IN THIS ISSUE

ASPE American Society of Plumbing Engineers™
BALTIMORE

MEETING FORMAT

6:00 - 6:30	Social
6:30 - 6:45	Announcements & Table Tops
6:45	Dinner Served
7:00 - 8:00	Presentation

DATE:	November 16, 2023
TIME:	6:00pm to 8:00pm
PLACE:	Olive Grove Restaurant
TOPIC	Natural Gas Piping Design
SPEAKER:	Jim Webster Kelly Generator & Equipment

Register Today

Olive Grove Restaurant & Lounge
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PHONE: 410-636-1385

Local Chapters are not authorized to speak for the Society.
Newsletter questions? Please contact Nikita Patel

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ASPE
American Society of Plumbing Engineers™
BALTIMORE

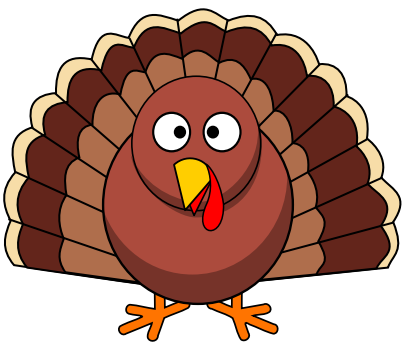
Chuck Swope, PE, CPD, LEED AP BD+C
Chapter President

Greetings, ASPE Baltimore Chapter members and plumbing engineering enthusiasts! As we approach the holiday season, we have some exciting news to share in our November newsletter.

First and foremost, we're thrilled to announce the release of the updated version of the ASPE Plumbing Engineering Design Handbook Volume 3. This chapter is oft overlooked, but contains valuable information to help size and select our systems that don't exactly flow downhill. This volume covers Fire Protection systems, Healthcare Facilities, Irrigation systems, Gasoline and Diesel systems, and more! ASPE strives to cover all of the systems that aren't just Sanitary and Domestic Water. As always, every ASPE member (Baltimore or otherwise) has access to digital versions of the Plumbing Engineering Handbooks via their education portal.

In upcoming news, we are excited to kick off our Engineer's Week talks at the Engineer's Club next week! This will be our 4th year that we've participated, where we take a group of high school students and introduce them to a career in Plumbing Engineering. We encourage our students to pursue not only consultant engineering, but also sales engineering and even showcase the Local UA 486 and their Plumbers and Steamfitters Training School. There are many career paths that are all part of the ASPE family.

With Thanksgiving just around the corner, we would like to take a moment to express our gratitude to all our dedicated members who have shown unwavering support for the ASPE Baltimore Chapter. Your passion and commitment to advancing plumbing engineering are the backbone of our organization, and we are thankful for your contributions. As we gather with our loved ones to celebrate this season of gratitude, let's remember the importance of our community and the role each of us plays in shaping the future of plumbing engineering.



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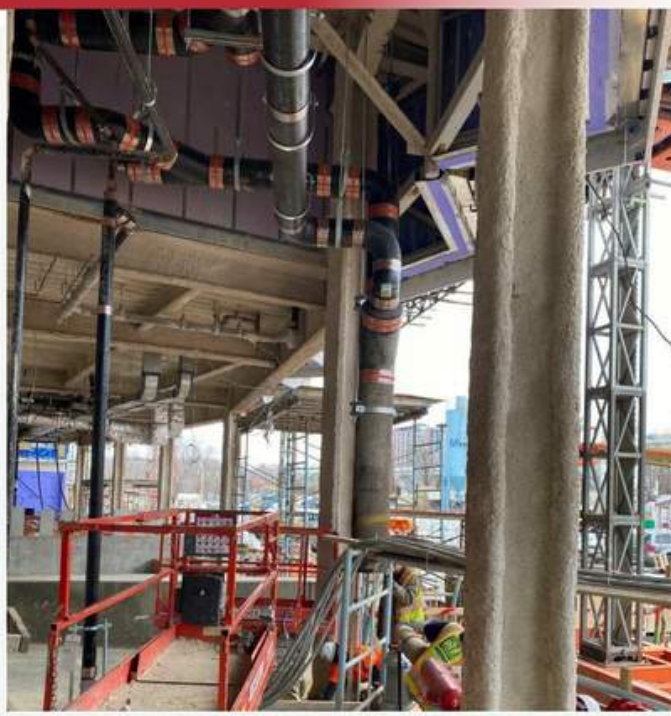

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ASPE American Society of Plumbing Engineers™ BALTIMORE

Julian Chiveral, LEED AP BD+C
Vice President- Technical

Hello, Plumbing Enthusiasts!

As the vibrant leaves of autumn gracefully descend upon Baltimore, the charm of this city truly comes alive in November. The brisk air carries the delightful aroma of pumpkin spice and the promise of Thanksgiving feasts just around the corner. While the weather might be cooling down, the warmth of camaraderie and shared knowledge in our plumbing community continues to flourish as always.

First and foremost, let's extend our heartfelt gratitude to all the attendees and our esteemed presenter, Nikita Patel, from our October meeting. Nikita enthralled us all with an insightful presentation on vacuum system design. With her expertise, we delved into the intricate world of vacuum systems, gaining valuable knowledge that will undoubtedly enhance our professional journeys. If anyone would like to follow up with specific questions about designing your next vacuum system, Nikita can be reached at npatel@shermanengineering.com.

Now, looking forward to our next monthly meeting, mark your calendars for Thursday, November 16! Note that this is sooner than our typical Fourth Wednesday of the month meeting, due to the Thanksgiving holiday, allowing everyone the opportunity to participate without any scheduling conflicts. I'm thrilled to introduce our upcoming presenter, Jim Webster, a distinguished sales engineer at Kelly Generator & Equipment.

Jim will be enlightening us on the crucial topic of natural gas piping design for generators. His presentation will cover a range of essential aspects, including guidelines for sizing the gas service, the correct size selection and type of pressure regulators, as well as gas piping recommendations aimed at minimizing pressure drops and regulator drop. With Jim's expertise, we will gain valuable insights into ensuring efficient and safe natural gas piping systems for generators, an area of paramount importance in our industry.

I encourage everyone to come prepared with questions and a thirst for knowledge, as Jim Webster's presentation promises to be both informative and engaging. The session will not only broaden our understanding of natural gas piping design but continue our ASPE tradition of fostering a sense of community among fellow plumbing professionals.

As we embark on this exciting journey into the intricacies of natural gas piping design, let's continue to embrace the spirit of collaboration and learning that defines our ASPE community. Together, we can elevate our expertise, share valuable experiences, and strengthen the foundation of our industry.
Looking forward to seeing you all on November 16 for an enriching and enlightening session with Jim Webster.
Let's make this November a month of growth, laughter, and shared wisdom in the wonderful city of Baltimore!

Warm regards,
Julian
Vice President – Technical

Fuel Gas Piping Systems and Fuel Gas Codes

These systems can be safe and economical choices if they are designed, installed and maintained properly.

September 4, 2023 | Ron George

I have been involved with designing, inspecting and investigating fuel gas system installations since 1978. Fuel gas systems can be safe and economical choices for space heating, water heating, energy generation or industrial process applications if they are designed, installed and maintained properly.

The United States uses two model fuel gas codes — the National Fuel Gas Code and the International Fuel Gas Code. They include sections on approved materials for fuel gas pipe, valves and fittings. Over the years, fuel gas systems have been installed in accordance with various model fuel gas codes and various editions of the model or local codes. The model codes have changed and evolved over the years.

The model codes are updated every three years, although some local jurisdictions do not automatically adopt the latest version of the model code. It is important to determine the code enforced by the local jurisdiction. The applicable codes should be identified on the project drawings or in the specification manual, as well as the year edition of the code to be followed.

FUEL GAS TYPES

Fuel gases include natural gas, propane, butane, methane, hydrogen, and mixed gases. For a given project, the design professional should first determine if one of these gases is available to the site from a local utility or gas service provider.

Several projects I was involved with used methane gas captured from wells drilled in landfills to run nearby gas-powered generators for electric power generation. The methane gas produced power, and the power was sold to nearby industrial facilities. Other projects used captured methane gas from wastewater treatment plants to run engines that drove electric generators and air compressors for the aeration process at the wastewater plant.

These gases, when designed, installed and maintained properly, can provide a relatively clean-burning energy source for fuel-burning equipment: generators, boilers, water heaters, furnaces, infrared heaters, cooking equipment, fireplaces, and many other fuel-burning appliances.

When designing fuel gas systems, the design professional and the installer should determine which code has jurisdiction in the municipality where the project is to be built. Local jurisdictions may have adopted one of the model fuel gas codes with local amendments, or they may provide their own code.

The most common fuel gas is natural gas. Propane also is a common fuel gas in rural areas where the gas is delivered in liquid form and evaporates into a fuel gas in the piping system at lower pressures. Butane and mixed gases are less-common fuel gases but are found occasionally, and hydrogen is being used in some areas where it is mixed with natural gas or methane in small percentages.

Verify the fuel gas type and the caloric value and document them in your calculations.

HEAT CONTENT FOR FUEL GASES

All fuel gases have a heat content or caloric value when they are burned. The caloric value is measured in British thermal units (BTUs), where one BTU is the amount of heat required to raise one pound of water one degree F. Check with the gas supplier or gas utility to confirm the caloric value of the fuel gas.

This article originally appeared in Plumbing Engineer, a PHCPPros publication. For more articles like this, please visit www.phcppros.com

Fuel Gas Piping Systems and Fuel Gas Codes

The caloric value helps to determine the cubic feet per hour of the fuel gas required for an application. Knowing the caloric value of the fuel gas can help with pipe sizing. Generally, fuel gases have the following heat content in BTUs:

- Natural gas has a caloric value of 1,000 BTUs/cubic foot.
- Propane has a caloric value of 2,500 BTUs/cubic foot.
- Butane has a caloric value of 3,200 BTUs/cubic foot.
- Hydrogen has a caloric value of around 325 BTUs/cubic foot.

Switching from one fuel gas to another requires changing or modifying the orifices or jets in the burner assembly. Since hydrogen is so low in BTUs per cubic foot, it is often blended with natural gas in amounts up to about 15%. If hydrogen fuel is burned at 100%, the burner jets would need to be much larger, and the pipe sizing would also need to be adjusted accordingly.

Natural Gas
When using natural gas, the designer should determine the BTU requirements for the fuel-burning equipment and divide by 1,000 BTUs/cubic foot of gas to get the cubic feet per hour (cfh) gas required for the equipment. Add the cfh required for each section of piping with no diversity.

The caloric value or heat content of natural gas per cubic foot (cf) can range from about 950 BTUs/cf to 1,100 BTUs/cf, depending on the gas utility's caloric value or blending with other gases listed for their gas. The specific gravity of natural gas is about 0.65, while air has a specific gravity of one. That means natural gas is lighter than air and dissipates when released into the atmosphere.

The flammability range of natural gas is from 3.9% to 15% volume in air. Any concentration of natural gas below 3.9% will not ignite because there is not enough fuel-to-air ratio to support combustion. This is often said to be too lean for combustion.

A concentration of gas above about 15% fuel gas-to-air ratio generally will not support combustion because the ratio is too rich for combustion. The amount of combustion air required for natural gas is 10 cubic feet of air for every cubic foot of gas.

Propane
Common in rural areas where it is delivered to remote locations by filling tanks on-site that are piped into the building, propane has a BTU content 2.5 times higher than natural gas. The specific gravity of propane is 1.52. Propane is heavier than air and pools on the ground or in low places, such as a basement, when released into the atmosphere. Some local codes addressed this by not allowing fuel gases heavier than air in basements.

The flammability range of propane is from approximately 2.1% to 10.1% volume in air.

Butane
Not as common as propane, butane is used mostly in rural areas. It has a BTU content of approximately 3,200 BTUs/cf. The specific gravity of butane is 1.95, which is much heavier than air. Like propane, butane pools on the ground in low places and is subject to restriction in some codes. The flammability range of butane is from approximately 1.9% to 8.6% volume in air.

Fuel Gas Pressure
Fuel gas pressures vary depending on the type of gas being used. Natural gas is typically piped from the gas fields to utility companies in high-pressure-rated piping mains that can withstand pressures in the thousands of pounds per square inch (psi). The reason the pressures are so high is to move large quantities of gas through relatively small pipe.

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Fuel Gas Piping Systems and Fuel Gas Codes

The local utility company typically buys gas from the market through transmission mains with control valves, gas compressors (pumps), meters to record the amount flowing, and regulators assemblies to maintain constant pressures downstream.

Propane and butane are typically delivered by tank trucks to on-site tanks and sometimes supplied in high-pressure liquid form. When released to lower pressures, they boil off or evaporate into a gas as they flow through the pipe or through an evaporator. Propane can be a combustible refrigerant; new code requirements are being developed to deal with combustible refrigerants.

Natural gas pressures can be expressed in several different ways, and I have seen people mix up these pressures in the past. High- and medium-pressure fuel gas systems are expressed in psi. Low-pressure gas can be expressed in several different ways. It is important when communicating gas pressures to be consistent with the units you describe. Fuel gas pressures are often given in one of the following:

1. Pressure units:
    a. Pounds per square inch (psi)
    b. Inches of water column (wc)
    c. Ounces of pressure
2. Pressure conversions:
    a. One psi equals 28 inches of wc, which equals 16 ounces of pressure
    b. One-half psi equals 14 inches wc, which equals 8 ounces of pressure

FUEL GAS VALVES

Valves for fuel gas piping should be rated for the fuel gas application and pressure and listed or approved by a third-party testing agency. In low-pressure piping systems (1/2 psi and below), a lubricated gas cock is sometimes used. These older-style valves have performed adequately because lubricated plug valves use thick grease as a seal against gas pressure.

If the pressure exceeds about 1/2 psi or if the temperature gets too high, the grease can be forced out of the annular space between the plug and the valve body, allowing a gas leak. In a fire, the grease in the lubricated plug valve melts and allows gas to escape.

For these reasons, I try not to use lubricated plug valves on gas lines. Newer gas valves use seals designed for fuel gas service for leak-free operation. Higher-pressure systems (above 1/2 psi) should use ball valves or other approved valves rated for water, oil or gas service pressures.

INSTALLATION REQUIREMENTS

Some areas of older East Coast cities have very old cast-iron gas main piping, and the gas utility cannot raise pressures too high because the brittle cast-iron can rupture, releasing the gas into the soil where it makes its way to the point of relief. Generally, these older gas mains operate between about 1/2 psi to 1/4 psi. Every gas appliance includes an appliance label with the manufacturer's maximum and minimum gas pressure required for the equipment to operate properly.

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Fuel Gas Piping Systems and Fuel Gas Codes

FUEL GAS BUILDING SERVICE ENTRANCE
Fuel gas piping is generally not allowed to enter a building belowgrade. Gas piping installations where the pipe enters the building belowgrade have been responsible for many building explosions and fires.

When soil around the fuel gas pipe shifts or settles, it creates a void along the pipe. Gas leaks far away from the building can travel along the void space between the pipe and expansive soil and enter the basement or crawl space if not properly sealed. Piping in concealed spaces or under floors should be double-walled piping, with the outer pipe vented to the outside.

GAS PRESSURE WITHIN BUILDINGS
Typically, the utility distribution pressure up to the building is less than 100 psi but can be higher in areas that have seen a lot of growth. The utility company typically provides a gas regulator with the gas meter assembly at each service connection to reduce the pressure to a lower pressure for customer use.

The pressure after the utility service meter/regulator assembly is typically reduced to about 1/2 psi or 14 inches or 8 ounces of gas pressure. In some areas, it may be slightly higher or lower, so check with the utility for pipe sizing within the building.

Some large commercial, industrial or heavy gas users may use pressures up to 5 or 10 psi. Most mechanical codes have pressure limitations of 5 psi inside a building. Variances can exist if large industrial boilers, furnaces or other process equipment require higher pressures to operate.

GAS APPLIANCE CONNECTIONS
Piping connections to equipment should include a gas shut-off valve with a dirt leg and a union for the removal of the equipment. After the gas appliance shut-off valve, if a gas line is connecting to an appliance, an approved gas appliance connector should be used if the appliance includes a motor that vibrates or if the appliance, such as a gas stove, grill or dryer, will be moved for service.

A cap or plug should be placed on the gas line if no gas appliance has been installed yet. If a gas appliance is not connected to the gas piping system, the code requires that gas piping outlets not connected to appliances are required to be capped or plugged gas-tight. This is because if the gas line is left open and someone inadvertently opens the gas appliance valve or an upstream isolation valve, gas can escape, causing an explosion and fire.

I have investigated many explosions and fires associated with uncapped gas lines where moving an appliance, like a dryer, bumped the valve open or where brooms, mops or pets beside or behind appliances bumped the valve and caused it to partially open, allowing gas to escape from an uncapped or unplugged gas outlet.

In other cases, the gas appliance valve was left open after pressure-testing equipment was removed; when an upstream gas valve was opened, gas flowed freely into the building. In each case, an explosion and fire injured or killed building occupants. A simple cap or plug on the pipe is required by code and will prevent such a disaster.

PURGING AIR FROM NEW GAS LINES
Many large gas explosions and fires have been attributed to the purging of gas due to a phenomenon known as “odor fade.” When new gas piping is installed, it has a dry interior surface with dirt and iron oxide that will condense and soak up the odorant added to the gas.

This article originally appeared in Plumbing Engineer, a PHCPPros publication. For more articles like this, please visit www.phcppros.com

Fuel Gas Piping Systems and Fuel Gas Codes

Natural gas generally has little to no odor, and because of early gas leaks and explosions, the fuel gas industry decided to add an odorant — ethyl mercaptan — to the gas, allowing it to be detected before reaching flammable limits. In new piping installations, the odorant condenses on the walls of the pipe, where the dirt and iron oxide soak it up until the pipe walls are saturated.

When new pipes condense the ethyl mercaptan, the odor fades. Many new gas piping installations have had explosions and fires, where the odorant was not noticed before the explosion or flash fire.

MAIN GAS PIPE SIZING

Gas piping should be sized in accordance with the sizing tables in the mechanical or fuel gas code. Typically, for sizing the main gas pipeline, you should determine the total developed length of the main gas pipe and the equivalent length of fittings from the gas service regulator at the building service entrance or in-line regulator to the farthest piece of gas equipment.

Then refer to the fuel gas or mechanical code for the gas sizing tables and find the gas pressure table corresponding to the gas pressure downstream of the gas pressure regulator in your project. Choose the column for the pipe length that meets or exceeds your total developed length to size the gas main from the farthest fixture to the gas service meter/regulator assembly.

For each closer branch, you add the cfh to the main pipe and select the appropriate size pipe size for the cfh flowing through that section of pipe.

For sizing the branch piping off the main, you can use the same column in the table to size all the branches. You also can use the total developed length from the meter/regulator assembly to the farthest branch fixture on that particular branch and size the branches on a column based on the shorter developed length.

In a few cases, going this extra step might allow you to downsize a branch pipe by one pipe size. In a large building, that might make a financial difference.

Please refer to the online version of this column for a review of the two model fuel gas codes: the National Fuel Gas Code (NFPA 54), administered by the National Fire Protection Association, and the International Fuel Gas Code, administered by the International Code Council.

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Kathy Dwyer
Treasurer

We had a great meeting on September 25th for anyone who missed it! Niki did an excellent and informative job on vacuum systems.

As a chapter we are in a stable financial position.

Just a few housekeeping items:

1. Please register. Olive Grove only cooks the number of crab cakes and sets the number of places that I have called into them on Tuesday before the meeting. When you just show up it puts us in a position of not having enough dinner nor seats for everyone who is attending.
2. The only other issue as a board we had decided we can only do a max of three tabletops / meeting so if you sign up and find you cannot get a table top it is because we already have three assigned for that meeting.

We appreciate your attendance and are trying to help things run smoothly. I am looking forward to seeing you on November 16th at the Olive Grove.

Kathy Dwyer
kdwyer@ejdwyer.com

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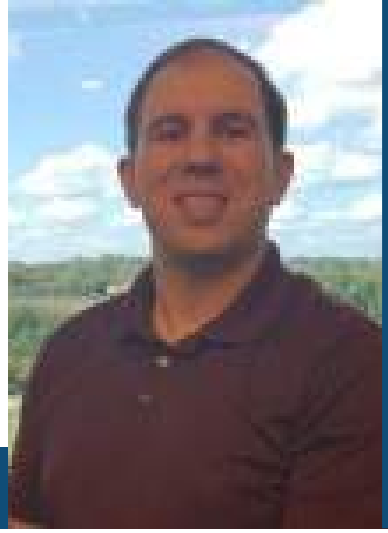

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Chris Imhof, PE, CPD
Vice President- Legislative

General Notice from Maryland Department of Labor
2021 Code Cycle Adoption Information
State (the Department) has adopted the 2021 edition of IBC, IRC, IECC, IgCC & IEBC for

(I) COMAR 09.12.50 Model Performance Code & COMAR 09.12.51 Maryland Building Performance Standards
(II) COMAR 09.12.57 International Green Construction Code
(III) COMAR 09.12.58 Maryland Building Rehabilitation Code Regulations

The effective date is May 29, 2023. State law requires local jurisdiction to start implementing & enforcing the new requirements by May 29, 2024.

Code Administration News - Building Code Administration

COMAR 09.12.50 Model Performance Code
Model Performance Code (MPC) provides standards for the construction of the Industrialized/Modular buildings and construction, alteration, remodeling, and renovation of the buildings that are owned, leased, operated and controlled by the State. The Model Performance Code is not binding on any subdivision of the State unless specifically adopted by it. One of the primary purposes of the code is to provide minimum standards for “industrialized” (pre-fab) buildings.

COMAR 09.12.51 Maryland Building Performance Standards
Maryland's law related to building codes is called the Maryland Building Performance Standards (MBPS). It requires each jurisdiction in Maryland to use the same edition of the same building codes that are the International Building Code (IBC), the International Residential Code (IRC), and the International Energy Conservation Code (IECC). The State has modified the IBC and the IRC to coincide with other Maryland laws. The International Building Code (IBC), the International Residential Code (IRC), and the International Energy Conservation Code (IECC), with modifications by the State, constitute the Maryland Building Performance Standards (MBPS).

Each local jurisdiction in Maryland may modify these codes to suit local conditions with exception to the International Energy Conservation Code (IECC - The Energy Code) and Maryland Accessibility Code (MAC - The Accessibility Code). The Energy Code and the Accessibility Code can be made more stringent but not less by the local jurisdictions. Please refer to the local jurisdictions listed under "Local Ordinances and Contacts" to view local ordinances that may contain their modifications. Since ordinances change and are modified from time to time, please contact the local jurisdictions to obtain their current building code information.

COMAR 09.12.57 International Green Construction Code
This is a new addition to Subtitle 12 - DIVISION OF LABOR AND INDUSTRY. The new language is very short and simply says “The purpose of this chapter is to adopt the International Green Construction Code (IgCC)” and “the 2021 International Green Construction Code (IgCC), International Code Council, is incorporated by reference.” Unlike the COMAR 09.12.51, COMAR 09.12.57 does not include definitions, modifications, local amendments, applications, or enforcement. Due to this lack of additional language, it is not clear if local jurisdictions will be required to adopt the IgCC, if the code could it be amended, and who would be responsible for enforcement.

COMAR 09.12.58 Maryland Building Rehabilitation Code Regulations
The purpose of COMAR 09.12.58 is to adopt the 2018 International Existing Building Code (IEBC), with modifications, as the Maryland Building Rehabilitation Code. The code may be amended by and is to be enforced by local jurisdictions.

Chris Imhof, PE, CPD
Vice President – Legislative

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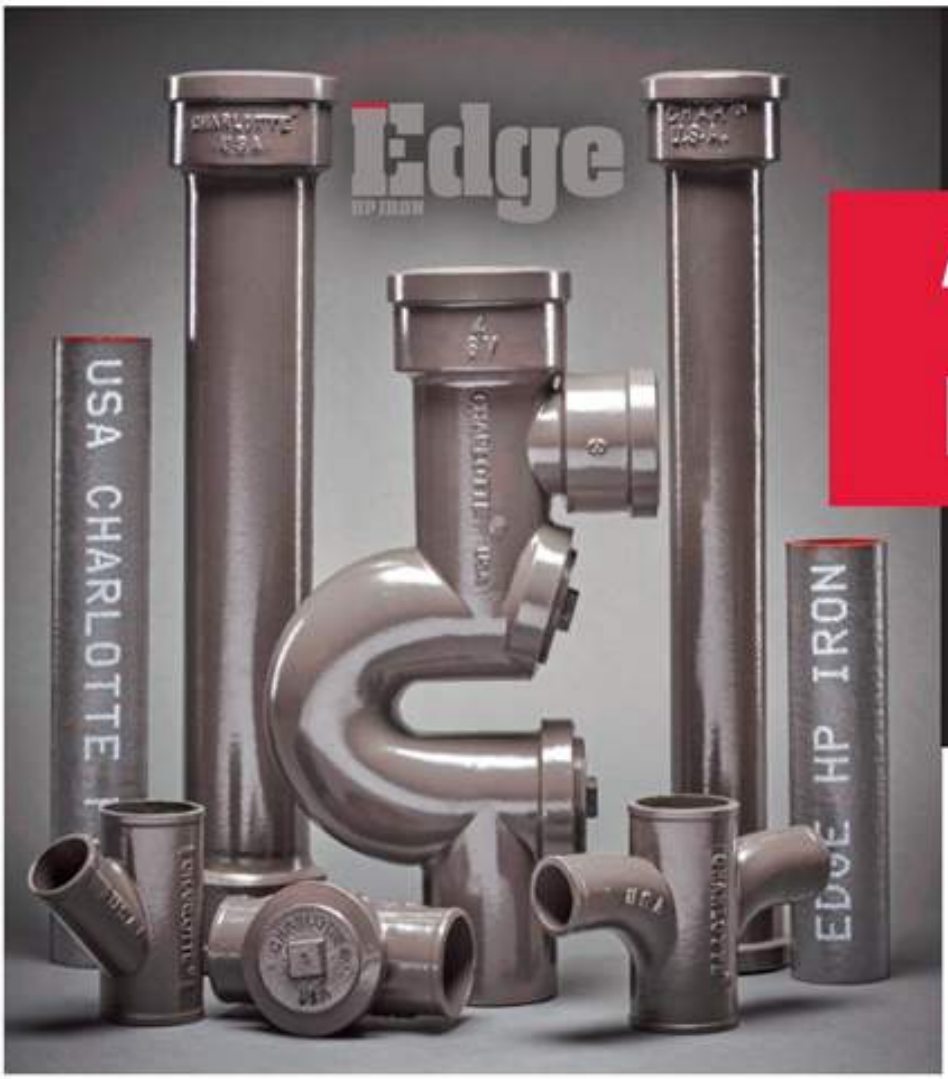

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WHAT IS DURAGUARD?

DuraGuard is an antimicrobial property built into the toilet seat to inhibit the growth of bacteria. The active ingredient in DuraGuard is zinc pyrithione, a non-VOC (volatile organic compound), broad-spectrum, highly effective antimicrobial agent used to control mold, mildew, yeasts, fungi, algae, gram positive and negative bacteria. DuraGuard does not protect users or others against bacteria, viruses, germs, or other disease-causing organisms.

WHAT IS STAY·TITE?

STAY·TITE Seat Fastening System™ anchors the toilet seat to the bowl by using a patented bolt design with a finned bushing and glass-filled nylon nut, eliminating the need to retighten the seat to the bowl after installation.

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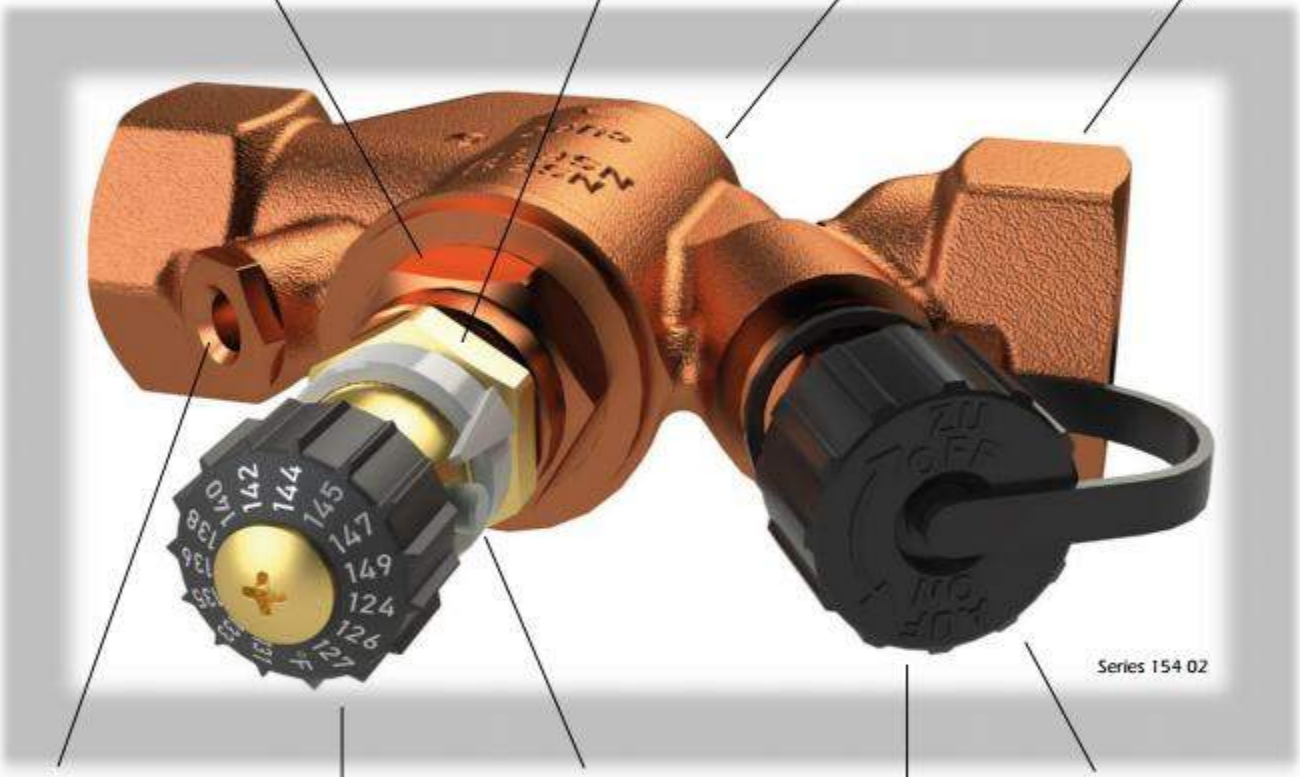

Available port
This port can be used for a BMS temperature sensor probe.

Locking dial
Set screw locks in the temperature setting hidden under a protective cap.

Built in isolation valve
This feature stops the flow of water through the valve.

Adjustable temperature dial
This feature provides flexibility and allows for real-time adjustments to the HW return temperature setting.

Integrated port
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Broken temperature probe alert		+	+	+
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INTELLISTATION® JR

IntelliStation® Jr. provides safe hot water consistently and on-demand for smaller applications than IntelliStation. It is also ASSE 1017 compliant, available in 3/4" through 2" sizes, and has a programmable temperature set-back/scheduling program that lowers water temperature when the building is unoccupied. Register the Jr. with the Watts OnSite mobile or web app for remote temperature control, monitoring, and visibility across locations and sublocations.

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Schedule of Events

SEPT 27	Communication Skills for Construction & Consulting	BJ Allen Warfel Construction
OCT 25	Vacuum System Design	Nikita Patel Sherman Engineering
NOV 16	Generator Basics	Jim Webster Kelly Generator & Equip.
DEC 13	Air Compressors	Will Dargan Cummins Wagner
JAN 24	Grease Interceptors	Schier Products
FEB 28	Fire Protection Specialties	Ken Isman University of Maryland
MAR 27	Fire Protection- Pre-Action Systems and Clean Agents	Josh Shapiro Reliable Sprinkler Co
APR 24	Siphonic Roof Drains	UV Systems
APR 2024	Annual Golf Tournament	Details to Follow
MAY 22	Natural Gas Sizing	Chuck Swope Mueller Associates ASPE Baltimore President
JUN TBD	Annual Summer Party	Details to Follow

MONTHLY SPONSORSHIP OPPORTUNITIES

Tabletop Presentations: $100 to provide a tabletop presentation of equipment or material relative to the plumbing profession. The tabletops 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.

Please make checks payable to the Baltimore Chapter of ASPE. Contact Kathy Dwyer or Chuck Swope if interested