



Upcoming Meeting

Date: March 25, 2020

Time: 6:00pm to 8:00pm

Place: Olive Grove Restaurant

Topic: Water Heater Sizing,
Construction, And Efficiency

Speaker: Jeff Henscheid, PVI

Meeting Format

6-6:30 Social

6:30-6:45 Announcements and Table Tops

6:45 Dinner Served

7:00-8:00 Speaker



CHAPTER AWARD OF MERIT

Recipient 2017-2018

2018-2019

In This Issue

- Board of Directors -2
- Golf Outing -3-4
- Presidents Report -5
- Membership Awards -6
- WOA Report & Event -10-11
- VP Technical Report -17
- Technical Article -18-24
- AYP Report & Event-27
- Membership Report -31
- Meeting Schedule -38

MEETING LOCATION



Olive Grove
Restaurant & Lounge

705 North Hammonds Ferry Road
Linthicum, Maryland 21090
Phone: 410.636.1385

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- All ads must be paid in full prior to the advertisement being included in the newsletter.
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Please Contact [Jason Eagles](#) or [Jeff Edwards](#)

Make checks payable to Baltimore Chapter of ASPE. Please contact the chapter Treasurer with any questions.

Kathy Dwyer
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ASPE BALTIMORE CHAPTER GOLF OUTING and COOKOUT

**Friday, April 24, 2020
The Timbers at Troy
Columbia, Maryland
\$125 / Golfer**

- Prizes for Team Play
- Door Prizes
- Longest Drive Prizes
- Closest to the Pin Prizes

SCHEDULE

| | | | |
|---------|---|---------|---|
| 7:30 AM | Registration/Check-In/Breakfast | | |
| 8:30 AM | Shotgun Start Scramble Format "Captain's Choice" Mulligans Available | 1:30 PM | Cookout (Hamburgers, Hot Dogs, etc.) |
| | | 2:00 PM | Awards & Prizes |

Sponsors and Participants, please contact:
 David K. Goodell
dgoodell@jamesposey.com
 James Posey Associates
 11155 Red Run Boulevard
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 Phone: (410) 265-6100

**Make checks payable to ASPE Baltimore Chapter.
 Reservations will be confirmed when check and participant information is
 received.**

PLEASE RETURN COMPLETED FORMS BY APRIL 10, 2020

Company _____

Name _____ Phone No. _____

No. of Golfers: _____ @ \$125 each Total for Golfers: \$ _____

Sponsorship Level: _____ Total Sponsorship: \$ _____

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2020 ASPE Baltimore Chapter Golf Outing Sponsorship Levels

- **Tee Marker (with Foursome)** **\$125.00**
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- **Cart Sponsorship** **\$600.00**
(Includes tee marker and cart signs for each cart)



All proceeds from the Golf Outing will benefit future Chapter events and activities.

Please make checks payable to: **ASPE Baltimore Chapter**

Mail registration and payment to:

James Posey Associates

Attn: David K. Goodell

11155 Red Run Boulevard

Baltimore Maryland, 21117



**Jeffrey W. Edwards, CPD ,GPD
President**

President’s Report

As I begin my March report, the skies are sunny with temperature about 50 degrees. The forecast for the upcoming weekend is also sunny with temperatures near 60 degrees. I’ve even got a tee time to play golf this weekend with my son and grandson. Okay, that sounds great, and hopefully spring is near, but, what are the chances we get our first snow of the year in March

On Friday, February 14th, the Baltimore ASPE chapter held our second annual Engineers Week presentation at the beautiful Engineers Club. Lead by the chapters Education chair, Chris Imhof, we presented the engineering field to approximately eighty high school and middle school students. I want to thank the chapter’s board members who participated along with all the volunteers from AMES Inc., Victaulic, Bay Associates, EJ Dwyer, McWane Plumbing Group, Sherman Engineering, Mueller Associates, Omega Flex and the Plumbing and Steamfitters Union Local 486 for another fantastic effort for all the students.

The Baltimore ASPE chapter held this years AYP event on Wednesday, February 19th at the 5 Iron golf simulation establishment in Baltimore. It was a great time and thanks go out to our chapter’s AYP liaison, Niki Patel for arranging this event. If you like golf or just looking for a good time, good food and a cold adult beverage, I highly recommend this place.

If you are having an issue with obtaining your CEU/PDH certificates from ASPE Society, please contact myself or Chuck Swope.

If there is anything you’d like to discuss with me regarding our chapter, please don’t hesitate to contact me.

Best Regards,
Jeff Edwards, CPD, GPD
President-ASPE Baltimore Chapter

| | |
|---|---|
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| Mechanical/Electrical Engineering |  |



B A L T I M O R E

Membership Award Presentations

March 25, 2020

Dedication is defined as a solemn commitment of your time to a cherished purpose. It is a loyalty or allegiance to a cause. We cannot think of a better term that defines many of our members. Being a member of this society is a choice and often involves hours of time devoted to the local chapter. The Baltimore Chapter would like to recognize the following members for their dedication to our chapter. Please spread the word and join us as we celebrate these milestones during our March meeting.

10 Year Awards

Brian Crisp

Andrew Cahill

Patrick Giordano

George Wilburt

Abbas Lohrasbi

20 Year Awards

Richard Grier

Brent Inners

30 Year Award

Bob Ruskey

If you are receiving an award and attending this meeting, please RSVP on the website www.baltimoreaspe.com. The Baltimore Chapter would like to cover this expense to further show our appreciation. Please RSVP for the meeting online and use the bypass payment option when prompted. You will need to click on Member Ticket \$35 and follow the steps to payment where you can bypass payment.

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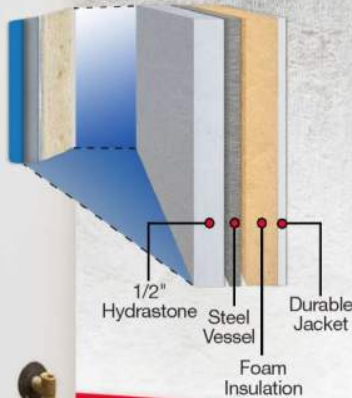
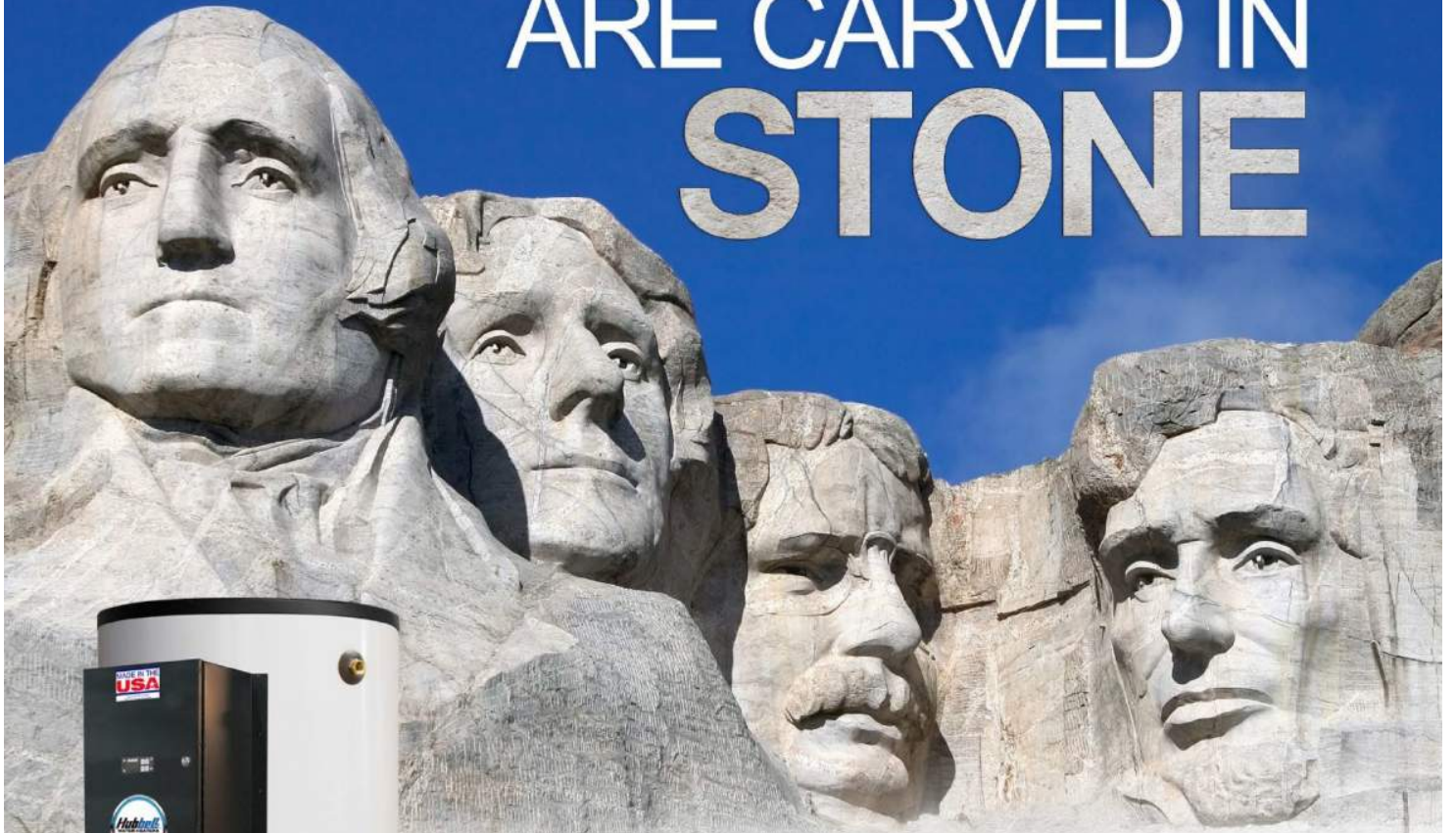
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Karen Schulte, PE, CPD, LEED AP BD+C
AYP & WOA Liaison

WOA Report

We are excited to announce this years Women of ASPE event will be a cooking class at the Baltimore Chef Shop. The class topic will be Taste of Normandy, where the attendees will prepare and taste a sampling of quintessential flavors of Normandy, France. This will be a menu-based class, so after we help prepare the various dishes associated with the menu, we will enjoy a sit-down dinner of the food we've just prepared. Space is limited for this event, based on the size of kitchen workspaces available at the Baltimore Chef Shop. If you'd like to attend, sign up early! See ad on page 9!

Best Regards,
Karen Schulte, PE, CPD, LEED AP BD+C



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cooking EVENT



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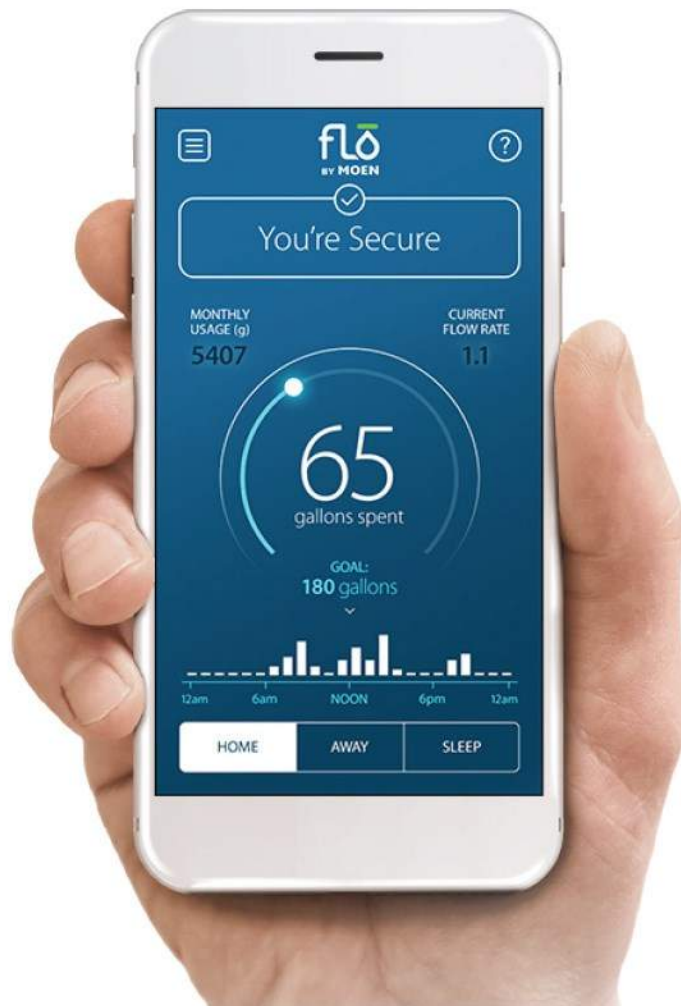
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410.646.4500 tel > 410.646.4738 fax
410.913.4135 cell
jedwards@muellerassoc.com



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Gary Compton
Business Development Manager

8905 Danville Terrace
Frederick, MD 21701
Phone: 240.357.0587
gary.compton@moen.com
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Mueller Associates, Inc. **Karen E. Schulte, PE, CPD,**
Consulting Engineers **LEED AP BD+C**
Mechanical Project Engineer

1306 Concourse Drive, Suite 100
Linthicum, MD 21090
410.646.4500 tel > 410.646.4738 fax
kschulte@muellerassoc.com



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CHRISTOPHER IMHOF, PE, CPD
Technical Standards
Engineering Manager
Regulatory Services Division

Office: 301.206.8514
Cell: 540.230.4664
christopher.imhof@wsscwater.com

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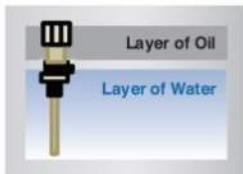


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Chuck Swope, PE, CPD, LEED AP BD+C
Vice President—Technical

Technical Report

February turned out to be an exciting month for the chapter. We had excellent attendance for our topic on the Importance of Hydraulic Calculations, presented by Professor Ken Isman. There was a lot to cover in a very short amount of time and I certainly learned a few things. February was also our chapter's second annual Engineer's Week presentation, where we partnered with the Plumbers and Steamfitters Local 486, AMES, Bay Associates, EJ Dwyer, Victaulic, Omegaflex, and McWayne Plumbing Group to help educate our local high school and middle school students on what options there are in the engineering field.

Our presenter for March will be Jeff Hensheid, from PVI. Jeff is the Regional sales manager at PVI Industries. He graduated from Midwestern State University. He has been working for PVI for over 27 years as a Regional and National sales manager. Previously he worked for Lochinvar, and Weben-Jarco. Prior to that he was a regional sales manager and Chief Estimator for Master Tank and Welding. He also served 14 years on the ASPE Exhibitor Advisory Committee for their National Conventions.

Jeff will inform us on the topic of Water Heater Sizing, Construction, And Efficiency. His goal is to introduce new engineers (and refresh our experienced engineers) on the considerations that go into water heater selections and making sure you don't get into hot water by running out of it! Puns aside, the topic is will be an excellent discussion on the different types of water heaters, sizing criteria, accessories, and more. I'm sure our favorite topic of Legionella control may come up once or twice as well!

Best Regards,
Charles J. Swope, PE, CPD, LEED AP BD+C
Vice President - Technical



Storage-type Water Heaters vs. Water-Tube Instantaneous: Which is Better for Legionella Control?

Although a good deal of conversation surrounds water heater design and Legionella, the conditions that contribute to the uncontrolled growth of Legionella are much more prevalent the closer one gets to the faucets and the farther from the water heater. Storage tanks can contribute to Legionella growth; if certain conditions are allowed. However, from more than four decades of research we now understand these conditions and know how to mitigate them. Do it right and storage tanks are not a problem. Centralized, instantaneous, water-tube water heaters are not a better solution (especially from a “whole building” perspective) and many of the claims of instantaneous, water-tube, water heaters should be questioned.

Stagnation or low flow

Storage Type: Tanks are lower flow (at times stagnant) but science proves that no or low flow contributes less to biofilm growth than higher flow rates. (Stagnation should not be equated with high residence time.) It’s presumed that the occasional water stagnation or relatively low flow velocity (~0.5 ft/sec) during operation contributes to higher biofilm growth on the sides of the storage tank. Actually, biofilm grows slower under a no-flow or low-flow rate compared to higher flow rates under the same water conditions. This was first documented in the late 1990s and has since been confirmed in several additional research studies ^(1,2,3,4,5,6). Those who continue to preach that low or no flow equates to more biofilm and more Legionella than the higher flows typical of domestic water systems, are being disingenuous or are unaware of the scientific evidence.

Instantaneous, water-tube: When they operate, there is flow. But the flow varies with demand, and flow is not sufficient to prevent or remove biofilm from heat exchanger surfaces. Manufacturers suggest that the high-flow environment of the water-tube design inhibits or prevents the formation of biofilms. The flow rate through a 250,000 BTU water-tube module typically ranges from 0 gpm at no load to 6 gpm at maximum recovery. One manufacturer suggest a 10 gpm flow with a velocity of 8.5 ft/sec is normal and can therefore routinely shear biofilm from tube walls and render the exchanger “legionella free.” This flow rate is possible but is certainly not practical or typical when considering proper water heater sizing as indicated in the table below for a condensing, 250,000 BTU water heater at 130°F.

| Gal/Min | Feet/Sec | $\Delta T @ .94E_t$ | Inlet Temp for 130° Outlet | Notes |
|---------|----------|---------------------|-------------------------------|--|
| 5.2 | 4.42 | 90°F | 40°F | ← Heater would be sized here. |
| 6 | 5.10 | 79°F | 51°F | ← Or maybe sized here. |
| 7 | 5.95 | 67°F | 63°F | |
| 8 | 6.80 | 59°F | 71°F | |
| 9 | 7.65 | 52°F | 78°F | |
| 10 | 8.50 | 47°F | 83°F | This flow rate assumes usage increases with increase in inlet water temperature. Not true. |

Table information extrapolated from Intellihot ASHRAE webinar presentation “Is ASSE 1017 and Legionella your worst enemy?,” 2019

The BTU input of a water heater is sized for maximum building demand (output) at the lowest expected inlet water temperature, for example 40°F or maybe 50°F. Therefore, if 6 gpm maximum flow is used to size the heater, this flow (hot water demand) is expected to be consistent throughout the year as would the resulting velocity. Warmer inlet water does not affect hot water demand, flow rates or flow velocity.

For water-tube, water heater models where multiple heat exchangers are combined in a manifold and modulate to share the load, the annual average velocity through any one heat exchanger in the collective is estimated at 3 ft/sec due to daily variation in hot water demand. This velocity then drops considerably when flowing through the larger-diameter header manifold pipe that connects all hot water outlets from each heating module. In the header, the velocity will regularly drop below 2.0 ft/sec. In the modules and in the header, the average velocities are well within the range of biofilm formation and the occasional higher flows are not sufficient to remove it. The header is a considerable concern due to potential temperature drop during extended low demand periods.

It is true that sufficiently high flow rates can shear biofilms from the surfaces of pipe walls, but these velocities are thought to begin at 10 feet per second ⁽⁶⁾, far higher than ever recommended in domestic plumbing systems due to the resulting erosion and noise.

Sediment

It's been known since the mid-1980s that sediment and scale precipitant at the bottom of a storage tank, a water heater, or anywhere in the plumbing system can provide a prime location for the development of biofilm and potentially promote Legionella growth.⁽⁷⁾

Storage Type: Sediments and precipitant accumulates over time but can be flushed out easily. The low-turbulence environment in a storage tank allows the sediment and precipitant to collect at the bottom and provides the opportunity to regularly flush the material through the bottom drain valve. The heater design and the regular tank flush largely eliminates sediment from the entire building piping system and by doing so helps to maintain a residual disinfectant level. In addition, modern, top-fired, condensing tank-type heaters suffer no efficiency loss due to the small amount of sediment and precipitant that accumulates at the bottom of the vessel between flushing cycles.

Instantaneous, water-tube: Sediment and precipitant can be carried into the building piping. The flow-centric design of instantaneous, water-tube water heaters forces scale precipitant and sediment to be carried into the common hot outlet header or into the building piping, where the sediments' potential to harbor Legionella continues. Afterward, locating the sediment and eliminating it from the building piping system becomes a more difficult if not impossible task.

Temperature stratification

Storage Type: Occurs due to relative densities. Hot water is less dense than colder water and temperature in storage tanks will naturally stratify. Toward the bottom of the tank, water temperature will be within the optimal growth range for Legionella (~95°F to 115°F). However, in the presence of a typical and maintained residual disinfectant level, microbial growth in water is curtailed regardless of the temperature. The typical residual (free) disinfectant level of water entering a building from a municipal distribution system is between 0.2 to 0.5 ppm, which is highly effective at eliminating Legionella in open water and, when maintained, has also been shown to mitigate biofilm growth under certain water quality conditions ^(19, 20).

Instantaneous, water-tube: Occurs due to forced counter-flow of water and flue gases.

Although this style of heater is not generally considered to experience temperature stratification, they absolutely do for condensing models as it is required by the laws of physics. In higher-efficiency condensing heaters, stratification is required to achieve condensing operation because flue products must pass across portions of the heat exchanger that contain cooler water for condensing to occur.

Operating temperature

Storage Type: A 140°F set point is recommended because it kills Legionella. All consensus Legionella control guidelines state that water should be stored at 140°F ^(23,24,25,26). At 140°F, the decimal reduction time for Legionella Pneumophila serogroup 1 (the most pervasive and temperature tolerant strain) in open water is 2.7 minutes. Meaning a 9.99% kill rate (3 log) can occur within 8.1 minutes ⁽¹⁶⁾. A storage water heater has an adequate volume of water at 140°F to provide the needed exposure time and this is a sufficient Legionella control maintenance temperature. It is often stated that 140°F water kills Legionella in 32 minutes. This is true in a highly contaminated environment with 1×10^7 or more bacteria per milliliter (99.9999% kill) and should not be considered a typical scenario for maintenance ⁽¹⁸⁾.

An additional and often over-looked benefit of 140°F water temperature is its ability to kill amoeba within the same time frame as Legionella. Many experts consider the prime growth mechanism for Legionella in a building plumbing system to be replication within a host amoeba after consumption, during which time the Legionella are protected from disinfectant residuals ^(9,10,11,12). When the number of Legionella clones exceeds the amoeba's capacity to contain them, the amoeba bursts and the Legionella are released into the piping system. The chlorine residual required to quickly destroy amoeba in drinking water is far higher than required for Legionella control and is dangerous for human consumption ^(13,14,15), so the 140°F temperature is an essential control measure.

Higher stored water temperature has raised some concerns; including scald risk and energy loss. The scald risk is addressed through the use of a failsafe digital mixing valve to blend water down prior to delivery to the building or point of use thermostatic faucets. The heat loss is addressed by the higher levels of tank insulation mandated by the Department of Energy. As a result, heat loss associated with 140°F stored water amounts to a fraction of a percent of the total energy used to generate domestic hot water. Compared to a 120°F stored water temperature, the difference in cost with a 250-gallon tank insulated to R12.5 (DOE requirement) would amount to an additional \$10 a year (9.8 therms).

As a final note on stored water temperature, 140°F is a recommended maintenance temperature. The occasionally cited temperature of 158°F (70°C) is intended for an emergency and temporary thermal eradication of a building piping system. It should not be considered the recommended stored water temperature, although a tank could be set at this temperature if desired.

Instantaneous, water-tube: Lower water temperatures are promoted but have a negligible effect on Legionella kill. Manufacturers of instantaneous, water-tube heaters promote an outlet water temperature of 120°F to 130°F as a benefit compared to the 140°F recommendation for storage-type heaters. The claimed benefits are fuel savings via lower standby loss, reduced scald risk, and lower equipment cost through elimination of an ASSE 1082 main mixing valve. Manufacturers assert that the low water content of the water-tube heat exchanger naturally minimizes or “prevents” Legionella, so higher temperature is not required as a control measure.

It is not disputed that Legionella stops multiplying at a water temperature of 120°F, but laboratory studies differ, and experts do not agree on the length of time the bacteria can remain alive and viable in 120°F water^(16,17). Achieving a 3 log kill at 120°F takes an estimated 14 hours. Achieving a 3 log kill at 130°F takes an estimated 1.5 hours. This is also true for their amoeba hosts. The concern is that 120°F or 130°F is initially not effective at killing the microorganisms and is then circulated through a building plumbing system, where maintaining the temperature becomes difficult if not impossible due to demand induced flow rate changes in what is often a complex hot water distribution piping system. When temperature drops 10 or 15 degrees, the still viable bacteria are exposed to an ideal growth temperature and possibly biofilms. Exacerbating the issue is that chlorine residuals are also decaying in that same piping system due to water temperature and the greater surface area to water volume ratio.

Unfortunately, simply adjusting the outlet temperature on an instantaneous water-tube heater to 140°F is no guarantee of killing Legionella because the exposure time is insufficient. Unless the required mixing valve is a considerable distance away from the water heater, the 140°F water would be blended down too quickly.

Preservation of a disinfectant level

Without a disinfectant level, the type of water heater is irrelevant when attempting to control Legionella in the building, so the focus must be on preserving and refreshing the residual. The central issue is avoiding prolonged residency of water in the system, which consumes chlorine residual through the bulk decay effect. Additionally, systems that have low water storage relative to larger amounts of surface area will see more rapid loss of disinfectant residual due to the influence of surface decay effect^(21,22).

Storage Type: Proper water refresh rate can be accomplished by “right-sizing” the tank. The presence of a water volume alone is not related to the accelerated growth of Legionella. Occasional stagnation is common but prolonged residency of water can be avoided if the water heaters or tanks are sized properly. This regular refresh rate ensures that the residual chlorine level is maintained. Additionally, regularly flushing sediment from the bottom the tank eliminates another cause of chlorine consumption further preserving the disinfectant level. An additional benefit to a storage tank is the very low surface area to water volume ratio, which minimizes chlorine decay.

Instantaneous, water-tube: High surface area to water volume is a concern. The most assumed benefit of an instantaneous, water-tube heater is that the low water volume helps to

prevent the growth of Legionella. While refresh rate is naturally high during operation, what many people don't realize is that the large amount of surface area relative to the water volume within the water-tube heat exchanger results in accelerated decay of residual chlorine. It's known as surface or wall effect decay. Circulation further hastens chlorine decay by increasing the contact against the pipe walls.

When comparing the factors that influence the potential uncontrolled growth of Legionella, the claims made by makers of instantaneous, water-tube water heaters do not hold up to scrutiny against the scientific evidence. When properly sized, operated and maintained a storage water heater can play a role in an effective Legionella control strategy. Regardless of the claims made by any manufacturer, a water heater cannot eliminate Legionella, especially throughout the building.

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Nikita Patel, EIT, MBA
AYP Liaison

AYP Report

To say the AYP event was a success is a major understatement! Earlier this month, we hosted close to 20 current and future members at Five Iron Golf in Baltimore. It was a great event for young professionals to get to know one another, while also practicing their golf swings with an instructor. Some of our more experienced players even participated in challenges!

It's always great to see so many young Engineers making a place for themselves in this industry that is surprisingly unheard of at a collegiate level! I know as the year goes on, we will have even more fun at our upcoming meetings and golf outing. Stay tuned for more updates as we plan even more events for our young professionals!

Thanks,
Niki

Have you been following our member spotlight on LinkedIn? Each week, we interview a different member of our chapter to get a glimpse into their lives both in, and out of, the plumbing industry. Follow us today to see more!

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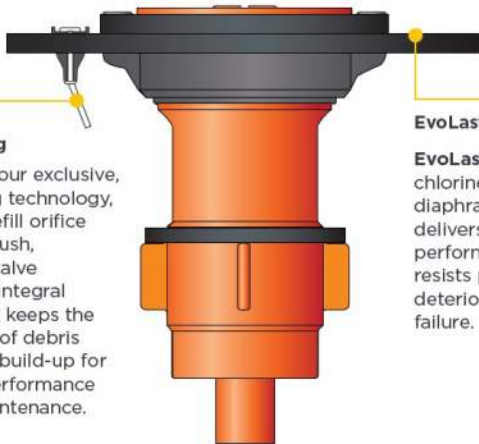


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Brian Crisp, CPD
Vice President - Membership

Membership Report

Hello again Folks!

I'm personally looking forward to this month's meeting on Water Heaters. I have a sizing spreadsheet for storage types that I've shared on connect.aspe.org. Let me know if you're interested and I can share it with you. Just a reminder that ASPE Connect is a great resource to utilize to get advice/feedback from your colleagues in the industry.

We will also be presenting Membership Tenure Awards at this month's meeting, so please join us to celebrate these individuals on their continued support to the chapter.

We have two new members this month. You know the drill, welcome them into the fold.

Dan Flaherty – Ames

Antoni Andri - GHT

We currently sit at 114 members. Just a reminder, you can renew your membership before the month that it expires. The expiration date is based on when you joined, so don't be afraid to renew early and avoid the stress :) You can also renew your membership for multiple years at a reduced rate!

If you or anyone you know is interested in joining, or at least hearing about the benefits of membership, please don't hesitate to reach out to me. You can also join directly at <https://www.aspe.org/join>.

Thanks, and see you at the meetings!

Brian Crisp, CPD
Vice President, Membership

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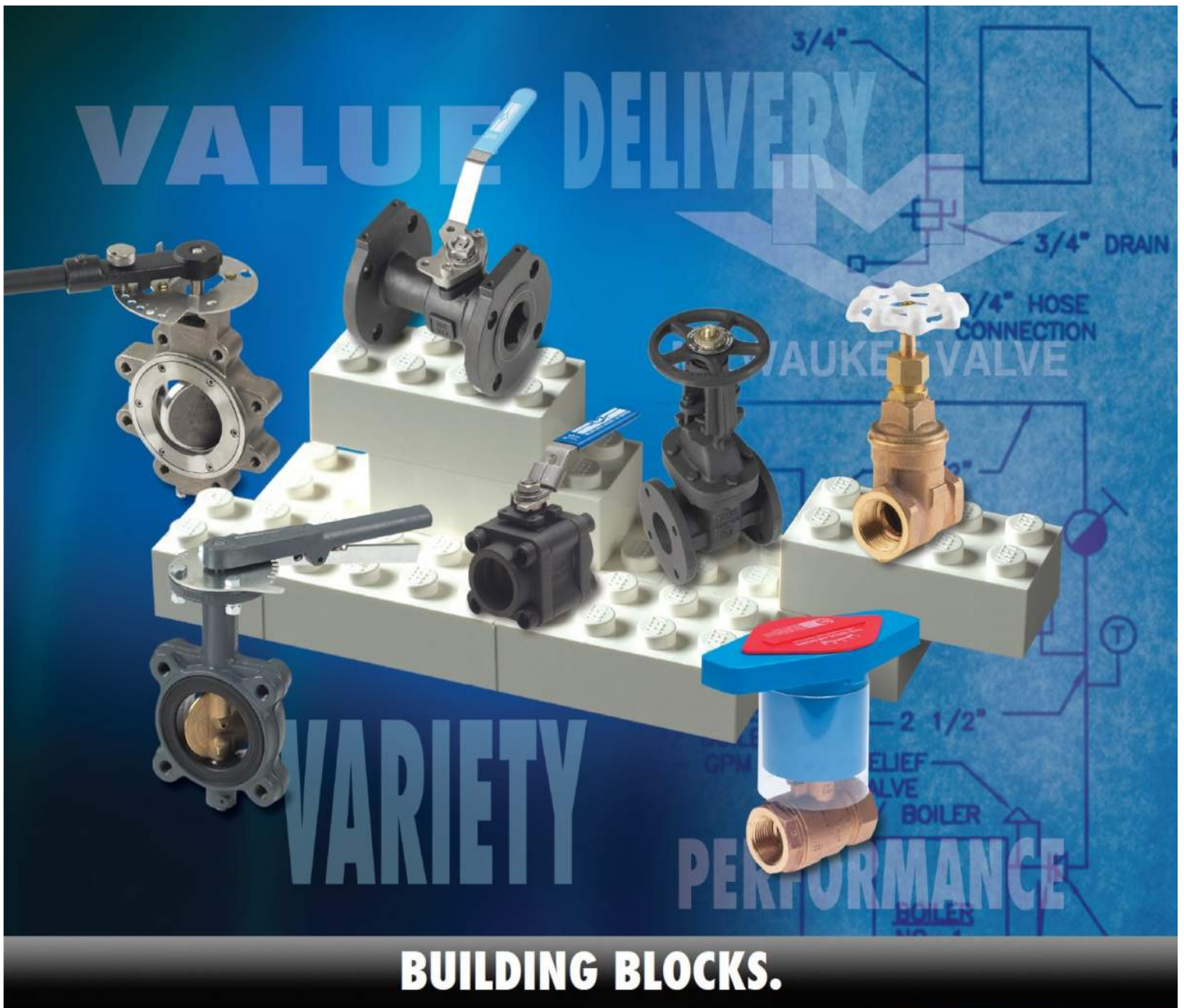
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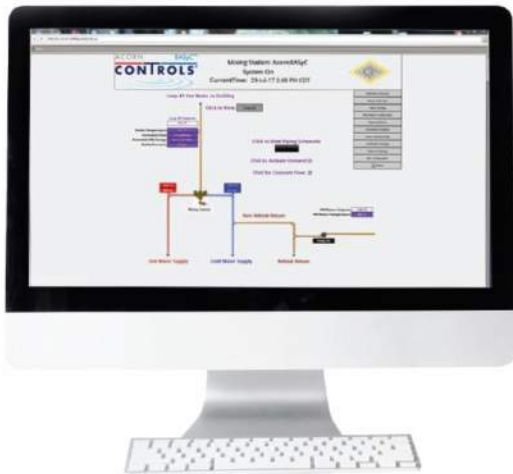
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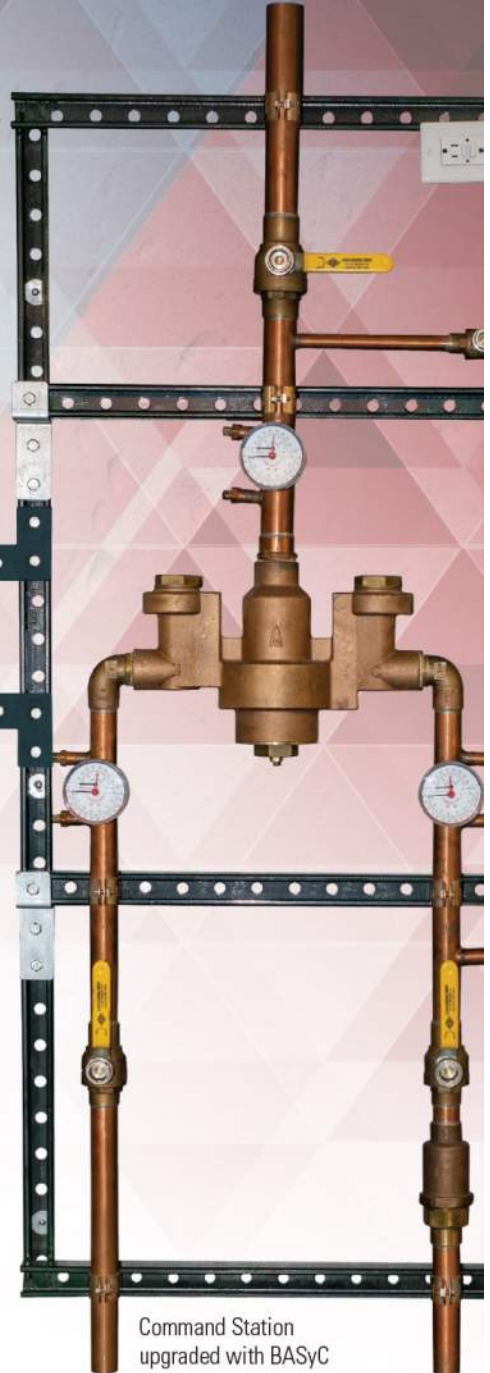
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2019-2020 ASPE Baltimore Chapter Meeting Schedule

Date: **September 25, 2019**

Speaker: WSSC

Topic: Cross Contamination Control

Date: **October 23, 2019**

Speaker: Generac

Topic: Natural Gas Sizing for Emergency Generators

Date: **November 20, 2019**

Speaker: Viega

Topic: Opportunistic Pathogens 101

Date: **December 13, 2019**

Event: Holiday Party

Location: [Mustang Alley's](#)

Date: **January 22, 2020**

Speaker: McShane PC

Topic: Professional Ethics in Engineering

Date: **February 26, 2020**

Speaker: Professor Kenneth Isman—UMCP

Topic: Importance of Fire Protection Hydraulic Calcs

Date: **March 25, 2020**

Speaker: PVI—Jeff Henscheid

Topic: Water Heater Sizing, Construction, and Efficiency

Date: **April 22, 2020**

Speaker: Charlotte Pipe

Topic: Cast Iron Pipe

Date: **April 24, 2020**

Event: Golf Outing

Location: [The Timbers at Troy](#)

Date: **May 27, 2020**

Speaker: Watts

Topic: Automatic Control and Pressure Reducing Valves



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The Baltimore Chapter of ASPE continues to have successful meetings and is looking to continue improving throughout the year.

The Chapter has the following sponsorship opportunities for each month:

Tabletop Presentations: \$100 to provide a tabletop presentation of equipment or material relative to the plumbing profession. The tablespots will be set up from the beginning to the end of the monthly meeting and provides the opportunity to provide a brief (under 5 minutes) presentation.

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