to a central repository of resources and tools to keep them informed of green building practices and the changing standards and codes that are driving the demand for green NIBCO products.

Being “green” isn’t a new concept at NIBCO. It will continue to evolve as the industry changes, and because it’s the right thing to do.

Green building practices are challenging the way buildings are designed, constructed and operated, while mea-

Continued on page 10

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Patent Pending

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Industry News

Continued from page 8

sureing the impact on human and environmental health. To learn more about NIBCO's commitment to green, please visit www.nibco.com and click on the Green link.

Campbell Mfg. & Baker Mfg. merge

BECHTELSTVILLE, PA. — Campbell Manufacturing Inc. of Bechtelsville and Baker Manufacturing Company LLC of Evansville, Wis., have announced their merger, which was effective late July, 2008.

The combination of Campbell Manufacturing and the Monitor Division of Baker Manufacturing will create the largest, most recognized prime manufacturer of water system accessory products for the residential and industrial markets in the industry.

Emery W. Davis, president of Campbell Manufacturing LLC (the new combined company), announced that management teams, personnel and manufacturing facilities will remain in place and will continue to offer all of the combined product lines to customers through existing channels.

IAPMO opens office in India

BANGALORE, INDIA — The International Association of Plumbing and Mechanical Officials (IAPMO) has opened

the doors to its IAPMO — India corporate office in the city of Bangalore, providing a strong platform for the adoption, implementation and education of the Uniform Plumbing Code — India throughout the nation.

Joining the IAPMO Group as director of IAPMO — India, Abdul Matheen will oversee daily operations of the new office and expand the business unit's reach and influence in the region.

Subhash Deshpande, director of Plumbing Education and Certification for IAPMO — India, will oversee all educational operations of the new corporation. Deshpande is a well-known figure in the plumbing and education fields.

Gillian D'Crus, office manager administrator, will plan, develop, implement and supervise the general administrative and office services.

HETs allow Americans to flush with confidence

PISCATAWAY, N.J. — According to a new white paper released by American Standard Brands, high efficiency toilets (HETs), with their proven performance and water-saving features, are the next important wave in plumbing conservation efforts for North America.

This document, entitled *High Efficiency Toilets (HETs): Why "Flushing with Confidence" is Here to Stay*, provides an excellent overview of why HETs were developed and why these low-flow toilets will be vital to the future.

The informative piece is available for free download to all members of the plumbing industry at www.plumberprotects.com.

The educational white paper conveys why HETs originated after the National Energy Policy Act of 1992, the initial challenges with this move from 3.5 to 1.6 gallons per flush and the ultimate success in HET design and performance.

According to the paper, HETs and the water efficiency they achieve are critical for the future. Growing populations, aging infrastructures that process and transport water, rising daily usage rates among individuals and environmental factors increasingly draw on the existing fresh water supply.

ICC code hearings feature major issues, dramatic moments

MINNEAPOLIS — The effectiveness of the International Code Council's open code development process played out in the concluding sessions of the Final Action Hearings as major changes, already approved, dominated the proceedings.

Actions so far:

- The 2009 *International Residential Code (IRC)* will require sprinklers in all new one- and two-family residences (including townhouses) as of Jan. 1, 2011, a change approved by more than 73% of the voting members.

- An additional stairway will be required in new skyscrapers, unless an elevator that can operate during a fire emergency is usable by occupants.

- Elevators, properly constructed for such use, will be

Industry News continued on page 70

Industry Movers

Anvil® International makes personnel changes

PORTSMOUTH, N.H. — Anvil International announced the following new hires and internal transfers:



Smayda

• John Smayda was promoted to vice president, marketing. Smayda was previously AnvilStar's director of sales, eastern United States. He is a 38-year veteran of the industry, having held a variety of managerial positions in the industrial, mechanical and fire protection markets. Smayda's responsibilities include global marketing for Anvil's product lines across all sales and marketing divisions.

• Bill Gilliam becomes the manager of Anvil International's Energy Division. A 35-year veteran of both Anvil and the oil and gas industry, he will concentrate on Anvil's customer base in the domestic oil and gas industry and will continue to monitor the industry's rapidly changing landscape.

• Shaun Dunn joined the company as national engineering manager, working with Anvil's business development team. Dunn has 18 years of experience; he worked previously for McWane Inc. as a territory sales manager and for Agilent Technologies as a technical sales engineer. He will be responsible for identifying and targeting key engineering and architectural firms for specification of Anvil's Gruvlok® product line and in assisting the company's sales team with engineering specifications, presentations and training programs.



Dunn

• Wendell Hayes transferred from Anvil's mechanical team to the Energy Division, where he will be responsible for sales to the oil and gas industry across the Gulf Coast region of Southeast Texas, Louisiana and Mississippi.

• John Dannaker joined Anvil as a mechanical specialist, working closely with PVF contractors on Anvil's Gruvlok and hanger product lines.

Chaney named deputy chairman of World Plumbing Council

ONTARIO, CALIF. — At the recent 8th World Plumbing Conference in Calgary, Alberta, GP Russ Chaney, executive director of the International Association of Plumbing and Mechanical Officials (IAPMO), was elected deputy chairman of the World Plumbing Council (WPC), effective Oct. 1, for a term of three years. Chaney previously served on the WPC's executive board from 2002 - 2005 and has represented the WPC at international meetings of the World Health Organization, WorldSkills competitions and, earlier this year, at the meetings of the Institute of Plumbing in South Africa. Chaney succeeds former deputy chairman Robert Burgon of the Scottish & Northern Ireland Plumbing Employers' Federation, who was elected WPC chairman. Their terms in office will end in September 2011, when the 9th World Plumbing Conference is to be held in Edinburgh, Scotland.



Chaney

A. O. Smith names new vice president

MILWAUKEE — Malcolm B. Kinnaird has joined A. O. Smith Corporation as vice president — corporate development. Kinnaird will be responsible for identifying new product and market opportunities in the global water treatment and filtration market segment. Initially, he will focus on the Asia Pacific market, helping to identify potential strategic partners and acquisition candidates.

Syska Hennessy names new vice president

LOS ANGELES — Matthew Ebejer has been named a vice president at Syska Hennessy Group (SHG). Ebejer will serve as a healthcare market focus leader, responsible for managing the well-established healthcare team in the firm's Los Angeles office and supporting healthcare clients throughout the greater Los Angeles/Orange County marketplace. He is a licensed professional engineer in 26 states and is a LEED accredited professional, with considerable expertise in sustainable design.



Ebejer

ICC presents awards

MINNEAPOLIS — During its annual conference in Minneapolis the International Code Council (ICC) presented the following awards to individuals and groups for their contributions to building safety, fire prevention, safe construction and code enforcement.

• Bob Weber, Code consultant and former building official and director of the Clark County, Nev., building department received the Bobby J. Fowler Award. The award, the Code Council's highest honor, is in memory of the late Bobby Fowler, who is credited with being the founding father of the ICC.

• Khanh Nguyen, building official for Costa Mesa, Calif., was named Code Official of the Year for his work to further the cause of building safety.

• Chief John Mueller, deputy state fire administrator for the State of New York received the Fire Service Award. A 30-year veteran of the New York State Office of Fire Prevention and Control, Mueller was instrumental in developing the world's first fire safety standard for cigarettes, now used in 27 states and Canada.

• The 18 volunteers of the Sun City, Ariz., Fire Department Fire Prevention Bureau received the Community Service Award, recognizing service to promote public safety, health and welfare.

• Jim Messersmith, coordinating manager of Regional Code Services for the Portland Cement Association, earned the Affiliate of the Year Award for his dedication to codes and code development.

• Doug Thornburg, technical director of product development for the International Code Council, received the organization's inaugural Educator of the Year Award.

Letters to the Editor

Ron George,

I enjoyed reading your article on code requirements for barrier-free fixture traps and supply covers (September 2008). It was very informative. I have been designing plumbing for 36 years and have gotten into a routine of doing design and not asking why. I recently was asked why pipes under lavatories are insulated when they are out of the knee and toe clearances requirement of A117.1 standards. After reading section 606.5, it appears that piping does not have to be insulated. I contacted the ADA resource center but could not get a definite answer. What are your thoughts on this?

Al Rucker, CPD,
senior mechanical designer
Eldridge and Associates P.A.

Al,

My opinion is that there are toe and knee clearances that allow a sink or lavatory to be accessible by a person in a wheelchair. If the pipes are exposed they are to be insulated as the toe and knee clearance surely could not meet every

wheelchair-bound American person's height or knee depth. Bruising is a major concern for wheelchair-bound people and also for diabetics and people on cancer medications. The bottom line is that if the fixture is a barrier free fixture it needs to be installed where the trap and supply piping will not be a hazard to the user. The final interpretation on this matter is left to the federal courts, which are the final authority having jurisdiction over the Americans with Disabilities Act legislation.

Section 606.5 deals with lavatories with enhanced reach range to access the faucet or soap dispenser controls. The following section 606.6 states:

606.6 Exposed Pipes and Surfaces. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks.

Ron George

Dear editor,

I am a long time reader/subscriber of your excellent *Plumbing Engineer* magazine. I recently had the occasion to search back through old issues to find a particular column of Tim Allinson's that dealt with the sizing requirements for line pressure gas regulator vent pipe sizing. Since I am basically a pack rat, I did find it, in the March 2007 issue. Now that I found it and re-read it, I realized that Tim's research on this topic must have been close to the same process I went through a few years ago, and I was wondering if Tim has further refined his process on this topic? I am especially interested because, as Tim states in his column, none of the Codes and none of the regulator manufacturers really address this issue, and it is becoming a more common installation problem on large commercial/industrial projects.

Russell H. Calderwood,
senior associate
Cosentini Associates Inc.

Hi Russell,

No, I have had no further technical advancements in the sizing of gas regulator vents. What wasn't stated in my article is the fact that the vent serves two purposes, as you probably know. Primarily, it allows the regulator diaphragm to breathe and move unimpeded. Under very unusual circumstances, it also serves as a gas relief in the event the diaphragm were to rupture.

If you wanted to dive into a technical sizing process, you could call the manufacturer and ask them how much of a pressure fluctuation the diaphragm can tolerate during normal operation. You would need to know how much volume it displaces as it moves. The vent would then have to be large enough to limit the friction to the tolerance level for the displaced volume. You could then create a chart that correlates valve size to pipe size and length, much like a traditional gas pipe-sizing chart. This might be a tough exercise though, because the displacement volumes and friction factors would be very small. Something tells me that the rule of thumb method leads to grossly oversized regulators.

Tim Allinson



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GRUNDFOS

Designer's Guide

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



Peer review

It is not the critic who counts or how the strong man stumbled and fell or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and blood, who survives valiantly, who errs and comes up short again and again, who knows the great enthusiasm, the great devotion and spends himself in a worthy cause, and if he fails, at least fails while enduring greatly, so that he'll never be with those cold and timid souls who know neither victory nor defeat. — Theodore Roosevelt

If you've been in this industry for awhile, chances are you have worked on a project where another engineer was tasked to review and critique your work. This is frequently referred to as a *peer review*. It is very common on projects for clients that have their own in-house engineering personnel capable of evaluating engineering design such as large universities, hospitals, and the like. It also is very common on design-build projects, where an owner might want

an insurance policy to guarantee that the design-build contractor is not cutting corners at the owner's expense.

The necessity for peer review, or lack thereof, comes down to the design capabilities of the engineer — be that person a consulting engineer or a design-build contractor. Of course, the greater the skill of the engineer, the less the necessity of the peer review — but the owner does not necessarily know the abilities of the engineer, hence the need for the insurance policy.

The dynamics of the peer review process and relationship can vary a great deal. Sometimes a professional bond is formed based on mutual respect, and the review process is productive and efficient. At other times the relationship can become adversarial, argumentative, extremely unproductive and inefficient, as each party tries to prove they are right.

These dynamics are at their worst when the peer reviewer is less knowledgeable and experienced than the design engineer. The peer reviewer sometimes reveals their ignorance in the nature of their comments or insults

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the intelligence of the design engineer with banal statements or questions, forcing the engineer to defend a design when no such defense is warranted.

I have sometimes been thrust into the position of being the peer reviewer, which is not a task that I enjoy. Playing the roll of critic is not much fun, at least for me. More frequently I am the reviewee, which is not usually a big deal, but can sometimes become complicated.

On one recent project, the owner hired a peer review engineer and then hired another engineer to do a peer review of the peer review. Call me crazy, but I can't believe that to be money well spent. Only the CIA could be less efficient, and it conjures images of the movie *Burn After Reading*, the popular Coen Bros.' film that I recently saw. I recommend it. It has parallels to the peer review process when it is at its worst.

So what do you do if you are thrown into the peer review process as the reviewer? The first thing is to be very clear on what you are charged to do. In some cases a peer review might only concern itself with building interface. Many building owners or facility managers want to be sure that a tenant-installed system will not create problems for the building. In that case it is not your job to comment on the quality of the drawings or even code compliance, but you want to be sure that the tenant loads do not exceed those that were allowed in the base building

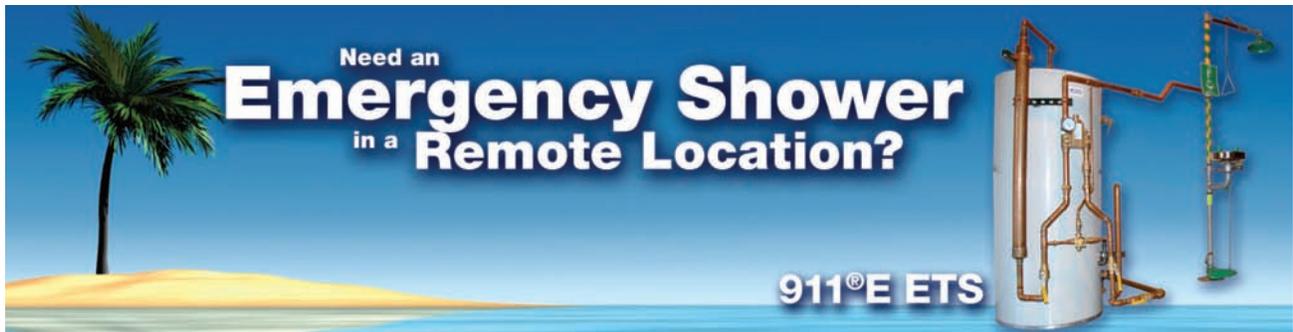
design. For example, if a building was provided with 3/4" future water connections and the tenant's design includes a flush valve WC requiring at least 1 1/4" pipe, you should comment that the water closet must be the tank type.

You also should make every effort to confirm that the tenant-run piping will not have a harmful impact on another part of the building. Is there a waste pipe running through the UPS room of the tenant below? Does it cross a decorative lobby ceiling? These details are not always easy to determine, but you should try to the extent possible.

Another form of peer review is when you are hired to do a complete critique of another engineer's documents, evaluating them in every respect. These reviews are more taxing and more delicate. Typically, they start with a set of general comments, followed by specification and sheet-by-sheet comments. In the opening paragraph you should state exactly what you are reviewing such as "The 50% construction documents for the plumbing of Project X." You should describe the drawings that were included, either by listing them or by referencing the drawing index, noting any drawings that were not included.

Next, the general comments should be as positive as possible to avoid setting a negative tone. The first statement might be, "The quality of the drawings and specifications was quite

Continued on page 16



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good and much in keeping with standards and expectations for 50% CDs," if that is, in fact, the case. Or you might say, "The floor plans are well developed, but riser diagrams, calculations and details have yet to be prepared."

When making specification comments you should reference each sec-

tion with each comment. You need to be sure that you understand the nature of the project — what the owner is paying for rather than what you think the project should have. You cannot tell the design engineer to specify a Cadillac if the owner has only budgeted for a Chevy. Also, comments

should not be picky in nature, but substantive. This, of course, is a subjective statement, but I think most people can discern the difference.

When making drawing comments, the respective drawing number should be referenced with each comment. Again, comments should be substantive and productive in nature, not vague, general or intentionally derogatory. Don't feel compelled to make a comment if you don't have one, just to justify the review process. Rather than stating, "Missing pipe sizes," it would be more productive to say, "Pipe sizes to be added after riser diagrams and calculations are complete." However, for a 50% CD review, this comment would be more appropriate as a general comment rather than as a comment that gets repeated for every floor plan. If you are reviewing a 95% submission and certain pipe sizes are missing on certain floor plans, then be as specific as possible in stating this.

In playing the role of peer review engineer you wield a certain amount of power. And as Spiderman says, "With great power comes great responsibility." (Forgive me, I've been watching too many movies with my son.) But seriously, it is easy to play the role of the critic. Don't take advantage of that. Put yourself in the other guy's shoes and treat him or her as you would expect to be treated yourself. In this way you will maximize your professionalism and add the greatest value to the project. ■

Timothy Allinson is a senior professional engineer with Murray Co., Mechanical Contractors, in Long Beach, Calif. He holds a BSME from Tufts University and an MBA from New York University. He is a professional engineer licensed in both mechanical and fire protection engineering in various states, and is a LEED Accredited Professional. Allinson is a past-president of ASPE, both the New York and Orange County Chapters.

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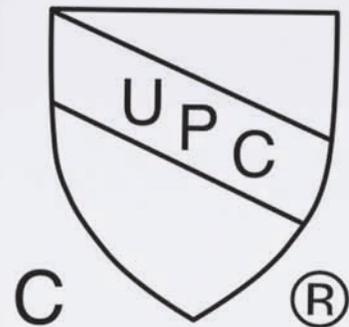
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Code Update

By Ron George, CIPE, CPD
President, Ron George Design & Consulting Services



ICC and IAPMO set to produce the 2009 editions of the Plumbing Codes

During the fall months there are numerous plumbing related organizations that hold their meetings. I have been traveling all over North America covering these meetings. Most recently, my travels have taken me to the International Code Council's final action code hearings in Minneapolis, then to the World Plumbing Conference in Calgary, Alberta, Canada, followed by a trip to the IAPMO Uniform Plumbing Code Hearings in Atlanta. Next up are trips to the American Society of Plumbing Engineer's (ASPE) Convention and Engineered Plumbing Exposition in Long Beach, Calif.; then to the American Society of Sanitary Engineering's (ASSE) annual meeting in Orlando, Fla.

The final round of model code organization's meetings included the International Code Council (ICC) and the International Association of Plumbing & Mechanical Officials (IAPMO) meetings. The two model code organizations are one step closer to producing their 2009 editions of the model plumbing codes. They should be ready for publication in the spring of 2009; then the jurisdictions can review the 2009 codes for adoption in their local jurisdictions.

International Code Council update

The International Code Council held their final action hearings at their annual conference in Minneapolis. During the conference, they elected their 2008 - 2009 board of directors and officers. The big code news from the ICC Hearings was a residential building code change addressing a proposal to require residential fire sprinklers in new home construction. That code change has been on the agenda for the last two code cycles and has been very closely contested. It was brought back as a challenge in Minneapolis, and it was ultimately approved for inclusion in the 2009 edition of the International Residential Code.

The following officers and board members were elected:

- Adolf Zubia was elected president. Zubia is fire chief for the city of Las Cruces, N.M., and a 21-year veteran of the fire service. He was first elected to the Code Council board in 2003 and previously served as vice president. He is past president of the New Mexico Fire Chiefs Association and recently completed a term as chairman of the International Association of Fire Chiefs Fire and Life Safety section.

- The new vice president is Ron Lynn, C.B.O., building official and director of development services for Clark County, Nevada. Lynn has worked for Clark County since 1981; he currently oversees a department of more than 500 employees. He is a nationally recognized expert on code administration and frequently lectures on topics including building codes, building performance standards, legal aspects of building department administration and more. Lynn previously served as Code Council secretary/treasurer.

- Jimmy Brothers, building director for Decatur, Ala., was elected secretary/treasurer. Brothers administers and directs Decatur's building safety program and is responsible for an \$850,000 budget and 13 employees. First elected to the Code Council board in 2005, Brothers is past president of the Code Officials Association of Alabama and the North Alabama Code Officials Association. He was honored as Alabama's Code Official of the Year in 1997.

- John Darnall, C.B.O., and John LaTorra were re-elected to serve three-year terms as directors. Darnall is assistant director of development services in Tumwater, Wash., and LaTorra serves as building and inspection manager for Redwood City, Calif.

The following newly elected representatives will serve three-year terms:

- Cindy Davis, C.B.O., is the building official and zoning officer for Butler Township, Pa.

- Patrick Parsley, C.B.O. is building official for the city of Fairmont, Minn.

- Ravi Shah, C.B.O., Assoc. AIA, is the director of urban development for Carrollton, Texas.

The board of directors also includes:

- Gregori Anderson, C.B.O., director of building safety and regulatory services for Chatham County, Ga.

- Bill Dupler, building official for Chesterfield County, Va.

- Greg Johnson, building inspector for St. Paul, Minn.

- Steve Jones, C.B.O., construction official for Millburn Township and the Borough of Florham Park, N.J.

- Barbara Koffron, fire marshal of the Phoenix, Ariz., Fire Department

- Doug Murdock, C.B.O., director of building inspections for the city of Gainesville, Fla.

- Ron Piester, AIA, director of the New York State Department of State, Division of Code Enforcement and Administration

- Tim Ryan, codes administrator for the city of Overland Park, Kan.

- Jeff Whitney, C.B.O., chief building official for Grand County, Utah

- Steve Shapiro, C.B.O., director of codes compliance for Hampton, Va., becomes the board of directors immediate past president.

IAPMO Code update

The final round of hearings for the Uniform Plumbing Code (UPC), Uniform Mechanical Code (UMC), Uniform Solar Energy Code (USEC) and the Uniform Swimming Pool, Spa and Hot Tub Code (USPC) took place at the IAPMO annual meeting, September 29 through October 2, in conjunction with the ISH North America product show, in Atlanta. The 2009 editions of

Continued on page 20



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the code are being assembled and, after the final appeals process, will be available at the IAPMO Standards Council meeting on November 13 and 14. The Standards Council will hear appeals to the proposed 2009 editions of the UPC and the UMC.

If you would like more information, or if you would like to receive a copy of an appeal filed with the IAPMO Standards Council and their responses or other written submissions related to an appeal, please contact Lynne Simnick at 909/472-4110 or Gaby Davis at 909/472-4203.

Other IAPMO news

The new consensus development procedures for the Uniform Solar Energy Code (USEC) and Uniform Swimming Pool Spa and Hot Tub Code (USPC) have been approved by ANSI (the American National Standards Institute).

In 2000, IAPMO applied to ANSI for accreditation for the UPC and the UMC. In January 2008, the IAPMO board of directors approved of the development of the USEC and USPC under a similar process. The IAPMO Standards Council administers the development of the UPC and the UMC; a separate oversight body will review and issue the USEC and USPC. This is important because now all of the 2009 Uniform Codes are being developed under an ANSI consensus process.

If you have any questions regarding the development of the Uniform Codes, please direct them to Lynne Simnick, Director of Code Development at 909/472-4110 or at Lynne.Simnick@iapmo.org.

World Plumbing Conference and Expo

More than 600 delegates from Canada, the United States and dozens of countries around the world met in Calgary, Alberta, September 23 - 27, 2008. Attendees had an incredible time as MCA Canada, MCA Alberta and the Canadian Institute of Plumbing & Heating (CIPH) hosted a truly world-class conference. Delegates participated in meetings, educational sessions and social events as part of the cooperative MCAC National Conference, the World Plumbing Conference and the CIPHEX West Trade Show. It was an exciting and welcoming environment, with Calgary as the ideal setting.

After two days of intense meetings for each organization, the conference kicked off with seminars on Wednesday and Thursday. Attendance doubled from last year's inaugural event, with national and international participants engaging in a morning open-forum discussion, a "lunch and learn" on wireless technologies and an afternoon session with featured speaker, Kevin Dougherty.

The full delegation came together for the first time in the Imperial Ballroom of the Hyatt Regency Hotel on Wednesday evening to participate in the opening ceremonies of the World Plumbing Conference, hosted by MCA Canada chairman and honorary conference chairman James Derksen and World Plumbing (WPC) chairman Robert Burgon. Delegates were warmly welcomed and witnessed the unveiling of the "Roll Of Honor" to officially open the conference. Flags from all over the

world were displayed as table centerpieces. Canadian Mounties, in their red jackets and white hats, stood as an honor guard and looked out upon a field of white Stetson cowboy hats in the ballroom. The hats were included with the registration and everyone participated in Calgary's internationally recognized "White Hat Ceremony." Everyone learned that the Calgary cowboy yell is "YAHOO!" (not "Yee Haw").

Thursday started off with a true Calgary style breakfast of steak and eggs with all the fixin's! Keynote speaker, Dr. Nick Bontis, the world's leading expert on intellectual capital and its impact on performance, provided a high-energy presentation. Thursday night there was a private rodeo for conference attendees.

Friday everyone enjoyed breakfast thanks to CIPH, with keynote speaker David Bengert. After breakfast, delegates had private access to the CIPHEX West Trade Show, with most of Canada's top suppliers on hand. Then delegates were off to the D'arcy Ranch Golf Club for the John Bradshaw Memorial Golf Tournament, surrounded by the beautiful Canadian Rocky Mountains.

Saturday's breakfast was a full house, featuring guest speaker and ultra marathoner Ray Zahab who ran more than 4,660 miles in 111 days, averaging almost two marathons per day (almost 42 miles per day) ... across the Sahara Desert! *Running the Sahara* is a soon-to-be-released movie produced by Matt Damon that documents Zahab's real life experience. Ray has now dedicated his running to safe water issues in developing countries, and he is planning his next run to the Antarctic. Anyone interested in sponsoring Ray for this event can contact him directly by phone at 613/868-2888 or by e-mail at rzahab@impossible2possible.com.

The Saturday night Chairman's Gala allowed everyone to gather one more time to say goodbye to old and new friends. WPC chairman Robert Burgon was joined by new MCA Canada chairman Bob Hoare. This dinner ceremony included a good-bye to outgoing chair James Derksen and his wife Monica, a welcome to the new board members of both WPC and MCA Canada and a look back at events over the past week.

During the World Plumbing Conference, I had a chance to meet and talk to some interesting and key plumbing industry people from around the world, and it was interesting to discuss with them some of the issues facing them in their corners of the world. ■

Ron George is president of Ron George Design & Consulting Services. He has more than 30 years experience designing plumbing, piping, fire protection and HVAC systems. He also provides plumbing/mechanical code and product standard consulting services and provides forensic investigations and litigation support for plumbing and mechanical system failures. Web site: www.rongeorcedesign.com. Phone: (734) 322-0225.

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Fire Protection

Richard Schulte, Schulte & Associates, Evanston, Ill.



Firefighter safety: June 18, 2007

Each July, the National Fire Protection Association (NFPA) publishes a report on firefighter fatalities in the United States during the previous year. A few excerpts from NFPA's report on firefighter fatalities for 2007 are as follows:

"In 2007, a total of 102 on-duty firefighter deaths occurred in the U.S. This is a sharp increase over the 89 firefighter fatalities that occurred in 2006, but returns to the long-term trend of close to 100 on-duty deaths annually."

"Of the 102 firefighters who died while on duty in 2007, 53 were volunteer firefighters, 42 were career firefighters. ..."

"Fire ground operations accounted for 36 deaths. ... Twenty-two of the victims were career firefighters and twelve were volunteer firefighters."

"The average number of career firefighter deaths on the fire ground over the past 10 years is 13 per year."

"There were 30 fatalities while responding to or returning from alarms."

"Thirteen deaths occurred during training activities."

"Seven firefighters were killed at non-fire emergencies."

"The remaining 16 firefighters died while involved in a variety of non-emergency-related on-duty activities. These activities included normal administrative or station duties (11 deaths), preparations for community fire prevention events (two deaths), preparing for a parade (one death), returning to base from a prescribed burn (one death) and flagging at a fire line construction project (one death)."

"Deaths resulting from exertion, stress and other, often medical, issues made up the largest category of fatalities. Of the 40 deaths in this category, 38 were classified as sudden cardiac deaths, usually heart attacks, and two were due to strokes."

"Of the 38 victims of sudden cardiac events in 2007, post mortem medical documentation showed that 10 had severe arteriosclerotic heart disease, five were hypertensive, four were reported to have had prior heart problems, such as previous heart attacks, bypass surgery or angioplasty/stent placement, and three were diabetic. Some of the victims had more than one condition."

"Over the past 25 years, post mortem information or other details on the victims' medical histories have been available for 720 of the 1,155 sudden cardiac death victims. Of those 720 victims, 663, or 92.1 percent, had suffered prior heart attacks, had severe arteriosclerotic heart disease, had undergone bypass surgery or angioplasty/stent placement, or were diabetic or hypertensive."

"Blood pressure screenings from 2005 through 2007 found that 6.2 percent of the tested firefighters had Stage 2 hypertension; 28.9 percent had Stage 1 hypertension and 48 percent were prehypertensive. Only 16.9 percent had normal blood pressure readings."

"Body fat was only tested in 2005, but of the almost

2,000 firefighters tested that year, 44.7 percent were found to be obese. Obesity is defined as 25 percent or more of body fat for men and 32 percent or more for women."

Note: The statistic on the percentage of firefighters who are obese appears to merit some additional research. By a commonly used measure of obesity (BMI), many athletes, particularly athletes who have utilized weight-training, are considered to be obese who obviously are not overweight (i.e., Governor Arnold Schwarzenegger).

"More than half of the firefighters over age 40 and almost two-thirds of those over age 50 who died in 2007 died of heart attacks or other cardiac events."

"Of the 36 fire ground deaths, 21 were due to asphyxiation, 7 were due to sudden cardiac death, 4 were due to internal trauma, 3 were due to burns and 1 was due to electrocution. This very high number of asphyxiation deaths includes the nine fire ground deaths in Charleston."

"Seventeen of the 32 firefighter deaths at structure fires occurred in residential properties. Fires in single-family dwellings killed 13 firefighters, and fires in apartment buildings killed four firefighters. There were nine deaths in the furniture store in Charleston. ...Two firefighters were killed in a restaurant fire, and two were killed in a building undergoing demolition. There was also one death in a fire in a farm shed and one death at a fire in a detached dwelling garage."

These last two excerpts from the NFPA report on firefighter fatalities in 2007 bring us to the topic of this column, the fire at the Sofa Super Store in Charleston, South Carolina, on the evening of June 18, 2007. Following are excerpts from the Phase II report by the Post Incident Assessment and Review Team commissioned by the City of Charleston:

"On the evening of June 18, 2007, units from the Charleston Fire Department responded to a fire at the Sofa Super Store, a large retail furniture outlet in the West Ashley district of the city. Within less than 40 minutes, the fire claimed the lives of nine firefighters and changed the lives of countless others." (page 21)

"The fire originated in discarded furniture and materials that had been placed outside the loading dock. The suspected cause of the fire was careless disposal of smoking materials." (page 21)

"The business occupied a complex of interconnected structures that had been constructed in several phases. The showroom building, facing Savannah Highway, was actually an assembly of three separate structures." (page 26)

"The main showroom was originally constructed as a grocery store, probably during the 1950s or '60s. The original building was approximately 125 feet in width and 130 feet deep, with a rectangular extension in the southwest corner (right-rear facing the building from Savannah Highway). The front wall was brick construction with

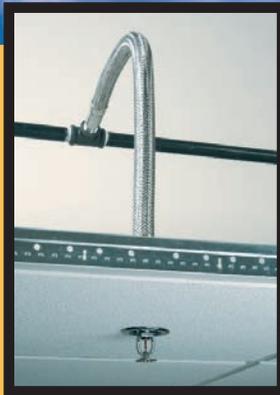
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Fire Protection

Continued from page 22

large storefront windows, while the side and rear walls were constructed of concrete block. The original structure had a flat metal deck roof, supported by lightweight steel bar joists (trusses), spanning from east to west across the store. The side walls supported the ends of the bar joists, while two rows of steel beams and columns provided intermediate support. A suspended ceiling was installed below the roof trusses.” (page 26)

“After the property was converted to a furniture store, two pre-engineered metal buildings were added on to the original structure to expand the showroom area. Each showroom addition was approximately 60 feet in width and 120 feet deep.” (page 27)

“City of Charleston records indicate that the original structure was the only building on the site when the property was annexed into the city in 1990. Building permits were issued for the construction of the three pre-engineered structures in 1993, 1995 and 1996. The building permit files indicate that the original building

and the three additions were considered as four separate structures for building code purposes. The concrete block side walls of the original structure were designated as fire walls and roll-down fire doors were installed in the six large (8' x 8') openings that connected the showrooms. A seventh roll-down fire door was installed at the point where the corridor leading to the warehouse was connected to the rear wall of the original building. All of the fire doors had fusible link release mechanisms.” (page 29)

“The division of the property into four separate structures allowed the additions to be constructed without automatic sprinklers. The floor area of each individual building was below the threshold that would have required automatic sprinklers to be installed.” (page 29)

“On June 18, 2007, there were no effective fire walls or physical separations to stop a fire that originated in the loading dock area from spreading into the three adjoining areas. The fire could spread directly into the rear of the original building through an open doorway. The fire could also spread to the warehouse and to the west showroom through sheet metal

walls that offered no fire resistance.” (page 34)

“Examination of the premises after the fire determined that three of the required exits had been compromised by the non-permitted additions and modifications and that all of the exits, with the exception of the main entrance/exit doors, were obstructed and/or locked at the time the fire occurred.” (page 34)

“Photographs that were taken after the fire indicate that all of the exit doors from the showroom buildings and the warehouse were secured by padlocks and hasps or by slider mechanisms. One of the exits from the warehouse was also physically obstructed by a large shipping container. The main entrance and exit doors at the front of the showroom building were unlocked.” (page 35)

“The annual fire inspection program for commercial occupancies was discontinued after the 1998 inspection was conducted. The City of Charleston Code was amended in 2001 to remove a mandatory requirement for annual fire inspections in mercantile occupancies.” (page 37)

“The Fire Department had conducted pre-fire planning and familiarization visits during the intervening years. These visits did not involve code enforcement activities.” (page 37)

“The City of Charleston occupies an area of almost 110 square miles, with a total estimated population of 121,247.” (page 47)

“In 2007, the Charleston Fire Department included 19 fire companies, operating out of 14 fire stations. The Department employed 246 sworn members and 14 civilians with an operating budget of 14.9 million dollars.” (page 47)

“The fire at the Sofa Super Store originated at approximately 19:00 hours (7:00 p.m.) on Monday, June 18, 2007. The store was open for business at the time, although no customers were present. There were five employees working in the showroom area and one in the workshop at the rear when the fire was discovered.” (page 53)

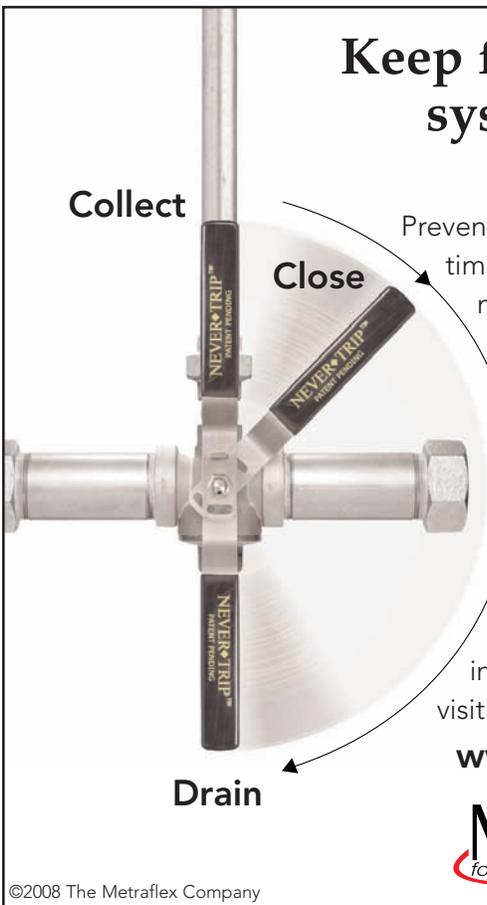
“At this point in the operation, approximately 19:25, all of the firefighters who were inside the showrooms were operating in zero visibility conditions.” (page 65)

“At 19:38:09, the Fire Chief broadcast “Everyone abandon the building.” Captain 11 sounded the

Continued on page 26

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air horn on Engine 11 as a signal to abandon the building at approximately the same time. Firefighters SAI and SA2 noted that the air horn was blowing as they were crawling back toward the front door. They were the last firefighters to escape from the building.” (page 77)

“All of the deceased firefighters died from a combination of smoke inhalation and/or thermal burns.” (page 81)

“The evidence indicates that the structural collapse of the roof occurred after the firefighters were incapacitated or deceased. The roof of the main showroom did not collapse until almost 20 minutes after the interior became fully involved in fire. The roof collapse did not cause their deaths.” (page 81)

“The loading dock was approximately 2,200 square feet in area and contained a substantial quantity of furniture and other fuels, including containers of flammable

Will the fire service’s attitude toward fire prevention change now? It’s hard to say, but I certainly have my doubts.

liquids. The dock was constructed of wood, and the structure built to enclose it was wood frame covered by sheet metal. The fire had immediate access to all of this fuel.” (page 84)

“The hot fire gases were probably flowing into and accumulating within the void spaces above the ceilings in both showroom areas by the time the first hose lines were being advanced into the building. The heated fire gases had access to the void spaces on both sides of the wall that divided the main and west showrooms, which caused the wall to be ineffective in limiting the spread of the fire.” (page 86)

“It is impossible to determine the exact sequence of events that occurred, although the critical time was close to 19:27. The radio transmissions from firefighters in distress began at 19:27 and continued until approximately 19:35. Engineer 6 encountered the three lost firefighters in the rear section of the middle showroom at approximately 19:30.” (page 88)

“At 19:26:17, Engineer 16 radioed Engineer 11 to advise that he was charging the supply line. At 19:29:02 Engineer 11 transmitted a message indicating that ‘water’s coming right now,’ which suggests that he was charging the 2-1/2 inch line at that time. The first radio transmissions indicating that firefighters were in distress inside the building were recorded at approximately 19:28.” (page 91)

“All three fire doors in the wall between the main and west showrooms failed to close, although the fusible links operated and caused the mechanisms to release.” (page 92)

“The firefighters who were attempting to attack the fire from the front of the building were approximately 200 feet inside a complex building when the situation became untenable, forcing them to abandon their attack. Nine firefighters lost their lives because they were too deep inside a highly combustible smoke-filled building and could not

find their way back to the entrance or locate alternative exits before they ran out of air or were overwhelmed by the fire.” (page 97)

“WHEN THERE IS NO POTENTIAL TO SAVE LIVES, FIREFIGHTERS SHALL NOT BE COMMITTED TO OPERATIONS THAT PRESENT AN ELEVATED LEVEL OF RISK.” (page 99)

“No building or property is worth the life of a firefighter.” (page 100)

“All interior fire fighting involves an inherent risk.” (page 100)

“The Charleston Fire Department did not have the resources, training, or leadership that would have been required to conduct an operation of this size and complexity in the limited time that was available.” (page 102)

“In addition to the familiarization and planning aspects of pre-fire planning, the process of visiting properties and gathering information often identifies fire hazards, unusual risks and situations that require special attention. The appropriate action can vary from providing information or recommendations to the business or property owner to referring a situation for follow-up by code enforcement personnel.” (page 106)

“Analysis of the recorded radio traffic indicates that the deceased members did not attempt to call for assistance until they were in critical distress. All of the recorded messages indicate that the firefighters are lost, disoriented, and either running out of air or already out of air. The firefighters were already in imminent danger, deep inside the building, when they began to call for assistance.” (page 115)

“Firefighter 15A had exhausted his air supply when he exited at 19:33. He had been using his SCBA for approximately 13 minutes.” (page 119)

“Captain 6 had run out of air when he exited at 19:35, approximately 12 minutes after he entered the showroom.” (page 119)

“If the firefighters waited until the low pressure alarms on their SCBA activated, they would have had only 3 to 4 minutes to find an exit from the depths of the Sofa Super Store before their air supplies were exhausted. A firefighter who was disoriented or had lost contact with the hose line would have been unlikely to find a way out of the building within the limited available time.” (page 120)

“The Charleston Fire Department did not have an established policy to apply the ‘2-in/2-out’ rule for the initial phase of interior fire fighting operations nor to assign Rapid Intervention Teams during fire incidents. The OSHA Respiratory Protection Standard (29CFR1910.134) and NFPA 1500 Section 8.5 both require the assignment of at least one Rapid Intervention Team (or crew) whenever firefighters are operating in an IDLH environment.” (page 121)

“It is important to recognize the limitations of a Rapid Intervention Team. Rapid intervention procedures are generally directed toward providing the ability to locate and rescue a single firefighter. It is highly unlikely that a single RIT could have entered the showroom, located and then rescued the number of firefighters who were in distress deep inside the smoke-filled building F.” (page 122)

“Charleston Fire Department members routinely entered and operated in IDLH atmospheres alone. In many cases the company officer operated a hose line while the other crew members operated semi-independently. Company officers frequently lost track of their assigned crew members. Firefighters who lost track of their assigned company officers took direction from any other officer who was present or became involved in whatever task caught their attention. Members who had expended their air supplies went outside individually, obtained replacement SCBA cylinders and returned to conduct interior operations.” (page 123)

“Water supply issues played a very significant role at the Sofa Super Store fire and contributed to the loss of the nine firefighters.” (page 124)

“The Charleston Fire Department did not use large diameter hose for supply lines; the standard hose load on engine companies provided only a single bed of 2-1/2 inch hose that could be used as a supply line. This arrangement severely limited the volume of water that was available for fire attack.” (page 124)

“The standard attack lines were configured to deliver very limited flows. The nozzles on the 1-1/2 inch pre-connected lines were set to deliver 60 gallons per minute. The nozzle operator had the option of resetting the nozzle to a higher flow, if necessary, and advising the pump operator to increase the pressure to provide the higher flow rate. Larger (2-1/2 inch) attack lines were rarely used inside structures. Engine companies were not equipped with pre-piped master stream devices.” (page 125)

“Conducting an offensive fire attack with two engines supplying the attack lines with tank water and no supply lines connected to hydrants is a very high risk situation under any circumstances. The risk was even greater when the particular circumstances of the Sofa Super Store are considered - a very large building with a heavy fuel load requiring firefighters to operate deep inside the structure.” (page 126)

“Delays were encountered in charging both of the hose lines that were taken through the showrooms to attack the fire in the loading dock. The delays and subsequent flow interruptions placed crews in extremely dangerous situations inside the building.” (page 128)

“Several other problems and interruptions in water flow were reported. The problems began during the early stages of the incident and increased as the incident grew in magnitude and complexity. The water problems became even more severe when the showrooms and the warehouse became involved and the demand for additional hose lines increased in proportion to the magnitude of the fire.” (page 128)

“Most of the water problems were related to inadequate supply lines and inexperienced pump operators. The single 2-1/2 inch supply lines that were used by the Charleston Fire Department could not deliver the flows that were required to conduct an effective fire attack, even if fire hydrants had been closer to the scene.” (page 129)

“Engine 11 is a 1500 gpm pumper. The maximum flow, with the 2-1/2 inch line charged, would have been approximately 350 gpm. The supply line from Engine 16 to

Engine 11 was incapable of delivering more than 250 gpm.” (page 129)

“The code violations would have been discovered if the City of Charleston had conducted regular fire inspections and if firefighters had been trained to identify code violations during pre-fire planning visits and report them to the Inspections Department.” (page 134)

“The fire suppression operations that were conducted by the Charleston Fire Department at the Sofa Super Store did not comply with federal occupational health and safety regulations, with NFPA consensus standards or with modern fire service expectations. These deviations from standard operational and safety practices exposed firefighters to excessive risks and failed to remove the nine deceased firefighters from a critically dangerous situation.” (page 134)

“The Charleston Fire Department was inadequately staffed, inadequately trained, insufficiently equipped and organizationally unprepared to conduct an operation of this complexity in a large commercial occupancy. The Department attempted to compensate for the limited resources and organizational inadequacies by engaging in dangerously aggressive and uncoordinated fire fighting operations. This placed the firefighters deep inside a large building without the systems that should have been in place to ensure their safety and to provide for the removal of all firefighters when the situation became critical.” (page 134)

“The volume of fire could not be controlled by the limited flow from small hose lines. Firefighters were operating deep inside the building without the capability to control the fire and without the support systems that should have been in place to protect them. The strategy and tactics attempted by Department members were inappropriate for the situation and exposed the firefighters to extreme and unnecessary risks.” (page 135)

“Fire fighting is not an exact science, and it is unrealistic to expect that every firefighter will perform flawlessly in every situation. Fire fighting is inherently dangerous and firefighters are human beings who can make mistakes. The final analysis of this incident does not suggest that any of the firefighters who lost their lives, or any of the surviving members of the Charleston Fire Department, failed to perform their duties as they had been trained or as expected by their organization. The analysis indicates that the Charleston Fire Department failed to adequately prepare its members for the situation they encountered at the Sofa Super Store Fire.” (page 135)

“Fire fighting involves inherent dangers and hazardous situations that must be anticipated, recognized, evaluated and properly managed to produce positive outcomes. The mission of a fire department is to protect lives and property from those hazards, and firefighters must be prepared to perform their duties in the face of those inherent risks. The health and safety of firefighters are directly related to the ability of the fire department to skillfully and effectively perform every aspect of that mission.” (page 136)

“The determination of the appropriate strategy — either offensive or defensive — is the key factor that con-

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Fire Protection

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trols firefighter safety. The determination of appropriate strategy must be based on an appropriate size-up of the situation, a realistic evaluation of the resources and capabilities that are available to conduct operations and the application of risk management principles.” (page 138)

“Offensive strategy can only be effective when the fire department has the capability to conduct an interior attack that delivers a sufficient quantity of extinguishing agent by firefighters to suppress the fire. Attempting an offensive attack without the resources that are required to suppress the fire places firefighters in needless jeopardy. If an offensive attack cannot be accomplished safely and effectively with the resources at hand, it should not be attempted.” (page 138)

“A successful offensive strategy requires effective action at the tactical level and coordination among actions. If the Incident Commander lacks the resources to execute the plan or the tactics are not adequately executed and coordinated, the operation cannot be accomplished safely or effectively.” (page 138)

“Firefighters operating in IDLH conditions must work in teams of two or more, remaining in direct contact with

Firefighters or civilians shouldn't have to die in order for the fire service to begin to realize that there is more to fire fighting than simply putting the “wet stuff on the hot stuff.”

each other at all times. The members of each team (or full company) enter, work and leave the IDLH area together.” (page 139)

“Rapid Intervention Crew(s)/Team(s) must be assigned at all appropriate emergency incidents. These teams must be trained, equipped and prepared to provide assistance to firefighters in distress.” (page 139)

“All Charleston Fire Department members must be trained to recognize hazardous conditions and situations, such as lightweight construction and unusual fire loads and to react appropriately.” (page 139)

“Mitigation programs to reduce or eliminate excessive risk levels should be encouraged and supported. Measures that mandate or provide incentives to encourage the installation of automatic sprinklers or support alternative fire protection measures should be adopted as public policy. The City of Charleston should continue to encourage actions at the state level that will support these efforts.” (page 143)

“All Charleston firefighters should be trained and should have a specific responsibility to recognize fire hazards and code violations and to initiate appropriate corrective actions.” (page 143)

“The City of Charleston should also work closely with the Water System to ensure that sprinkler system connections are provided at the least possible cost.” (page 144)

“Coordination with the Charleston Department of Public Service, Building Inspections Division to assure that fire safety concerns observed by firefighters are corrected, to assure that code compliance inspections of commercial occupancies are conducted on a regular basis, and to assure that buildings are constructed utilizing fire

safe practices.” (page 144)

“The building was last inspected by a City of Charleston fire inspector on March 30, 1998.” (page G-4)

“Charleston Fire Department personnel visited the store on multiple occasions between 1998 and 2007 for pre-fire planning purposes. A Sofa Super Store employee noted that they made some safety and prevention suggestions during their visits.” (page G-4)

“Roll-down fire doors in required fire separations did not operate properly.” (page G-5)

Discussion

A meeting to address the issue of firefighter life safety, referred to as a Firefighter Life Safety Summit, took place in Tampa, Florida, in March 2004. The following are excerpts from the report on the Summit:

“An unprecedented gathering of the leadership of the American fire service occurred on March 10th and 11th, 2004, when more than 200 individuals assembled in Tampa to focus on the troubling question of how to prevent line-of-duty deaths.”

“The Summit marks a significant milestone, because it is the first time that a major gathering has been organized to unite all segments of the fire service behind the common goal of reducing firefighter deaths.”

“This is the first step along a path that will require a huge commitment of energy and resources over several years. Some of the initiatives that were agreed upon will involve radical changes for the fire service.”

“The essence of professionalism in the fire service is the ability to function safely and effectively within that dangerous environment. We will never be able to eliminate all of the risks, but we can be very well prepared to face most of them.”

“The willingness of firefighters to risk their own lives to save others must never be used as an excuse to take unnecessary risks. Firefighters are highly respected for being willing to risk their own lives to save others, but that cannot justify taking unnecessary risks in situations where there is no one to save and nothing to be gained. In too many cases firefighters lose their lives while trying to save property that is already lost or to rescue victims who are already dead. While these efforts are valiant, they are also futile. Individual firefighters who take unnecessary risks, or fail to follow standard safety practices, endanger their own lives as well as the lives of other firefighters who are depending on them or who might have to try to rescue them.”

In a nutshell, this last excerpt summarizes the investigation report on the fire at the Sofa Super Store. While the report on the Sofa Super Store fire specifically addresses the operations of the Charleston Fire Department, the observations and recommendations contained in the report are really applicable to every fire department in the United States.

It is interesting to note the similarities in the operations of the Charleston Fire Department at the Super Store fire and the operations of the Chicago Fire Department at the fire at the Cook County Administration Building on October 17, 2003. Like the Chicago Fire Department at the County Administration Building, the chief officers of the Charleston Fire Department failed to take control of the fire companies working the fire. It's apparent that the Charleston Fire Department didn't learn much from the

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Fire Protection

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investigation into the Cook County Administration Building fire. (Perhaps that's because the two investigation reports on the fire in downtown Chicago were so poorly written, despite the outrageous cost to the taxpayers of the State of Illinois for these reports.) From my perspective as a building code consultant, what I found most interesting in the Super Store investigation report were the

comments regarding building code compliance and how the lack of inspections and code enforcement directly impacted firefighter safety at the fire. As has been previously stated in this column, the inspection of existing buildings for continued code compliance by the fire service is just as much part of the job of a firefighter as is actual fire fighting. Unfortunately, it cost the Charleston Fire Department the lives of nine firefighters to find out that this statement is true.

A little more than 25 years ago

(1980 - 1982), I worked as the fire protection engineer for the San Jose (California) Fire Department, reviewing architectural drawings for code compliance and performing field inspections of new high-rise buildings and hospital construction. It was clear to me back then that few of the firefighters in the department of 600 had any interest in or respect for the activities of the fire prevention bureau. Few firefighters showed any appreciation of the fire prevention bureau's efforts. The report on the Charleston Fire Department confirms that the fire service's attitude toward fire prevention activities hasn't changed all that much in the last quarter century.

Will the fire service's attitude toward fire prevention change now? It's hard to say, but I certainly have my doubts.

Conclusion

Just one final comment regarding the Super Store investigation report. The authors of the report, J. Gordon Routley, Michael D. Chiaramonte, Brian A. Crawford, Peter A. Piringer, Kevin M. Roche and Timothy E. Sendelbach, have done a fine job with their report and deserve a standing ovation. The report is clear and concise and the writing is excellent.

One of the questions that remains is whether the observations and recommendations contained in the report will be implemented, not only by the City of Charleston Fire Department, but, even more importantly, by the rest of the fire service. Firefighters or civilians (as was the case at the Cook County Administration Building) shouldn't have to die in order for the fire service to begin to realize that there is more to fire fighting than simply putting the "wet stuff on the hot stuff." ■

Richard Schulte is a graduate of the Fire Protection Engineering Program at the Illinois Institute of Technology. He formed Schulte & Assoc. in 1988. His consulting experience includes work on the Sears Tower and many other notable structures. He also has acted as an expert witness in the litigation involving the fire at the New Orleans Distribution Center.

The views and opinions expressed in this column are those of the author and do not reflect those of *Plumbing Engineer* nor its publisher, TMB Publishing.

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Bristol's six principles of good solar hydronic design

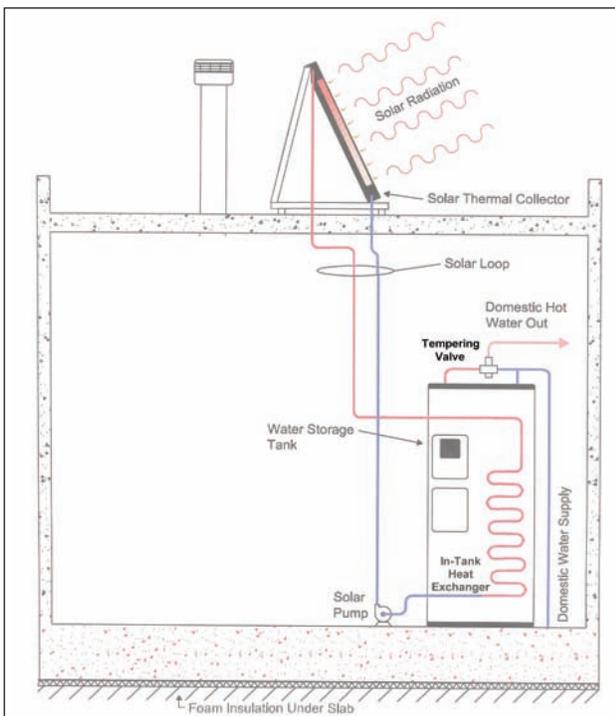
Part 5: The evolution of "direct" active solar heating

Let's review what we have been discussing so far in this series of articles. The key ingredients for solar/hydronic design and installation can be divided into six categories, listed below, roughly in order of their importance.

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

The success of any solar hydronic home heating installation depends on the often-conflicting balance between any of these six principles. Finding the balance between them defines the art of solar heating design. In my work in solar heating over the past thirty years, I have slowly gravitated towards the concepts that withstand the test of time in my region. The methods that best conform to the six principles and meet the needs of the broader solar heating market include the following:

- Solar heat collector systems using closed loop glycol rather than drain-back;
- PV pumped glycol rather than AC pumps on the solar heat collector loop;
- Potable hot water tanks with immersed heat exchangers rather than external exchangers with pumps;
- Reliable automatic solar heat controls rather than manual



Solar collectors used to directly heat a domestic hot water storage tank.

or simplistic controls; and

- Automatic overheat prevention rather than depending on manual cooling or a relief valve blowing off.

These ideas and the others discussed in previous articles have become the building blocks of the heating systems we are deploying today.

A fundamental concept that we employ in every heating system we install is the idea of "direct" solar heating. This concept is not widely used yet in the hydronic heating industry, but we have been using it with good results for many years in our local region. You might say that we are the pioneers of Direct Active Solar Home Heating. Let's take a closer look at it now.

What is direct active solar heating?

First, let's get a few definitions out of the way. Passive is the opposite of active. Passive solar heating occurs when solar heat is delivered only by natural means, such as natural convection, radiation, thermal siphoning and other mechanisms found in nature. "Direct gain" passive solar heating is a well-known method of solar home design. When a house is designed with many windows facing the sun (allowing the house to warm up in much the same way a greenhouse does) that is known as direct gain solar heat. The heat is collected into the house in a single step, as it passes through the window into the heated space. Heat gain could not be more direct than that.

Active solar heating occurs when an energy source (besides the sun) that is not provided by nature is used to transfer the solar heat from one place to another. It is typical for active components such as circulator pumps, fans or motorized valves to be used that are powered by AC electricity and sometimes by DC. This outside energy is known to solar designers as "parasitic" energy, because it reduces the net energy savings provided by the solar collector system.

How can an active solar heat collector be a direct system? By delivering the solar heat from the collector in one step. A good example of this is a solar water heater with an immersed heat exchanger in the potable water tank. [See diagram of the solar water heater, left]. A glycol pump delivers solar heat directly from the collector into the potable water tank. The existence of the pump and its power source and controller make this an active system. If there were an external heat exchanger or a separate heat storage tank between the collector and the heating load (the potable water) then the system would be more indirect, with more heat loss and lower solar heating contribution. But this is the most direct solar heat delivery possible with an active system.

From water heating to direct active solar floor heating

Clearly, this is a simple and reliable way to build a solar water heater, but it is also possible to apply this system to heat a warm concrete mass floor. In fact, one of the earliest direct active solar heated floors I know of was constructed around

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Solar Solutions

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1957 here in Santa Fe, New Mexico, by a local solar pioneer, Peter van Dresser. The idea was to pump heat directly from a solar heat collector into the heat storage mass of a masonry floor. The floor would warm up slowly and stay warm well into the evening on cold winter days. The challenge was to size the collectors and tilt them so that the floor is provided with a quantity of heat that does not cause uncomfortable temperatures at any time of the year. This has a lot to do with the specific heat storage capacity of the masonry material in the floor, which has about 1/2 to 1/3 of the heat storage capacity of the same volume of water. If you take this into account and control the heat in the floor within the comfort range, you realize that maybe you don't need those enormous solar heat storage water tanks that everyone else is using. The floor acts as a "solar accumulator," to use a phrase that's come into favor lately.

Back in '57, van Dresser was using solar hot air collectors and air ducts in his mass floor. His direct active heating idea became even more practical as hydronic tubing became more widespread and pumps and controls became more advanced. By 1985, as chief engineer at the Coyne Solar Company, I was building solar hydronic heated floors that resemble the system seen in the diagram (*below*). Several other local builders throughout the 1980s and '90s

were trying similar things. In our climate, a well-insulated mass floor can be heated with about 10 - 15 % of the floor area in collectors, and the collectors work quite well when mounted vertically on a south-facing wall. The vertical tilt keeps them from overheating in summer, because the high summer sun angle prevents them from gaining heat. The low winter sun angle provides maximum solar heat to a vertical collector during the cold season.

Most people want it all

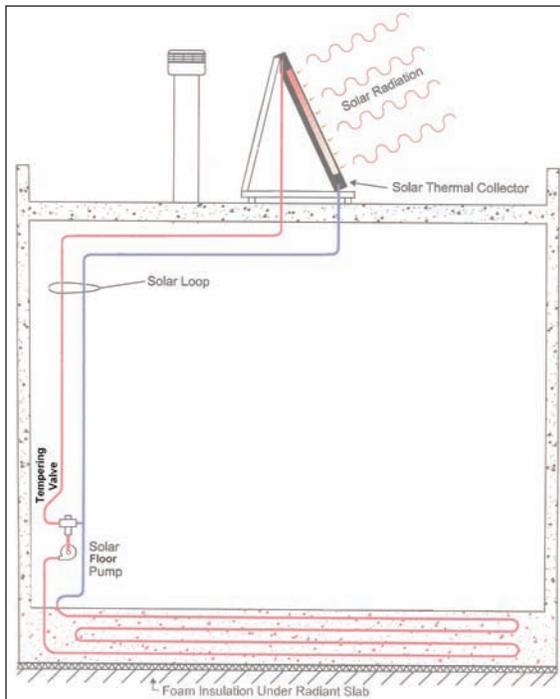
By the late 1990s, I began dealing less with individual warm floors or single water heaters and getting more demands for both, with an integrated backup system as well. At first, I did what every heating system designer does: I drew custom piping diagrams for each job with tees and motorized valves and agonized over flow directions and check valves and such. This type of design can still be seen in current manufacturer's installation literature. I have come to refer to it as the "Spaghetti Diagram School of Solar Design."

I graduated from the Spaghetti School around 1997, inspired by a class given in Glenwood Springs, Colo., by Dan Holohan, who was teaching about primary/secondary piping. I realized that most of the components for residential heating systems could be treated as modules and plugged together with two pipes. After that, my diagrams began to look more

like the diagram on page 38, using a primary loop to connect everything together and every secondary loop connected with two pipes. Modular design is already popular in Europe and manufacturers such as PAW, Caleffi, Precision Hydronics, Watts Radiant and others are offering more modular components in the U.S. market all the time.

Another advantage of modular design is that the control system becomes more standardized. If the plumbing modules plug in and out with two pipes, the controls can be designed to do the same thing. It is really the con-

Continued on page 38



Solar collectors used to directly heat a mass radiant floor.

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Solar Solutions

Continued from page 36

trols that make direct solar floor heating possible. If we could not control the solar heat in the mass floors accurately, within the range of human comfort, we would have to add more big solar heat storage water tanks to absorb the extra heat. Since these tanks are expensive and add complexity to the piping and wiring design, I like to avoid them.

I have found that controlling the solar heat storage in the mass floors is easier and less expensive to install than big solar heat storage tanks nearly every time. At my company, Cedar Mountain Solar, we build our own control systems that do this job. We use 2-stage room thermostats to allow the solar heat to provide a slightly higher setpoint than the boiler heat. And we use the primary loop and the normal zone valves to send the solar heat to wherever it is needed most. The collector is tilted more toward vertical if little heat is needed in summer and tilted back more if there is a big water heater load or a swimming pool.

In this way, we can eliminate big

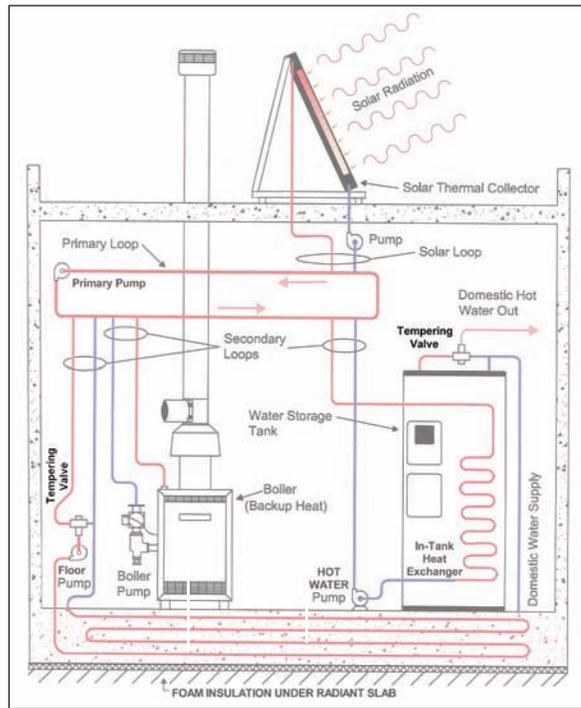
solar water storage tanks in virtually any house that has well insulated hydronic heated mass floors. We have done hundreds of houses like this over the years, and it seems like a natural for the hydronic heating industry as a whole to adopt this approach on a wider scale.

Regional conclusions may vary

Final collector-to-floor area ratios and collector tilts are very climate-dependent and are also dictated by the number and type of heating loads attached to the solar heating system. I hope to go into more detail in future articles. ■

Bristol Stickney, partner and technical director at Cedar Mountain Solar Systems in Santa Fe, N.M., has been

designing, managing, engineering, repairing and installing solar hydronic heating systems for more than 30 years.



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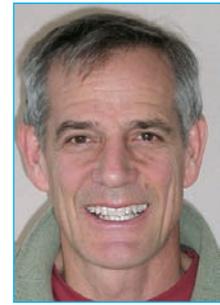
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Sustainable Design

By Bob "Hot Rod" Rohr



Raindrops keep falling on my roof

Being well versed in the piping trade, I've decided to try and wrangle some of those drops. Rainwater collection systems are getting a lot of attention again. I remember a lot of homes with cisterns in the basement as I grew up in the western New York area in the '60s. I remember those systems being used mostly for irrigation, specifically for lawn sprinkling.

These days I see more complete rainwater systems being offered. Factory-built systems with various levels of filtration are available. The basic system might have a filter at the roof or downspout for leaves and debris. Some systems have clever valves, or collection tubes, which cause the first small batch of water to be dumped. This allows the roof to be rinsed, so to speak — to wash the roof of any bird droppings, etc. before flowing into the tank. Good thinking!

Additional filters can be added at the inlet into the storage tank. Filtration as simple and basic as spin-on cartridges can be installed or as high tech as a RO, UV and carbon filters. Chlorine can be added for disinfecting, and the taste and odor can be removed via carbon block filter before going into the home. It is quite possible to turn rainwater into safe potable water, if desired. When you think about it, with enough technology, even sewage can be turned into potable water.

My plan for my own home is to use the rainwater for toilet flushing and, possibly, laundry use. We have a great producing well for our domestic water in terms of gpm, but the water is very hard and has high iron content. It takes a multi-stage, water-wasting filtration system to make it user friendly. With the rainwater component, I hope to cut back on both water softener and rust filtration use.

The HDPE tank I purchased is not listed for potable water storage. I bought an underground style tank with a 1000-gallon capacity. The tank has two large manhole sized openings on the top. I piped some PVC lines into the tank for extracting the water and for wiring to add a level sensing system to cut the pump out as the level drops. I'm still trying to decide between a submersible and a variable speed well pump, mounted above the tank. I like the idea of the new variable speed, ECM well pumps that work efficiently and without a large storage well tank.

Another option would be a PV powered pump. It would fit into my "green" theme. But I am considering the cost of a high gpm DC pump with batteries. Is the juice worth the price? I like my green lean. I'm thinking about the Viega Manabloc system for my distribution, with the rainwater piping well labeled. I noticed that a purple-colored

PEX is used in Europe to denote rain and graywater piping. Some green PEX would be a nice match for rain or graywater systems. I did see some sample green PEX manufactured from recycled PE. What a nice touch, to build a green pipe for green technologies.

Controls are another area I am still "noodling." Certainly, a seamless switch to well water, should the rainwater tank run low, would be ideal, as the tank may run low and lock out when I am out of town, like the boiler does. Manual rainwater operation may not be what my wife wants on her to-do list.

My system is pretty much home-built, with common off the shelf components. All of the parts and installation are well within the comfort level of readers here. My largest expenditure so far was the rental on a small mini-excavator for digging the hole for the tank and piping runs to the tank.

I also decided to build a small greenhouse over the top of the tank. I hope to heat this 60 square feet of slab on grade with solar and water the crops with collected rainwater. I installed a PEX loop below the under-slab insulation for a dump zone for the solar, if needed. It would also act to preheat the earth below the well-insulated slab. A PEX loop is also included in the green-

house slab for cold weather tempering of the space.

The next step will be a separate HW tank, solar powered, of course, to heat the collected rainwater for laundry use.

I have noticed some factory-built systems showing up on the market. Texas seems to be a leading state when it comes to rainwater collection technology and components. Here is a link to a rainy day site, should this technology grab your attention — www.harvesth2o.com.

On a recent trip to St Croix, I found that rainwater is a crucial part of life in the islands. Desalination is slow and expensive; rainwater is a simple solution. But I am hearing that rainwater collection may be banned in some areas. Should you decide to let some raindrops slide down the pipes to your system, check into the codes and laws in your area first. ■

Bob "hot rod" Rohr has been a plumbing, radiant heat and solar contractor and installer for 30 years. Hot rod also is a columnist for PHC News and Mechanical Business magazines, and has been a longtime RPA member. Rohr has since joined Caleffi North America as manager of training and education.



Hot Rod's rainwater collection system.

The views and opinions expressed in this column are those of the author and do not reflect those of *Plumbing Engineer* nor its publisher, TMB Publishing.

"Great fast-track support."



– Jack Hausbeck, Project Manager
Foley Company, Kansas City, MO



Sprint Center, Kansas City, MO

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pumps, suction diffusers, Plus 2 Multi-Purpose valves, CA expansion tanks, and air separators. With Taco quality built in, they could count on years of reliable system service.

A job well done.

Jack Hausbeck, Foley's on-site project manager, started the job in January, and finished in May. "What we appreciated from an installation standpoint, especially on a fast-track project like this one, is the support we received from Taco. All the equipment arrived on site as needed, submittals were received in a timely

manner and that permitted us to stay on schedule".

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High-Efficiency Toilets

By using water more efficiently, we can help preserve water supplies for future generations, save money and protect the environment

By Susan Ecker, Rumsey Engineers

Drought is becoming a major issue, both in this country and around the world. Although much attention is given to oil, water is vital to sustain life and, therefore, its importance should not be minimized. A recent government survey showed that at least 36 states are anticipating local, regional or statewide water shortages by 2013. But by using water more efficiently, we can help preserve water supplies for future generations, save money and protect the environment.¹

Currently, in the San Francisco Bay area, due to shrinking reserves, some water utilities are mandating a 10 percent decrease in water consumption by homeowners. In order to accomplish this, conservation practices are being implemented. Homeowners may be decreasing their time in the shower, curtailing or eliminating landscape irrigation and/or installing new water conserving plumbing fixtures.

One of these fixtures is the toilet. If you recall, when the 1.6 gallon per flush (gpf) toilet was introduced in this country, it was not welcomed with open arms. Many times it took multiple flushes to clear the bowl, making users wonder whether water was really being saved. Today, there are high efficiency toilets, or HETs, as they are commonly referred to. These toilets are tested by an independent testing agency and cataloged according to the weight of material that can clear the bowl in a single flush.

High efficiency toilet fixtures

Two types of toilet fixtures dominate the marketplace: Ultra-Low Flush Toilets (ULFTs), aka “low flow” or “ultra low flow,” and HETs. ULFTs are defined by a flush volume in the range between 1.28 gpf and 1.6 gpf.

The HET is defined as a fixture that flushes at 20 percent below the 1.6 gpf maximum or less, equating to a maximum of 1.28 gpf. The HET category includes dual flush fixtures.

This 20 percent reduction threshold serves as a metric for water authorities and municipalities designing more aggressive toilet replacement programs and, in some cases, estab-

lishing an additional performance tier for their financial incentives (e.g., rebate and voucher programs). It is also a part of the water-efficiency element of many green building programs in the United States.¹

Currently, this standard applies to tank type toilets only. Flushometer valve toilets have not been studied in the same way as tank types. Testing for flushometer valves needs to be performed on the flushometer valve with the various bowls on the market; the pair would then be rated.

WaterSense program

The EPA Energy Star program is easily recognized by the consumer as a way to save energy. Many consumers refer to this rating when they purchase a major appliance for their homes or businesses. Energy Star products use 10 to 15 percent less energy and water compared to standard models. The EPA wants to impact water conservation in the same way, so the WaterSense program was developed.

The specification for the WaterSense program is based on the Uniform North American Requirements (UNAR) for toilets and on industry and product research, in collaboration with external stakeholders. UNARs were developed by a collaboration of water utilities to establish a standard for toilets that would perform to customer expectations, save water and maintain water savings over the long term. The EPA specifications set the water use level at 1.28 gpf or less, include design requirements and, to ensure user satisfaction, have a higher requirement for flush performance.

UNAR establishes the criteria for a tank-type HET under the WaterSense program. It is applicable to the following:

- Single flush, tank-type gravity toilets;
- Dual flush, tank-type gravity toilets;
- Dual flush, tank-type flushometer tank (pressure-assist) toilets;
- Tank-type, flushometer tank (pressure-assist) toilets;
- Tank-type electrohydraulic toilets; and

Continued on page 44

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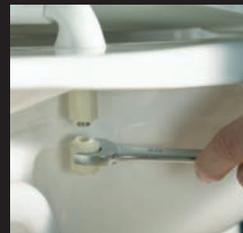
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Plumbing Engineer

- Any other technologies that meet these performance specifications.

Power assist toilets operate using a pump to force water down at a higher velocity than gravity toilets do. These toilets require a 120V power source to operate the small, fractional horsepower pump. Typical flush volumes are between 1 and 1.3 gpf. Single and dual-flush models are available.

To be listed as a WaterSense toilet, the toilet must meet the following criteria.

1. Effective flush volume. Effective flush volume shall not exceed 1.28 gallons for both single flush and dual flush toilets. For single flush toilets, the effective flush volume is the average flush volume when tested in accordance with ASME A112.19.2, *Vitreous China Plumbing Fixtures and Hydraulic Requirements for Water Closets and Urinals*. For dual flush toilets, the effective flush volume is defined as the average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A112.19.2 and ASME A112.19.14, *Six-Liter Water Closets Equipped with a Dual Flushing Device*.

2. Solid waste removal. Solid waste removal must be 350 grams or greater. Fixtures get a Pass or Fail grade based on whether the fixture can completely clear all test media in a single flush in at least four of five attempts. Toilets that pass qualify for the EPA WaterSense label.

Test media consists of seven test specimens, 50 ± 4 grams each, consisting of soybean paste forming a "sausage" approximately 4 ± 0.5 inch in length and 1 ± 0.25 inch in diameter and four loosely crumbled balls of toilet paper. The flush performance criteria apply to single flush toilets and to the full flush option of dual flush toilets. The solid waste removal requirement does not apply to the reduced flush option on dual flush toilets.¹

There is a performance requirement associated with this program. A collaboration of U.S. and Canadian water utilities have developed a flush performance test protocol called the Maximum Performance (MaP) Test to provide a uniform measure of toilet performance. MaP test scores range from 250 to 1,000 grams. Products will be independently certified by a third party to confirm that the product meets EPA criteria for efficiency and performance. For a listing of toilets and their MaP test score visit www.cuwcc.org/MaPTesting.aspx.

3. Adjustability and other supplementary requirements. All single flush toilets must conform to ASME A112.19.2 and all dual flush toilets must conform to ASME A112.19.14. The criteria in this section apply to tank-type gravity toilets; these toilets must conform to ASME A112.19.5, *Trim for Water-Closet Bowls, Tanks, and Urinals*. The fill valve shall be the pilot valve type only or shall meet the performance requirements of the fill valve test protocol detailed on the WaterSense Web site. All fill valves must conform to ANSI/ASSE 1002.

The tank capacity, as defined by the EPA, is a barrier, bucket, dam, displacement device, or similar fixture used in a toilet tank to affect flush volume: the device shall be tamper-resistant and permanently affixed to the tank. Any device that can be tampered with or removed, such that the toilet can be made to flush with greater than the maximum flush volumes noted above, is non-compliant.

The maximum volume of water that may be discharged by the toilet, when field adjustment of the tank trim is set at its

Continued on page 46

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HETs

Continued from page 44

maximum water use setting, shall not exceed the following amounts:

- For single flush fixtures: 1.68 gpf
- For dual flush fixtures: 1.40 gpf in reduced flush mode and 2.00 gpf in full flush mode

The maximum volume of water discharged, using both original equipment tank trim and using after market closure seals, shall be tested according to the protocol detailed on the WaterSense Web site.

Drainline carry

Since the introduction of the 1.6 gpf toilet in the early 1990s, questions have been raised about whether sufficient water exists to move solid wastes in building drainlines and in municipal sewer systems. To date, there has been no evidence to show that waste transport problems occur because of the use of the original low-flow toilets.

The introduction of high efficiency toilets in the late 1990s precipitated the same concerns. As a result, a collaboration of water utilities sponsored a full laboratory study to address the issue. The drainline study, completed in 2004, concluded that HETs flushing with as little as one gallon provide sufficient water in residential and commercial applications to move the waste from the fixtures to the sewer.

With regard to municipal sewer lines, the transport of waste has not proven to be an issue of concern in those areas with a concentration of HETs. Supplementary wastewater flows from other end uses are always sufficient to move solids

through the system. Furthermore, some wastewater utilities are co-funding and sponsoring the toilet replacement programs and other water efficiency initiatives of the water utilities for the very purpose of reducing sewer flows to their treatment plants.¹

Conclusion

Many toilet fixture performance tests exist, including proprietary tests by the fixture manufacturers, tests by *Consumer Reports* magazine and the tests mandated by the plumbing codes for fixture certification. Few of these, however, use test media that closely resembles the real “demands” upon a toilet, i.e., that of removing human waste.¹

When choosing a high efficiency toilet, the plumbing engineer can choose a toilet based on performance, using the data provided by a third party testing company in the form of a MaP test score and the WaterSense label. Using independent third party testing based on measurable criteria makes the decision based an informed one. This is especially important when specifying low flow toilets, which were not well received when they were first introduced in this country, because they did not operate well.

References

1. www.epa.gov/watersense

Susan Ecker is a senior plumbing engineer with Rumsey Engineers Inc., in Oakland, Calif. She has extensive experience in designing plumbing systems for industrial and commercial market sectors. She holds a Bachelor of Science degree in Mechanical Engineering from Lehigh University. She can be reached at secker@rumseyengineers.com.

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Is there a difference between a grease interceptor and a grease separator?

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flow of waste water and resulting in a sanitary sewer overflow.

Yes, there is a difference between grease interceptors and grease separators!

So, engineers, contractors, wholesalers, plumbers, beware! When choosing a method of managing grease, insure that it really does what the manufacturer says it will do. Some technologies or "miracle cures" don't eliminate the problem, thus resulting in grease accumulations further down the sewer line.

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End of year PVF market analysis

By Gary J. Cartwright,
President, Piping & Equipment Inc.

This report is published as a service to the PVF Industry, indicating the direction of prices, lead times and market conditions reported by various domestic and import manufacturers as they believe the direction the market is heading each quarter.

Market Condition & Activity Bulletin
October - November - December 2008

Stainless steel pipe

Pricing: Manufacturers predict price decreases in the range of 5% - 10% due to falling surcharges, weaker demand, very low import prices flooding the U.S. market as business drops in other parts of the world and raw material costs.

Lead Times: Forecast lead times are 4 - 8 weeks with fill rates of 50% - 70% for commodity stainless pipe. Non-stock specials are forecast for 8 -20 week deliveries. Backlogs are down worldwide. Most service centers are not buying, and are aggressively de-stocking in the light of dropping prices according to manufacturers. Import lead times appear to have shortened considerably after coming back from the August holiday period.

Comments: One manufacturer states that pricing will not improve significantly until the larger global financial issues begin to be straightened out. Another manufacturer reports that the stainless market will struggle for the next four or five months. Energy-related projects will rebound in

the second quarter of 2009, making the 2009 year similar in overall volume to 2008. The weak economy and the government bail out of our banking system is the most troubling. Prices in the U.S. market are being dropped to ridiculous levels in some cases in an attempt to "buy" a backlog for the first quarter of 2009. One manufacturer state that the recent hurricanes have slowed business activity significantly at a time when orders were being placed at a comfortable pace prior to the storm's impact...now things seem very slow to come back.

Stainless steel weld fittings, 150 and hi-pressure fittings

Pricing: Manufacturers of stainless fittings indicate pricing to be down 3% to 5% due to demand and competition. One manufacturer indicates there will be no change in pressure fittings.

Lead Times: Fill rates for commodity fittings are running 60% - 70%. Lead times for commodity material not shipping from stock is 4 - 8 weeks. Non-stock specialty items depending on material grades can go out as far as 8 - 16 weeks. Large OD fittings are forecast for 16 - 20 weeks.

Comments Nickel pricing has dropped almost 30% since September 1, 2008. However, alloying ingredients like iron, molybdenum and chromium remain strong which have offset the net cost decrease for stainless steel PVF prices. A major manufacturer of stainless fittings comments that activity is still healthy; however, as compared to the 2nd and 3rd quarter of 2008, it may be down approximately 10%. We are hoping that after elections and year end, the activity is expected to pick up. There are still quite a few

jobs that need to be purchased. Our economy is affecting other countries, which has helped the slow down in the PVF market. However, things should recover and start showing signs of improvement within the next six months. Another manufacturer comments that due to economic conditions, this 4th quarter may become soft. Some manufacturers may drop prices just to get an order. The Houston and surrounding markets may save the quarter due to hurricane recovery.

Stainless steel flanges

Pricing: Manufacturers of stainless steel flanges forecast price decreases of 5% - 7% with reducing raw material costs. High nickel alloy and chrome alloy flanges may reduce 10% - 15%.

Lead Times: Lead times are forecast for 3 - 4 weeks with fill rates of 40% or more. Chrome is forecast for 6 - 8 weeks, and high nickel alloy is forecast for 12 - 16 weeks.

Comments Manufacturers indicate distributor purchasing for stainless is cautious for inventory due to the drop in nickel pricing. The most volatile issues facing manufacturers are nickel pricing, volatile foreign exchange rates, high energy and gas prices, and unapproved import pricing.

Carbon steel pipe — seamless, ERW and continuous weld

Pricing: Seamless • Welded — Pricing for carbon steel seamless pipe is forecast to increase 5% - 7% due to raw material costs, supply, capacity, demand, and labor following a new labor agreement at U. S. Steel. Carbon steel weld pipe is forecast for a decrease of 10% or more.

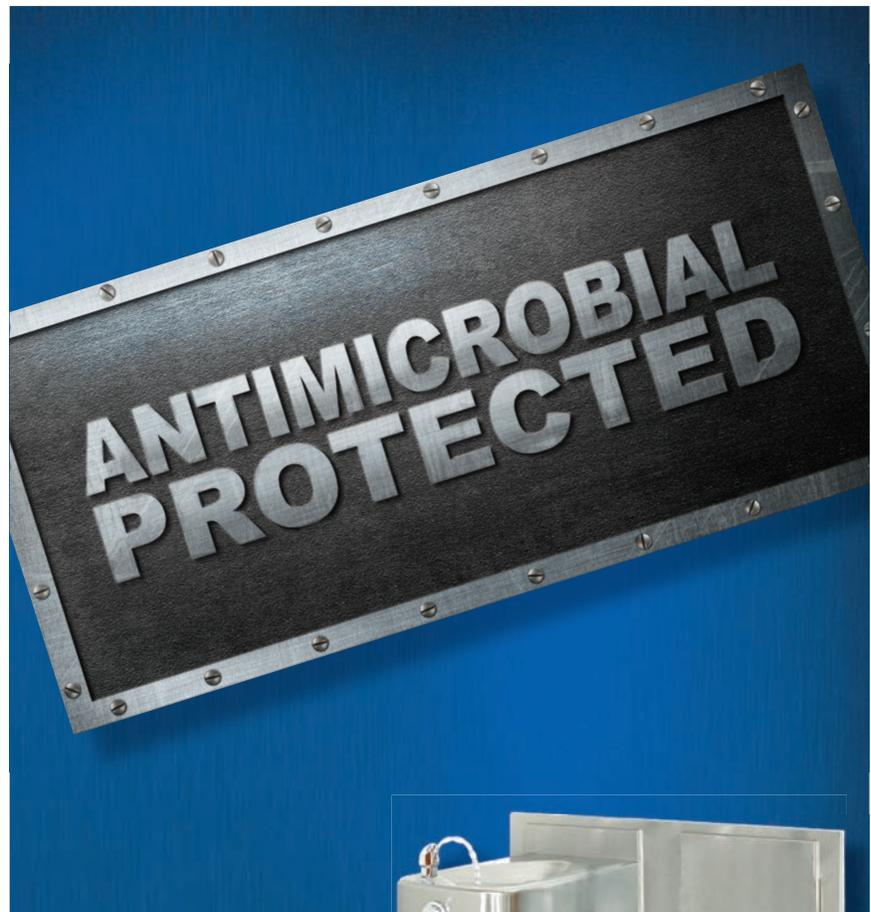
Lead Times: Fill rates for carbon steel is running 60 - 70%. Commodity material is shipping in 6 - 8 weeks for welded pipe and 3 - 4 months for seamless pipe.

Comments Early indications are for a soft welded pipe market thru the 4th quarter. Dumping suits are pending for ERW from China and Korea. U.S. Steel Tubular announced a \$200 per ton increase for all seamless and line pipe products effective for shipment in October 2008 or later. According to their letter, orders that were already placed will also be

increased \$200 as well as all new orders. United States Steel (Pittsburgh) and ArcelorMittal (Chicago) reached separate agreements on new four-year labor contracts with the United Steelworkers. U.S. Steel reached their agreement in early August that covers 16,000 workers employed at Granite City, Ill.;

Gary, East Chicago and Portage, Ind.; Ecorse, Mich.; Braddock, Clairton, West Mifflin and Fairless Hills, Pa.; Fairfield, Ala.; Lorain, Ohio; Keewatin and Mt. Iron, Minn.; and Lone Star, Texas. This contract is the new standard in the industry. A second four-year agreement was reached with

Continued on page 52

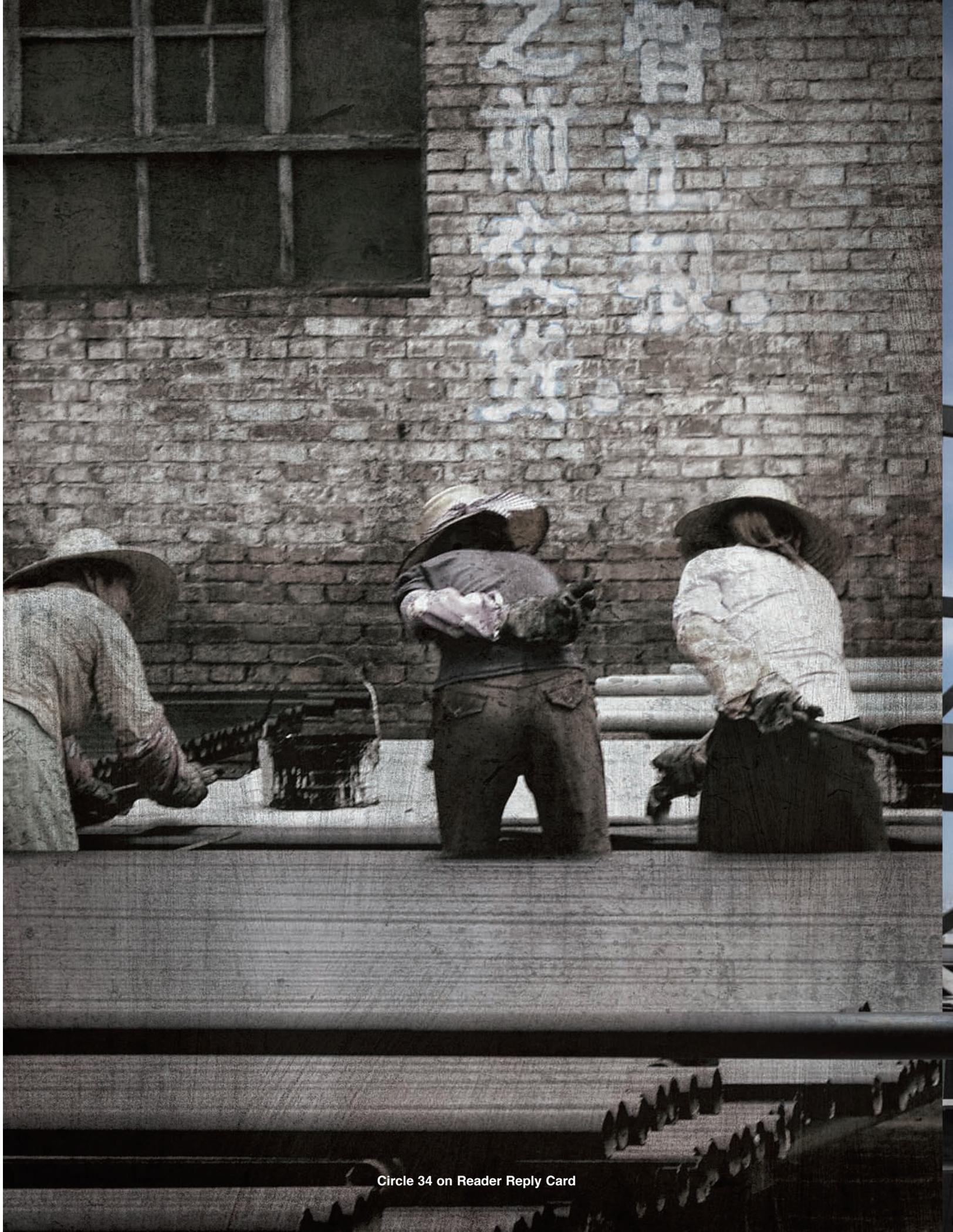


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900 USW employees at the company's tubular products Texas Operations division. ArcelorMittal and the United Steelworkers reach their agreement two days after the union membership authorized its bargaining team to call for a strike. The four year contract covers 14,000 steel workers at 14 U.S. plants. The deal was struck without any disruption to business operations.

Carbon steel weld fittings and flanges

Pricing: Fittings • Flanges — Manufacturers indicate price reductions of 3% - 5% on flanges to match competition; however, butt welding fittings are expected to remain stable thru the end of the year.

Lead Times: Lead times for commodity material is 3 - 4 weeks with fill rates of 80% - 90%. Non-stock specials are forecast for delivery in 6 - 8 weeks.

Comments The price of A106B seamless pipe and lack of availability is pressuring scheduling in production to meet demand; however, most manufacturers are still meeting the 3 - 4 week lead time. There are no indications in the industry for pursuing anti-dumping litigation for carbon steel welding fittings or forged steel flanges. Pricing for steel scrap has softened somewhat. The weakening of the U.S. dollar, higher energy costs, strong offshore demand, higher costs and longer lead times for offshore materials and strong demands in the energy sector are placing stronger demands on domestic production. Tenaris, a Luxembourg manufacturer of tubular goods and related products, has announced plans to build a plant in Mexico. The 450,000 tonnes capacity facility will produce up to 7-inch diameter piping for the oil and gas markets.

Forged steel fittings

Pricing: Pricing from manufacturers is forecast to remain stable this quarter for forged steel fittings following the price increase announced on 8/25/2008.

Lead Times: Fill rates of 95% with deliveries forecast for 1 - 3 weeks for commodity forged steel material not in stock. Specials are forecast for 3 - 4 weeks.

Comments Manufacturers comment that the weak dollar continues to prevent European competition. The former demand of AML approved material has moved to domestic. The scrap prices have reduced to March levels, thus decreasing special bar quality steel used to manufacture forged steel and branch connections. This reduction will alleviate discussion regarding additional forged steel / branch connection increases in the near future.

Stainless steel gates, globes and check valves

Pricing: Pricing for stainless steel gate, globe and check valves is expected to remain the same thru the end of the 4th quarter.

Lead Times: Deliveries for commodity items is forecast for 6 - 12 weeks with fill rates improving to 60% - 70%. Non-stock specials are forecast for 16 -20 weeks or more.

Comments The demand for stainless steel valves is strong. Pricing is currently stable with raw materials for stainless valves.

Bronze and iron gates, globes and check valves

Pricing: No change is forecast for bronze or iron valves through the end of 2008.

Lead Times: Deliveries are running 4 - 8 weeks for iron valves and 3 - 4 weeks for bronze valves. Fill rates remain around 80% for both bronze and iron valves. Non-stock specials are forecast for 12 -16 weeks for iron valves and 6 - 12 weeks for bronze valves.

Comments Bronze valve pricing is stable currently. Price declines are predicted for copper in 2009. However, copper and brass scrap remains in strong demand, but supplies are limited not only by low operating rates at brass mills but also the absence of building demolitions as a scrap source.

Cast steel gates, globes and check valves

Pricing: Manufacturers of cast steel valves are not forecasting any changes in the fourth quarter.

Lead Times: Fill rates are 60% - 70% for commodity cast steel valves with deliveries forecast for 6 -8 weeks on commodity cast steel with specialty cast steel valves running 16 - 20 weeks or more.

Comments The costs of molybdenum are expected to increase in 2009 driving up the pricing on chrome alloy valves.

Forged steel gates, globes and check valves

Pricing: No price change is forecast for forged steel valves during the fourth quarter of 2008.

Lead Times: Standard commodity forged steel valves are shipping in 6 - 12 weeks. Fill rates are running 50% - 70%. Deliveries of special non-stock forged valves are forecast for 8 - 16 weeks or more.

Quarter turn valves — ball and wafer

Pricing: No changes are forecast in the quarter turn valve market during the last quarter 2008.

Lead Times: Fill rates are running 50% - 70% for commodity material with lead times of 6 - 8 weeks. Non-stock specials are forecast for 12 - 16 weeks or more depending on the material. One manufacturer notes that they are depending more on foundry sources for machined components.

Comments Manufacturers indicate that supplier backlogs remain high; however, they are concerned over the possibility of a global slowdown that might eventually reach the Energy and Hydrocarbon processing markets. Customers in the "Tar Sands" region of Canada have serious concerns with projects that may be cancelled or delayed because of limited financing from major banks. Market competition remains high from India, Korea, and the European Union for high-end metal seated valves. ■

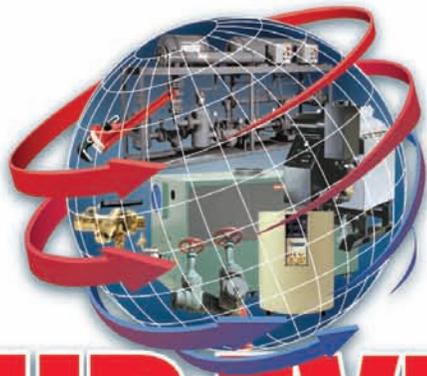


Gary J. Cartwright, president of Piping and Equipment, Inc., is a past president of the PVF Roundtable. Gary is also a member of the Board of Directors of Affiliated Distributors.

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Catching Raindrops

with Rainwater Catchment Systems

Recently, renewable energy such as solar has hit mainstream in the plumbing and hydronic heating industry. Its prominence has only heightened awareness of other such “green” building, and its resurgence has bolstered the dedication of environmentally conscious building practices. And, the United States Green Building Council’s Leadership in Energy and Environmental Design (LEED) programs encourage and accelerate global adoption of sustainable green building and development practices while facilitating fundamental sustainable design principles with its Green Building Rating System.

Harvesting the sky

One other such renewable resource method is the use of rainwater harvesting or catchment systems. The use of these systems just makes sense. Worldwide water consumption continues to rise at a 2-to-1 rate of population growth. “Since water is a finite resource, current and future plans must strive to maintain or improve available water quality while utilizing the available water resources as efficiently as possible. Rainwater harvesting systems serve as an alter-

native decentralized water source, especially in the age when groundwater supplies are depleting and municipal water infrastructures are facing high replacement costs,” reports the 2007 Virginia Rainwater Harvesting Manual, Cabell Brand Center. Due to the increasing demand for public water supplies, groundwater levels are declining and municipal treatment plants are struggling to supply current demands while dealing with declining infrastructures. Decentralized rainwater harvesting offers an often times overlooked alternative and sustainable water source, the report states.

Did you know?

The 2007-2008 NUS Consulting Group International Water Survey & Cost Comparison July 2008 reveals some interesting developments in the world’s water industry with 11 of the 14 countries surveyed showing an increase in pricing. Two countries revealed no increase over the last year with one country claiming a modest decrease in water cost. Germany claims top honors as the most expensive surveyed country in terms of water with the United States being the least expensive.

Continued on page 56

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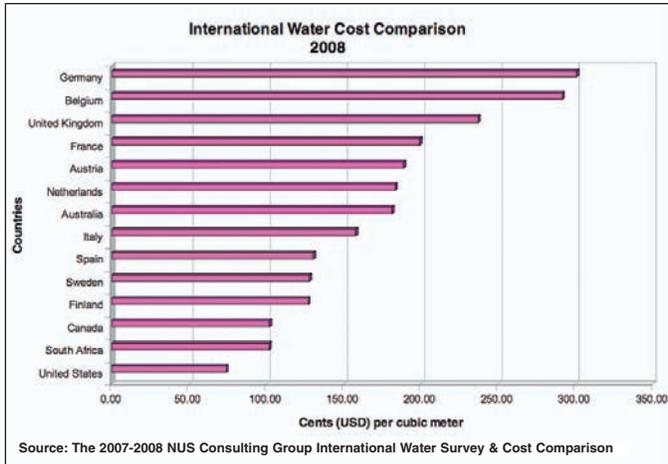
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Rainwater Harvesting

Continued from page 54



Australia experienced the largest year-on-year increase in pricing at 18.5 percent. Over the past two years, average water rates in Australia have grown by more than 35 percent. The United States reported an average water pricing increase of 7.2 percent over the past year.

Benefits in a barrel

A 1" rainfall event on a 1,000-square-foot surface provides 620 gallons of harvested water. In commercial or residential construction, a rainwater har-

vesting system can provide an economical alternative to municipal water sources. Rainwater Harvesting products have made it easy for most all types of buildings to have ready-to-use water. The concept of harvesting rainwater is simple; rainwater is collected from a rooftop and conveyed through the roof drains and piping and then sent through vortex fine mesh filters, to filter debris from the water. The filtered water is then sent to the storage tanks through a smoothing inlet where the heavy particles sink to the bottom and the light organic matter floats to the top.

There are many benefits of using rainwater systems:

- It is free; the only cost is collection and use.
- It lessens the demand on the municipal water supply.
- It saves money on utility bills.
- It diminishes flooding, erosion, and the flow to storm water drains.
 - It is good for irrigation and plants thrive because stores rainwater is free from pollutants as well as salts, minerals, and other natural and manmade contaminants.
 - It adds life to equipment dependent on water to operate, as rainwater does not produce corrosion or scale like hard water.
 - It helps you achieve LEED credit under Water Use Reduction, Water Efficient Landscaping, and Storm Water Management.

Historical building retrofit calls on siphonic roof drainage

A local ordinance in Pasadena, California required the exterior of a 100-year-old historical Disney building could not be changed, and that all of the drainage be piped into the city storm drainage system. Additionally, the job required a quick and viable roof drainage solution. It was the smart and quick thinking of associates at Clive Wilkinson Architects who contacted the local Jay R. Smith Mfg. Co. representative, Elmco/Duddy, for insight on using siphonic roof drains. Enrique Muñoz of Elmco/Duddy agreed to work with the architects in order to find a solution to their problem.

The siphonic roof drainage system from Jay R. Smith Mfg. Co. was selected and used because the overflow could be controlled to a specific point on the building. In the original design there were no overflows in place so the siphonic drains were the perfect solution to their problem. Muñoz showed the architect how the siphonic action of the roof drains allow the piping system to be run horizontal. This piping design enabled the overflows to be evacuated on the side of the building, which satisfied both the architect and the city of Pasadena.

Jay R. Smith Mfg. Co.'s siphonic roof drain by has the same features as a traditional roof drain including the drain body, flashing ring, dome strainer and fastening hardware. The difference is an air baffle, which prevents air from entering the piping system during peak flows. This technology provides full bore flow within engineered siphonic roof drain piping systems, making piping pitch unnecessary. Several drains can tie into a horizontal collector that is routed to a convenient point where it transition into a vertical stack. This stack, once it reaches the ground, is piped to a vented manhole where water is discharged into the storm system.

Benefits of using a Siphonic Roof Drainage System

- Smaller pipe diameters can be used reducing material cost.
- Level pipe installations allowing fewer vertical stacks, saving ground work and building costs.
 - Driving head is greater which further reduces pipe size and promotes self-cleaning.
 - Vertical stack and horizontal pipe locations are highly flexible.
 - Optimizes maximum use of open space without intrusion of drainage piping.
 - Can be used as a retrofit, which helps to achieve LEED credits for reuse of existing buildings.
 - One main rain leader conductor instead of multiple rain leader conductors
 - Sleeving and Coring – One main riser as opposed to four
 - Below slab piping – One 10" connection point as opposed to four smaller connection points



For more information on siphonic roof drains, visit www.jrsmith.com.



(left) A crane strategically places the cistern in the ground at this installation of a rainwater harvesting system at The Waters, Pike Road, Ala.

(bottom left) With the cistern already in the ground, an example of an installation of the rainwater harvesting filter and piping process.



Rainwater harvesting offers an affordable sensible and reliable alternative water source; and it protects the environment from detrimental non-point source pollution by reducing rooftop runoff.

Virginia LEED Certification Project

To exemplify the benefits and use of rainwater harvesting systems, the Claude Moore Educational Complex renovation job was the first building in Roanoke, Va. to be registered with the USGBC for LEED certification. The Henry Street building that once was the Lincoln Theater has green features that should reduce energy consumption by 35% - 40%. The job uses wood products free of formaldehyde and harvested from sustainable forests; siphonic roof drains that collect the rainwater for flushing toilets and irrigate the landscaping; solar panels to pre-heat the water for the kitchen needs.

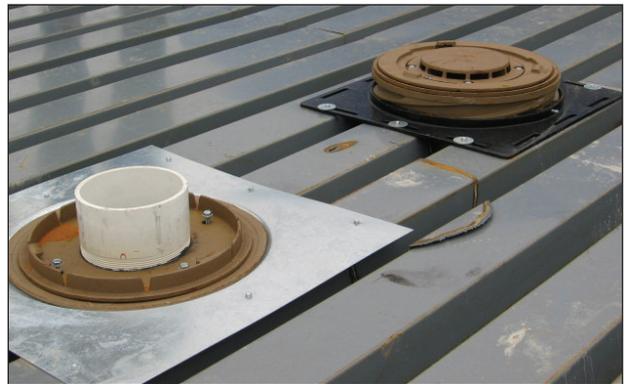
The city stormwater system will not be burdened by the runoff as part of the roof will be green roof (planted) and the discharge from the siphonic roof drains is captured in two 2,500-gallon tanks buried under a patio/paver area.

This facility will serve as a showcase culinary school as part of the Roanoke Culinary Arts Institute. One of the goals for the renovation was to save money on energy and water usage while maintaining a practical working environment. This particular project offered challenges that are typical of renovation projects. The existing building had to be used and due to construction bud-

gets only a small percentage of the roof and walls could be retrofitted with drains and piping. Furthermore, the Roanoke County had strict restrictions on the quantity and quality of storm water runoff from the site.

Rainwater Management Solutions, a consulting company and Jay R. Smith Mfg. Co. partner worked with Gregg Lewis of Smith Lewis Architects and the construction team to provide them with the right product and installation information for the job. Siphonic roof drains and rainwater harvesting products were selected and used in order to collect, convey and store the rainwater. Siphonic roof drains use smaller diameter pipe and piping is installed horizontally which drastically reduces the amount of space consumed by piping. The piping was routed to one point of the building to facilitate rainwater harvesting on the job as an additional benefit for cost and space savings. At the point of discharge, two vortex fine mesh filters were used to filter debris from the water. The filtered water is then sent to the storage tanks where the heavy particles sink to the bottom and the light organic matter floats to the top. Harvested water for use in the building is extracted from the cleanest part of the tank, just below the surface of the water using the floating filters and a pump. Overflow devices are installed for overflow situations. In this particular project the harvested rainwater was used as supply water for flushing the toilets and urinals.

The architect achieved his goals for this installation to reduce potable water demand and to reduce the storm water runoff from the site. Other usages



An overflow standpipe drain is used with a siphonic roof drain. A rainwater harvesting system, similar to this one, can help earn LEED building certification.

such as dishwashers, laundries, irrigation, and HVAC cooling towers can also be accomplished by using rainwater harvesting products.

The Roanoke Culinary Arts Institute (part of Virginia Western Community College) has been pleased with the steps taken to lessen their water usage, preserve the integrity of the building and meet the city of Roanoke requirements. Additionally, the job is a showcase example of green and sustainable building practices.

For more information, contact your local representative, visit www.jrsmith.com. ■

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Circle 36 on Reader Reply Card

Fuel Gas

Fuel gas odor fade – a matter of life and death

By Paul R. Bladdick, FASSE, MP

Fuel gas odor fade is a serious yet relatively unknown phenomenon, because it does not get much press coverage. I have been a master plumber, licensed in the state of Michigan for more than thirty years, and, in recent years, I have been engaged to consult on several natural gas explosions in various states around the country. One common comment in many of these fuel gas explosion cases was, "I (we) didn't smell any gas."

Most of us have used either natural gas or propane as fuel, and we know that both smell like rotten eggs. In their natural state, however, both natural gas and propane can be colorless, tasteless and odorless. Fuel gas is often delivered through a high-pressure transmission pipe to your local gas utility company without any odorant; there they meter it, reduce the pressure and distribute it in their distribution system. The gas company also adds an odorant called ethyl mercaptan (odor) to the gas before distributing it.

Because fuel gases can be odorless, and because they are flammable, federal regulations require that an odorant be added to them to warn of leaks in the piping system. The type, amount and frequency of odorant are pretty much left up to the local gas company.

Ethyl mercaptan, the odorant most commonly used for this purpose, has the distinctive smell of rotten eggs. Ethyl mercaptan is chemically stable when mixed with natural gas or propane, and it has many of the same physical characteristics as propane. One can be reasonably assured that, if ethyl mercaptan's distinctive rotten egg odor is detected, fuel gas vapors may also be present.

In new piping installations, gas-piping materials, especially black iron pipe, have the propensity to absorb the odorant into the pipe walls. The porosity of the pipe, as well as the joining methods used, are two major contributors to this process. Oxidation is another underlying cause, along with cutting oil, rust, water, dirt or any other foreign substances inside the piping system.

Until the piping system has absorbed enough of the odorant to satisfy its hunger and, essentially, to coat the inside walls of the pipe, the absorption process will continue, and the odor fade will continue. The larger the system, the longer it takes to "pickle" or coat the pipe walls with the odorant.

If you open a gas valve and hear the flow of gas and do not smell gas in a few seconds, do not assume that there is no gas. **STOP!** Call the gas company or use a gas detector, get a canary, anything, but don't light a match or flip a light switch, because either could lead to an explosion and fire. It only takes a very small percentage of gas in the volume of the room to reach the lower explosion limit (LEL).

The phenomenon of fuel gas odor fade is not a new thing. Gas companies have been aware of it for many years. They are required by law to do periodic testing of the

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The Fixture Unit

A historical perspective

By Dan Cole



Fixture unit is a plumbing term coined by Dr. Roy B. Hunter in the early 1920s¹ to ascribe a relative value to the discharge rate of various plumbing fixtures. For example, the least discharge rate was that of a lavatory sink and the greatest was that of a toilet. Through experimentation, it was discovered that the lavatory sink discharged at an average rate of 7.5 gallons per minute (gpm), and the toilet discharged at an average rate of 45 gpm: the lavatory sink had a discharge rate $\frac{1}{6}$ of the rate of a toilet. Relative to the toilet, the sink was assigned one fixture unit; the toilet was assigned six. All other plumbing fixtures fell between one and six fixture units. (BH13, 48 and 91)

The unique feature of the fixture unit was the application of the principles of probability. Mathematically incorporating time factors and intervals of the frequency of concurrence and overlapping discharges, the drainage system could be reduced according to the *probable* simultaneous discharge of various plumbing fixtures, rather than sizing the drainage for the total number of fixture units and gpm. (BH13, 91 - 98)

The fixture unit was further developed between 1937 and 1940 to ascribe a value for a certain number of plumbing fixtures relative to demand in gpm for the water supply. Once again, the utilization of probability produced a graphic curve (See Figure 1.) which determined that only a certain number out of the total number of plumbing fixtures would operate simultaneously. Therefore, the water supply could be reduced according to the probable demand rather than to the total demand of all fixtures. (BMS65)

Rather than explore the ingenious scientific investigation and mathematical formulae of probabilities in the fixture unit provided by Dr. Hunter, we will explore the historical occasion that influenced such genius. Biographical information about Dr. Hunter leads us to the National Bureau of Standards, where he was employed as a physicist from 1921 through 1943. We will visit the historical time in which he lived as provided from general history and, more particularly, from the history of the National Bureau of Standards and from written histories on plumbing in America. Knowing this historical occasion will pro-

vide an interpretive framework for the more detailed analysis

of his work and use of the fixture unit. This is of major importance, since all model codes nationally and internationally, including the World Plumbing Council and the World Health Organization, still utilize the fixture unit concept to determine pipe sizing of a plumbing system.

Roy Hunter was born in 1877 and grew up during a time of great prosperity. Theodore Roosevelt ushered in the 20th century as the 26th president. America swelled in gold production in its economy, as well as in its national reserve.

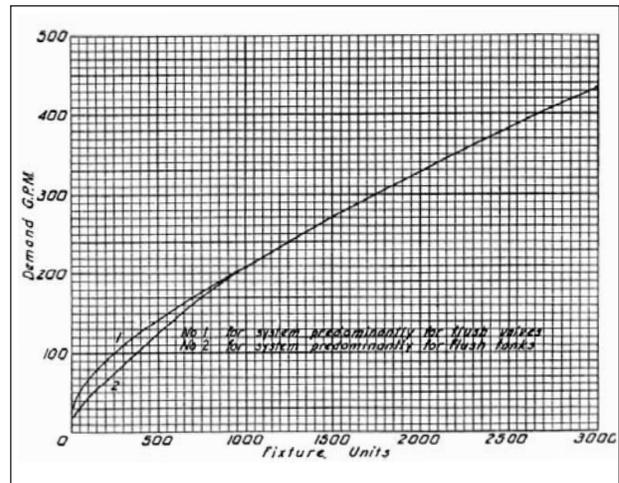


Figure 1: Illustrates No. 1 for system predominantly for flush valves; No. 2 for system predominantly for flush tanks.

The largest business of this time was the U.S. Steel Corporation, and the greatest export demand was for agricultural goods. Skyscrapers rose in Chicago and New York.

As a child of the Industrial Revolution, Roy Hunter saw the advent of the railroad and steam engine. He would have heard about Wilbur and Orville Wright's demonstration of the first airplane at Kitty Hawk in 1903. Henry

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The Fixture Unit

Continued from page 59

Ford was a prominent figure of his time, promoting the Model T as affordable for common use, due to the genius of the assembly line. The internal combustion gasoline engine drove the automobile, flew the airplane and propelled the submarine.

Hunter's world was rapidly changing as electricity and gas mains came into use in the expanding towns (George, 2001). Wireless signals were transmitted across the Atlantic. Chemists discovered fertilizers, and explosives were produced from coal tar. The radio became the new media and moving pictures the new entertainment.

The marvelous wonder of physics in the early 1900s was the discovery of radioactivity and the development of nuclear physics. This caused an evolution of international physicists from France's Antoine Henri Becquerel, Pierre and Marie Curie, England's J.J. Thomson and Lord Rutherford, Germany's Max Planck and the Netherlands' Niels Bohr. Albert Einstein also emerged with his revolutionary four-dimensional world and space-time continuum (Palmer and Colton, 629).

This marvel of physics must have greatly influenced Roy Hunter. After concluding his B.A. at Yale in 1908, he taught mathematics and physics at Davis & Elkins College for three years. He then returned to Yale and completed a Master's degree in physics in 1912. Within the same year, he began a doctorate in physics (Sc.D.) at New York University while being employed as assistant in physics. After a short stint in the military during World War I, he was introduced at the National Bureau of Standards as "...then associate physicist of the Bureau of Standards [1921], now physicist in that bureau [1928], to whom was delegated the task of conducting the experimental work." (BH13, 3) His particular task in history was not to further develop nuclear physics or electricity². Now known as Dr. Hunter, the task before him was to apply his knowledge of physics to plumbing³. For the first time, owing to the scientific movement of the Industrial Revolution, plumbing entered not only the world of science but also into the highest order of science and mathematics of the time — physics⁴.

In 1901 the Office of Construction of Weights and Measurements was re-formed as the National Bureau of Standards and moved to the Department of Commerce in 1903/04. Its function was the custody of standards, especially "the determining of physical constants, and the properties of materials ... of great importance to scientific or manufacturing interests."⁵ The Bureau was to carry out research in engineering, physical science and mathematics and to compile and publish its scientific and technical data.

Until the formation of the National Bureau of Standards, the United States was without a modern national standards laboratory⁶. The laboratory represented commitment to the advancement of science and the Industrial Age. It became the established facility for the scientist's empirical investigation for the collection of data. In 1921, it was in the laboratory that Dr. Hunter commenced a series of experiments and tests to gather physical data of various aspects of the plumbing system. (BMS65, 1) With respect to the fixture unit, he designed an ingenious apparatus that would graph the amount of flow to a rate of time in seconds.

By means of this apparatus, a rate of flow in gallons per

minute could be accurately determined for the toilet, laundry tub, bathtub, kitchen sink and lavatory⁷ (the commonplace fixtures in residences in the 1900s). Once the empirical data of flow rates were tabulated, the theory of mathematical probability was employed to determine the coincidence of overlapping discharge. (BH13, 91- 98) This, in turn, decided the estimated peak loads instrumental in reducing the sizing of vertical stacks and horizontal drains. (BH13, 191-198)

Not only were Dr. Hunter's laboratory investigations advancing the science of plumbing in an industrial age but they also addressed a very pressing economic social need in America. Following the signing of the Versailles Treaty in 1919, marking the end of World War I, soldiers returning home increased the demand for housing. Builders faced the challenge of providing for housing in limited urban land space. The solution was to construct small apartment dwellings and to introduce the bungalow style house. As a result, the bathroom was downsized and limited to one per dwelling, including apartments⁸.

In spite of the booming construction industry, not all was well economically in the 1920s. The industrial and urban expansion was, for the most part, financed by credit. The working class income was less than a fair wage and lagged behind corporate profits and dividends. As industrialism increased, agriculture fell into depression. (Palmer and Colton, 800)

The National Bureau of Standards had its eye on this economic condition in the construction industry when it recommended minimum requirements for plumbing. In the following decade, the expectation was "to replace old buildings, to make up for the lack of building during the war and to provide for the increasing population." (BH13, 224). The intent was to reduce "costs to the industry and savings to the consumer." (BH13, xvi)⁹ Investigations by the Senate Committee discovered that "great economic loss resulted from lack of uniformity and justice in such regulations." (BH13, 1)

In 1923, Herbert Hoover, then Secretary of Commerce, commended the report submitted by the Subcommittee on Plumbing for answering the economic need and for providing a scientific basis for regulations. (BH13, xvi) It is this subcommittee that specially commended Dr. Roy B. Hunter for the genius he displayed in his laboratory investigations. (BH13, 4)

The *fixture unit*, born out of the laboratory investigation, was recognized as the scientific and economic standard of measure for pipe sizing in a plumbing system in answer to the social needs of the time. Yet more development was needed in the following years.

In 1929, six years after the completion of the *Recommended Minimum Requirements for Plumbing in Dwellings and Similar Buildings* (BH, 2) was submitted to Herbert Hoover¹⁰, the stock market crashed. Between 1929 and 1933, more than 30 million people were unemployed. The dollar was devalued 50 to 60 cents, and World War I allies soon defaulted on their debt payments to the United States. The national income fell by more than half from what it had been in 1929. (Palmer and Colton, 802 - 04)

During these years of the Great Depression, Roy Hunter

was active in the development of the “Hunter Machine” that was utilized to measure frictional coefficients of walkway materials (published in RP204).

He was also involved in experiments regarding cross connections in plumbing systems (RP1086). His research on plumbing systems resumed in 1937, with special emphasis on “plumbing for low-cost housing...” (BMS65, 1) Two of the research projects ran concurrently with the preparation of the Plumbing Manual that was released in November 1940. (BMS79, 2)¹¹ Both publications dealt with the factors of load and capacity¹² that determine pipe sizing: Summaries are found in the *Plumbing Manual*.

Although the *Plumbing Manual* was a consensus effort

of the Subcommittee on Plumbing¹³, it is easy to see the fruit of Dr. Hunter’s labor woven throughout. The fixture unit as a factor of the load-producing values of plumbing fixtures (BMS66, 7) is the consensus standard by which to size a plumbing system.

Most likely, it was the New Deal programs under the Roosevelt administration that stimulated Hunter’s continuing research into plumbing for low-cost housing. These programs assisted the farmer and small house owners, as well as industry. The Keynesian philosophy of deficit government spending gave the American people financial assis-

Continued on page 62

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Lide. “The National Institute of Standards and Technology (NIST) Celebrates its Centennial,” <i>Chemistry International 2001</i>, Vol. 23, No. 3: 65 - 68 Palmer, R.R. and Joel Colton. <i>A History of the Modern World, 7th ed.</i> New York: McGraw-Hill, 1992 thelumber.com. “History of Plumbing in America.” July 1987, April 2008: www.thelumber.com/usa.html <p>1 In Report BMS65, dated 1940, Dr. Hunter refers the reader to the publication <i>Recommended Minimum Requirements for Plumbing</i> (a revision of the 1923 document) for the original concept of fixture unit and further states, “... the term <i>fixture unit</i> ... has become fairly well established by usage during the past 15 years ...” (BMS65, 13).</p> <p>2 One of the first responsibilities of the newly formed National Bureau of Standards was “to address the growing use of electricity.” National Bureau of Standards</p> <p>3 “Especial commendation should be given to Dr. R. B. Hunter for his ingenious and accurate physical investigations of the hydraulics and pneumatics of drainage systems under various conditions of use.” (BH13, 4).</p> <p>4 “One of the chief reasons for appointing the committee on plumbing was the manifest need of a carefully planned investigation of the scientific principles of plumbing systems. In spite of many experimental investigations which have been made in England, Germany and the United States, some of the latter being of recent date, there is a widespread feeling that the subject is still imperfectly understood and that some of the present-day plumbing regulations are without adequate scientific foundation.” (BH13, 47). With the application of mathematic probability, it was recognized that “... even in such a commonplace subject as plumbing, the so-called higher mathematics may be used to</p>	<p>show what capacities are necessary and sufficient.” (BH13, 50).</p> <p>5 Six functions were delineated and enacted into law: “The functions of the bureau shall consist in the custody of the standards; the comparison of the standards used in scientific investigations, engineering, manufacturing, commerce and educational institutions with the standards adopted or recognized by the Government; the construction when necessary of standards, their multiples and subdivisions; the testing and calibration of standard-measuring apparatus; the solution of problems which arise in connection with standards; the determining of constants, and the properties of materials when such data are of great importance to the scientific or manufacturing interests and are not to be obtained of sufficient accuracy elsewhere.” (Measures for Progress, 43)</p> <p>6 “By the end of the 19th century, several countries had established prominent national standards laboratories, among them the Physikalisch-Technische Reichsanstalt (Germany, 1887) and the National Physical Laboratory (Great Britain, 1899). Surprisingly, at the turn of the last century, the United States was the only great commercial nation without a significant standards laboratory.” (Goldberg and Lide, 65)</p> <p>7 Respectively from the largest discharge to the least, the fixture units relatively assigned are 6, 3, 2, 1½, and 1. (BH13, 91)</p> <p>8 “Many new tenements were erected in large industrial cities to house the swelling populations ... water closets were provided in toilet compartments accessible from the public hallways on each floor. In many cases, more than one family used the toilet facilities ... new regulations ... require[d] water closets to be installed in toilet rooms or bathrooms in each dwelling unit.” (George, History of Plumbing, Part 3, 52).</p> <p>9 “On the whole, the adoption of the committee’s recommendation should save the people who build dwelling houses very large sums of money, the figures probably amounting to several million dollars per annum.” (BH13 224)</p> <p>10 “Because of Hoover’s efforts with The National Bureau of Standards, when the first plumbing code was developed ... it was nicknamed the Hoover Code.” (George, “History of Plumbing”, Part 4, 49)</p> <p>11 The introductions of both publications lay stress on low-cost housing, which most likely owes to the aftermath of the Depression and New Deal programs between 1933 and 1936. The <i>Plumbing Manual</i> states, “Particular emphasis is placed upon its usefulness in connection with low-cost housing, where there is special need to take advantage of all legitimate economies.” (p.5)</p> <p>12 BMS65 deals with load and capacity as it relates to probability. In this report, Dr. Hunter expounds the concept of probability step-by-step. BMS79 deals with load and capacity as it relates to friction loss and degrees of roughness in pipes. Here he details the formulae that went into producing the nomographs of friction loss.</p> <p>13 Roy B. Hunter sat as the technical advisor to the Subcommittee of Plumbing in the preparation of the <i>Plumbing Manual</i>.(BMS66, 1)</p> <p>14 “... from 1929 to 1954, sales by distributors of plumbing products and heating equipment rose from \$498 million to \$2.33 billion ...” (<i>Plumbing in America</i>)</p> <p>15 <i>Uniform Plumbing Code, 2006 ed.</i> (pp. 112-121, esp. Table 7-4 and Appendix A: 279 - 94.); <i>International Plumbing Code, 2006 ed.</i> (Appendix E); <i>National Standard Plumbing Code, 2006 ed.</i> (Table 10.14.2B).</p> <p>16 An acronym for Leadership in Energy and Environmental Design. See www.usbc.org/about for more information.</p> <p>17 A Draft Report on the revision of Hunter’s Curve has been submitted by the author to a technical task group formed by IAPMO for evaluation. Copies are available upon request.</p>
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The Fixture Unit

Continued from page 61

tance where they needed it the most, for jobs and homes. The federal government financed the construction of housing by providing loans to the states to stimulate slum clearance and the construction of low-cost housing (Palmer and Colton, 808 - 09). These measures actually provided for phenomenal growth in the sales of plumbing products¹⁴.

It is at least fascinating, if not providential, to see how the seasons of history provide for the fertile growth of ideas and ingenuity. The fixture unit is no exception. It was an idea planted in a time of prosperity and of scientific industrial revolution. It was an idea that matured in answer to the social need of economizing housing for an expanding population. It was a proven idea applied during the New Deal era in answer to the Depression, for reducing costs by reducing the sizing of plumbing systems. As a result, the fixture unit became the consensus standard in the *Plumbing Manual* in 1940.

Since 1940, all model plumbing codes¹⁵ have retained Dr. Hunter's fixture unit concept. As Dr. Hunter did, we too are stepping into a new era for plumbing that calls for further reductions in the plumbing system. The United Nations has declared 2005 - 2015 the International Decade for Action, "Water for Life," (Health Aspects of Plumbing, vii) calling for global action to both conserve and preserve safe potable water. LEED¹⁶ requirements include reducing water consumption, and plumbing manufacturers are answering with low-consumption fixtures. Water reduc-

tion reciprocates in drainage reduction, resulting in the reduction of pipe sizing requirements.

Regarding these reductions, it has been asserted that "it is safe to reduce the values obtained by use of Hunter's curve by 40%" (Steele, Engineered Plumbing Design II). Perhaps. If history is once again providing a fertile season of ingenuity, then a return to the laboratory may be needed to rate the flow of new low-consumption plumbing fixtures, along with a new evaluation of the probability data¹⁷ used to plot the curves. In any event, the reduction of Hunter's curve should be sustained by empirical and mathematical data joined by standard consensus.

The fixture unit has provided the most empirical and economical method to estimate the demand for a safe and cost-effective plumbing system through the years. The future generation awaits the same inspiration to meet the pressing need of the day. ■

Daniel P. Cole is a plumbing inspector and plumbing plans examiner in Lake Zurich, Illinois. He is a licensed journeyman plumber in the state of Illinois and holds ICC certifications for plumbing and residential building inspector. He is a member of the Illinois Plumbing Inspector's Association and the International Code Council.



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Circle 35 on Reader Reply Card



What are Grease Interceptors?

By Michael Whiteside

Grease interceptors, also known as “hydro-mechanical grease interceptors” in the new editions of the Uniform Plumbing Code (UPC) and International Plumbing Code (IPC), are required in all kitchens and areas that discharge grease-laden water into the sanitary sewer system. Their purpose is to “intercept” or “trap” FOG (fat, oil and grease) within the device for removal through a regular maintenance program. Because of the cost to remove grease from their water treatment plants, many water authorities across the country impose fines and penalties on restaurant owners that fail to clean and maintain their grease interceptors.

There are many different kinds and styles of grease interceptors. The traditional design looks like a rectangular box with an inlet and outlet at the same level from the bottom, an accessible lid, interior baffles and an external, vented flow control fitting. Most are made from fabricated steel. Interceptors made from plastic, stainless steel and cast iron are also available.

In the 1940s, the Plumbing and Drainage Institute (PDI) was the first authority to write a grease interceptor standard — PDI-G101. This standard is still in wide use today and is the root standard used by many cities and plumbing codes throughout the country. One of the key features of PDI-G101 is the requirement of a vented flow control fitting. This is typically a cast iron device that has an inlet and outlet and a vent connection at the top. It should be installed in the piping between the fixture(s) discharging into the grease interceptor and the inlet connection of the interceptor and have the vent connection terminate above the water level within the sink.

The purpose of the flow control fitting is to allow vented air to enter the grease interceptor via the plumbing line. Once the air enters the interceptor, it will naturally rise to the surface, carrying particles of FOG to the surface. The other purpose of the flow control fitting is to slow down the flow of water entering the grease interceptor so that there is enough retention time within the interceptor for the separation of FOG from water process to occur. All PDI-approved grease interceptors must be

tested and certified by a third-party testing laboratory to ensure that they meet the PDI performance standards. The key performance measurements are that 90% of the FOG that enters the interceptor be retained within the interceptor and that the grease retention capacity of the interceptor must be double the rated flow rate in gallons per minute (gpm).

Grease interceptors are sized by calculating 75% of the cubic volume of water discharging into the device from the fixtures. For example, a three bay sink with dimensions of 20" × 20" × 18" × 3 sink bays = 7,200 cubic inches of potential water volume, divided by 231 = 31.17 gallons of total water holding capacity of the fixtures × 75%, to allow for displacement of pots, pans and dishes in the sink = 23.38 or a 25 gpm grease interceptor.

Regular maintenance of grease interceptors is critical to their long-term performance. Unfortunately, most restaurant owners do not even know what the purpose of their grease interceptor is. Therefore, within a relatively short period of time (sometimes within two weeks), especially for devices that are located in “greasy spoon” restaurants, interceptors will be filled to capacity with FOGs. This often results in the FOGs passing through the grease interceptor into the sanitary sewer system, followed, in many areas, by monetary fines from the water authorities.

The lids of grease interceptors should be removed weekly to determine how much grease has accumulated; then they should be cleaned. Once it is determined how long it takes for the grease interceptor to accumulate a large amount of grease, a regular cleaning schedule can be set. This schedule must be adhered to in order to maintain the long term performance of the grease interceptor. To clean a grease interceptor, remove the lid, remove the baffles inside the device and then remove the accumulated grease floating on the surface with a ladle or bucket. Some areas have rendering companies that will pick up the accumulated grease for recycling.

Solids interceptors are a good product to install

Continued on page 64

upstream of all grease interceptors. Their purpose is to “intercept” small



The MI-G grease interceptor, for example, is instrumental in keeping grease out of our sanitary sewers, and providing a source of waste for recycling.

particles of food, rice, scraps, etc., before they enter the grease interceptor. Often, it is the rotting of food particles inside the grease interceptors that result in the foul odors that

many associate with them. Solids interceptors also need regular maintenance to ensure that they do not get clogged and pass their waste into the grease interceptor.

In summary, grease interceptors can perform a valuable function—they keep grease out of our sanitary sewers, and prove a source of waste for recycling. It is important to choose the correct size grease interceptor, to install it with the vented flow control fitting and to clean it regularly. ■

Michael Whiteside is the president of MIFAB Inc., a manufacturer of grease, oil, solids and custom interceptors, fixture carriers, floor, roof, area and trench drains, cleanouts, backwater valves, floor sinks, wall hydrants, trap seal primers, access doors, pressure reducing valves, no hub couplings and stainless steel specialty products.

odorant levels in the distribution piping and to adjust the amount of additive as needed.

Most gas companies reference the issue in their safety manuals and hold instructional meetings for their employees. Surprisingly enough, I find that, although they should have been informed of this by their employers, many gas company employees claim no knowledge of the phenomenon.

That is only one side of the coin. On the other side are the installer and the user; they are by far the ones at the most risk, and they are the least informed about the dangers associated with the issue of odor fade. As I travel the country attending trade association meetings or speaking at different events, I never fail to mention this phenomenon and regularly receive that “deer in the headlights” look. When I ask trade instructors and inspectors what they know about it, I get the same reaction most of the time.

I talked to a forensic engineer that has investigated several fuel gas explosions involving injuries and deaths; he said that injured parties commented that they did not smell the gas. It is frightening to me that no one I have spoken with besides the gas utility companies addresses the odor fade issue with their apprentices or students or informs the utility’s customers or public of the problem. Gas companies know about it; installers and users don’t seem to know about it.

If anything that I have mentioned about fuel gas odor fade interests you or scares you, take some time to go to the Internet and look up “odor fade” or “odorant fade” or “odorant loss.” There is a lot of information about this issue.

This message, I hope, will reach out to our entire industry, not only to plumbers and pipe fitters but also to general contractors, plumbing designers, plumbing and mechanical inspectors, fire marshals and the end user, the general public.

If you have any questions or concerns about this issue, you may contact me at Bladdick@comcast.net. I would be glad to hear from you. ■

Paul R. Bladdick, FASSE, MP is a Licensed Master Plumber for LPB Company, Mich.

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Circle 37 on Reader Reply Card

Product News



EasyInstall widespread faucet

EasyInstall Concealed Widespread faucet for the foodservice and plumbing industries features a brand new concealed body, which will provide cost savings and simplified one person installation. The EasyInstall saves up to 50% on labor cost and installation time, and comes with pre-assembled components. Additionally, the faucet eliminates connections under the mounting surface, prevents side bodies from rotating and becoming unaligned, and eliminates three potential leak points. Widespread only affects the standard 8" concealed product line. **T&S Brass and Bronze Works.**

Circle 100 on Reader Reply Card



Home Guard Max

Home Guard Max is a high capacity, high efficiency water powered back-up system. With no electricity or batteries required, the Home Guard Max takes over seamlessly when your primary sump system fails. The Home Guard Max comes fully assembled for fast, easy and trouble-free installations and its small footprint allows for installation in even the smallest sump pits. With superior performance and discharge capacity, it uses less water and costs less to operate. You will sleep well tonight knowing you are protected to the **Max. Zoeller.**

Circle 101 on Reader Reply Card

Actuation valve

New iWorX valve series consists of ZV Series, MV Series and FV Series valves. The ZV, MV and FV Series valves can be used in a variety of applications where accurate control is required. These include hydronic systems, residential zone systems, fan coil units and reheat on commercial terminal box units. By accurately controlling flow, these valves reduce sudden changes in supply temp and provide more even heating and cooling. **Innovex Technologies.**

Circle 102 on Reader Reply Card

Press connect valve

CimPRESS is getting bigger with the release of eight new large diameter valves in 2 1/2" - 4" sizes. Available in two versions: XLB, which are specifically designed for compatibility with Elkhart's XPress and Viega's XL press fittings, jaws and rings; and XLC, which are specifically designed for compatibility with Viega's XL-C press fittings, jaws and rings; the new valves include the 220XLB/XLC full port ball valve, the 30XLB/XLC inline check valve, the 80XLB/XLC swing check valve, and the 74XLB/XLC "Y" strainer. **Cimberio Valve.**

Circle 103 on Reader Reply Card



GT Series heavy duty pumps

The new GT Series of horizontal split case pumps feature a cast iron casing and bronze impeller both built to ASTM standards along with a carbon steel shaft. GT Series pumps have a standard operating pressure of 175 PSIG and can handle fluid temperatures up to 250°F - 120°C. **Taco.**

Circle 104 on Reader Reply Card



Rainwater harvesting technology

Simple to install, operate and maintain. It is convenient in the sense that it provides water at the point of consumption and operating costs are negligible. Water collected from the roof catchment is available for use in non-potable applications such as toilets and urinal flushing, laundries, mechanical systems, custodial uses, and for site irrigation. Since rainwater is collected using existing structures, i.e., the roof, rainwater harvesting has few negative environmental impacts compared to other water supply project technologies. **Jay R. Smith Mfg. Co.**

Circle 105 on Reader Reply Card



Effluent Pumps

Effluent pump line has been expanded to include larger 1hp, 1.5 hp and 2 hp models. The new pumps feature maximum head capabilities of over 130 feet and flows to 130 GPM. A dual-sized discharge features a 1 1/2" removable flange with a 2" threaded port for connection to either pipe size. The pumps also feature a standard 25' quick-disconnect power cord and dual shaft seals. 2-year limited warranty. **Liberty Pumps.**

Circle 106 on Reader Reply Card

Product News



HydroKing commercial CPVC

HydroKing Commercial is a line of IPS SDR 11 CPVC hot and cold water plumbing pipe engineered specifically for multi-story commercial water systems in both new construction and retrofits. HydroKing® Commercial offers a cost-effective alternative to metal water systems and is easily installed using Schedule 80 CPVC fittings with solvent-welded joining techniques. **Harvel Plastics, Inc.**

Circle 107 on Reader Reply Card

SHIELD commercial water heater

With inputs up to 500,000 Btu/hr, 96 percent thermal efficiency and storage up to 125 gallons, SHIELD has everything it takes to provide the ultimate green operation — without the risk of



lime scale buildup inside the tank. With other commercial water heaters, heat transfer takes place inside the tank through flue tubes or coil-type heat exchangers. As a result, thermal efficiency decreases over time due to lime scale buildup, which gradually drives operating costs up. In fact, as little as one-fourth of an inch of lime scale on the heat exchanger can increase operating costs by 25 percent and cause tank failure in as little as two years. Designed to provide a 100 percent effective defense against this problem, SHIELD is equipped with the industry's most advanced stainless steel heat transfer system located outside of the tank, ensuring the same high efficiency and low operating costs throughout its life cycle. Ideal for green commercial buildings, SHIELD provides low NOx ratings compatible with the most stringent air quality standards. **Lochinvar.**

Circle 108 on Reader Reply Card



Adjustable floor drain

Halo Drain adjustable floor drain with deck flange, was created to provide greater installation options than traditional “deck drains.” Benefits include: installs easily from the top of the floor; perfect for loft remodels, second floor utility/laundry rooms, or cored concrete floors. Features include: 253 or 354 outlet connection — ABS or PVC; Adjustable head allows upward adjustment to 3/4”; optional Finish Line feature allows for even more adjustment options; stainless steel deck flange is water tight; and threaded trap primer port connection with knockout. **Sioux Chief.**

Circle 109 on Reader Reply Card



Proven quality and reliability

Water efficiency, ADA and vandalism concerns are addressed with the Hydrotek 1000C sensor-operated, commercial lavatory faucet. Standard features include: Chrome-plated, solid brass, 4-inch center set construction, 0.5 gpm vandal resistant flow control, automatic timeout, in-line filter, preset but adjustable sensor distance, slow-closing solenoid valve, armored control cable, waterproof/vandal resistant control box and the availability of both AC and Battery powered versions. Options include: mechanical or thermostatic mixing valves and 8-inch cover plates. **Hydrotek Intl., Inc.**

Circle 110 on Reader Reply Card

Magna circulator

MAGNA is the “smart” wet rotor circulator that’s amazingly adaptable. Wet rotor technology means the pump is oil-less and seal-less. It has no noisy fan because it’s cooled and lubricated by the water it pumps. Integrated variable speed drive automatically adjusts performance to meet demand, saving energy — and MAGNA’s revolutionary permanent magnet rotor design saves more energy than other speed-controlled circulator pumps. Flange connections designed for easy replacements. **Grundfos.**



Circle 110 on Reader Reply Card

Commercial hand sinks

Two new ADA compliant “hands-free” handwashing sinks have been added. The new model 7-PS-41 wall-mounted sink features a “no-seam” drawn



one-piece bowl, self-actuating paper towel dispenser, soap pump and an electronic “hands-free” faucet. Model 7-PS-44 features a front push panel valve to activate the faucet. The sink includes large 2" radius corners in its 14" x 10" x 5" bowl. **Advance Tabco.**

Circle 111 on Reader Reply Card

Winter heating products special

With the winter heating season just around the corner Matco-Norca has announced its 2008 Heating Products



Special, with discounts on over 20 products. **Matco-Norca.**

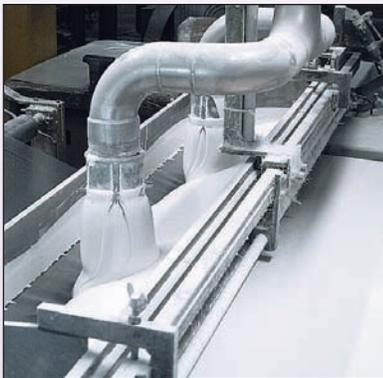
Circle 113 on Reader Reply Card

Product Application



MEAJOSAM introduces a new generation of trench drain

In 1995, JOSAM partnered with MEA to promote and sell their extensive line of polymer concrete and non-polymer concrete trench drain systems in the United States under the name MEAJOSAM. This product line added to Josam's cast iron and stainless steel trench drain offerings.



The impregnation of the fiberglass.

Today, MEAJOSAM is pleased to be able to introduce to the industry the next generation of trench drains, the MEAJOSAM Pro-Plus.

Material, material, material

The Pro-Plus series, offered both with and without slope, is manufactured using sheet molding compound (SMC)

glass-fiber reinforced polyester (GRP) — material that is superior in all respects to existing materials that are offered in the trench drain market. Extraordinarily robust and yet surprisingly light, these diverse properties highlight the advantages of GRP over other trench drain materials. The material has revolutionized many industrial products and has become indispensable in today's world. Its applications are wide and varied: rotor blades on helicopters, bodywork for automobiles, yachts and aircraft. In fact, glass-fiber reinforced polyester made from SMC is used wherever extreme conditions prevail and special degrees of durability and rigidity are called for, precisely as in MEAJOSAM's Pro-Plus drainage solutions.

This product is lighter, stronger and expands and contracts less in extreme temperature ranges than polymer concrete.

In addition, GRP has greater compressive, flexural and tensile strength and less thermal expansion properties than either polypropylene or high density polyethylene.

Glass-fiber reinforced polyester (GRP) is an innovative material and is clearly superior to all other

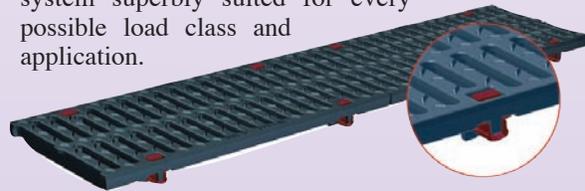
trench channel materials. Key advantages of GRP include the following:

- Shatterproof and extremely resistant to abrasion
- Frost-, heat- and rust-resistant
- Lightweight
- Non-porous structure with a smooth surface
- Resistant to chemicals
- Resistant to oil, gasoline, hot asphalt and tartaric acid
- Free of halogens, asbestos and toxic heavy metals
- Capable of being formed into complex shapes
- An excellent cost/performance material

Innovative grate securing system

The Pro-Plus series trench drain is offered with the patent-pending STARFIX system, which constitutes another innovation regarding grate securement. The whole process has never been as fast or as simple. The innovative four-point locking that is inside the channel makes a solid and secure fit and **requires no bolts**. It's simple and fast insertion and removal of gratings with a single hand movement, without the need for special tools. Just press-in, click, and it is complete! What's more, the channel cross-section remains completely unobstructed so that discharge rates remain unaffected.

The various design and material alternatives — slotted and mesh grates in galvanized steel and stainless steel, non-slip pool grates in HDPE, as well as slotted grates in ductile iron — make the MEAJOSAM Pro-Plus channel system superbly suited for every possible load class and application.



Diversity and service

The MEAJOSAM Pro-Plus series is available in widths of 4", 8" or 12" and either with or without slope. The various design and material alternatives make the MEAJOSAM Pro-Plus channel system superbly suited for every application. The inherent strength of the channel combined with a wide range of grate offerings provide a system ideal for applications from pedestrian use to heavy commercial vehicles.

MEAJOSAM offers a free-of-charge technical design service providing hydraulic calculations, CAD drawings, quantity schedules and product specifications. Dedicated

Continued on page 68

Product Application

Continued from page 67

and knowledgeable customer service personnel are available to assist you in selecting the right engineered trench drain system for your project.

For more information on all JOSAM Company products, contact your local representative or visit our Web site at www.josam.com. ■

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(2) Paid In-County Subscriptions Stated on Form 3541 (include advertiser's proof and exchange copies)		
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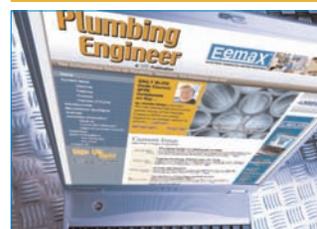
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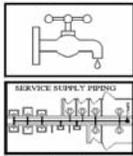


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EOE

Industry News

Continued from page 10

authorized for occupant evacuation.

- A comprehensive energy package of code changes (EC14) that required 67% to pass, failed by a small margin, receiving 64%. (Supporters attempted to pass separately a series of partial measures that were defeated as a block.)

- Regulations under the IBC and IRC for pools will now reference a new standard for entrapment designed to be consistent with the Virginia Graeme Baker Federal Pool and Spa Safety Act.

- Carbon monoxide alarms will be required in homes where there is fuel-fired equipment or an attached garage.

Adolf Zubia, fire chief for the City of Las Cruces, N.M., was elected by participants at the annual conference to serve as the new president of the International Code Council.

OSHA and AFSA form alliance

WASHINGTON — A new alliance has been formed between the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) and the American Fire Sprinkler



Assistant Secretary of Labor for OSHA Edwin G. Foulke Jr. (left) and AFSA president Steve Muncy (right) met on September 24, 2008, to sign the Alliance.

Association (AFSA). Through the Alliance, employers and employees in the fire sprinkler and construction industries will receive guidance on material handling and fall hazards and on motor vehicle safety issues. The Alliance will develop training and educational programs addressing these hazards and communicate information through exhibits, conferences and OSHA- and AFSA-developed Web sites.

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing a safe and healthful workplace for their employees. OSHA's role is to assure the safety and health of America's working men and women by setting and enforcing standards; providing training, outreach and education; establishing partnerships and encouraging continual process improvement in workplace safety and health. For more info, visit www.osha.gov.

Report on workplace violence focuses on role of facility professionals

HOUSTON — The IFMA Foundation has released a new report on workplace violence entitled *Violence in the Workplace: The Role of the Facility Manager*. Written by

Wayne D. Veneklasen, Ph.D., CFM and Donald W. Barnes Jr., CPP, the report looks at the history of violence in the workplace, examines the scope of the problem, describes the statutes surrounding it and concludes with a focus on planning, response and recovery.

While publications on workplace violence have traditionally focused on the preventive role of the human resources department, there are many aspects of the problem that can be alleviated by having the proper safety plans and security procedures in place — and by the facility itself. This new report takes the perspective of the building owner and facility manager, outlining the steps they can take to help mitigate this problem.

The report was made possible through contributions donated in memory of W. David Beverly, the late husband of Linda Beverly, CAE, IFMA's vice president of administration. A long-time engineer at the National Aeronautics and Space Administration, David Beverly was killed on April 20, 2007, at Johnson Space Center in Houston by a contract engineer who shot him and held another coworker hostage before committing suicide.

To obtain a free copy of the report, visit www.ifmafoundation.org.

California signs uniform codes into law

ONTARIO, CALIF. — Gov. Arnold Schwarzenegger has signed legislation permanently establishing the International Association of Plumbing and Mechanical Officials (IAPMO) model plumbing and mechanical codes as the basis for the development of the California Buildings Standards Code.

Introduced by Sen. Ron Calderon (D-Montebello), Senate Bill No. 1473 seeks to clarify who has authority to develop building standards, including green building standards, for particular types of buildings and includes intent that the measure will not affect the ability of local governments to adopt changes to the building code.

Sec. 5 of the bill adds Section 18938.3 to the Health and Safety Code, to read: "... Those model codes designated in Sections 17922 and 18938 that continue to be published and updated shall continue to serve as the basis for the California Building Standards Code." The bill establishes the Uniform Plumbing Code and the Uniform Mechanical Code, which were the basis for the 2007 triennial edition of the California Plumbing Code and California Mechanical Code, as the model codes for all future editions of the California code.

EPA 2008 report shows decline in lead levels

WASHINGTON — The EPA has just issued a report on efforts to protect children from environmental hazards. The report is entitled *Children's Environmental Health: 2008 Highlights*.

The agency's findings highlight several major health issues for children, including the significant progress made on lead exposure reduction in the United States in recent years. Specifically, the report notes that the median concentration of lead in children age five and younger declined 89 percent over the last three decades, from 15 micrograms per deciliter (mcg/dL) in 1976 – 1980 to 1.6 mcg/dL in 2003 – 2004. ■



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