

COA
The Right Direction

"Get Certified"
Inspector of the Year
2011
Casey, O'Malley Associates
Las Vegas Inspection Event

Casey, O'Malley Associates

New Plumbing Components and Codes

Keystone Home Inspector Conference

Schematic of Plumbing System

The diagram illustrates a cross-section of a house with a green roof. A central red water heater is connected to a network of blue pipes representing the hot water supply system. Yellow pipes represent the cold water supply system. Grey pipes represent the drainage and vent system, including a sink on the right and a vent pipe extending through the roof. The system is shown with various valves and fittings.

Illustration by Code Check color modified by COA

First rule, know the system

Significant Recent Code Changes

- Shower stall drains can now be 1-1/2 inch, was 2-inch min (2-3/4gpm shower head max)
- Building drain vent can be through a sidewall, previous was through roof only
- Drain vent min. 6-inches above the roof (previous was not identified)
- Sump pump discharge pipe must be same size as pump discharge tapping

Significant Recent Code Changes

- Nail (striker) plates to extend min. 1-1/2in beyond diameter of hole
- Water service pipe may not pass through one townhouse to serve another – must enter independent
- Concealed gas vents to be protected by strike plates in wall at top and bottom plates
- AAV not allowed for Sewage Ejector vent (2009 IRC)

Significant Recent Code Changes

- Bidet water temp limited to 110F
- Tub and whirlpool water temp limited to 120F (same as shower)
- Whirlpool pump access to be 18x18 if pump >2ft from hole
- If more than 50% of plate removed install metal strap with 8-16d nails each side (not total)

Mixing Valve to Lower Temp

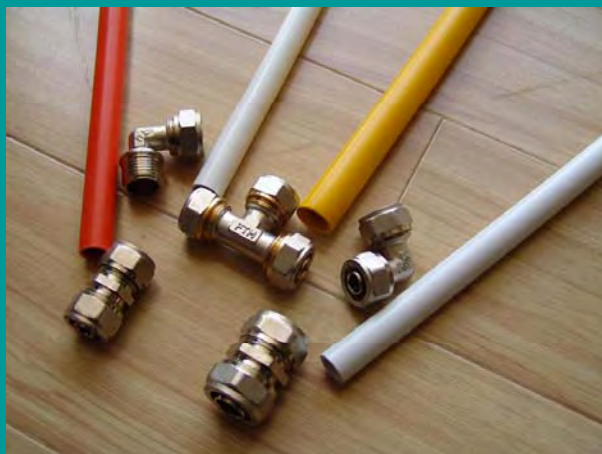


PEX Tubing – Metal Fittings



**Cross-Linked Polyethylene
(this is not PB)**

PEX-AL-PEX with Fittings

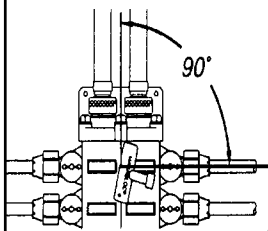


Used for Service pipe and for Heating

PEX (Zurn) with Corroded Fitting



Cross-Linked Polyethylene

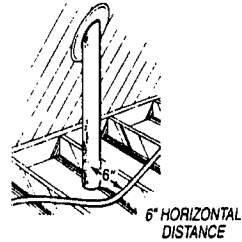
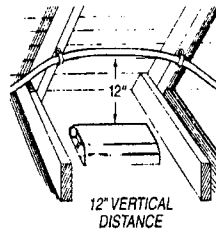


6. As the distribution lines are eventually connected to the MANABLOC (see instructions pages 14 & 15), ensure that the tubes exit the unit at a 90 degree angle to the centerline of the MANABLOC so as not to induce bending stress on the MANABLOC.

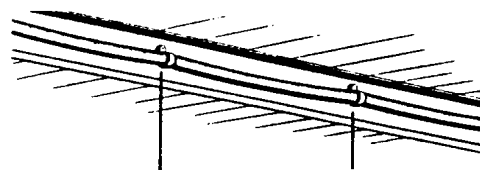


Cross-Linked Polyethylene

■ Keep the Vanex tubing (PEX) a MINIMUM of 12" vertically and 6" horizontally from sources of high heat such as recessed light fixtures, gas flue vents, heating appliances or electric motors. Forced air heating ducts are not generally considered sources of high heat. These areas of installation should be rechecked after further construction and other mechanical systems have been installed.



Cross-Linked Polyethylene



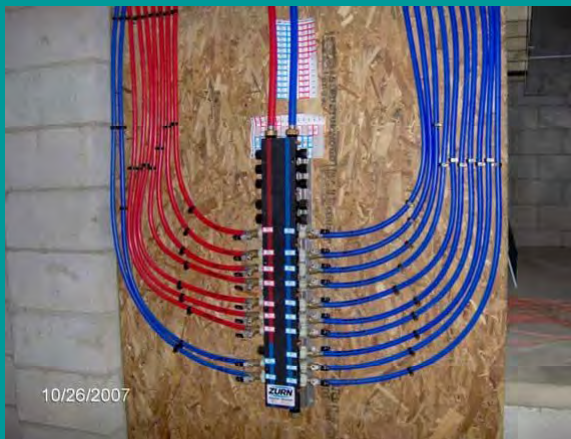
Support the horizontal tubing at least every 32".

DO NOT use supports that may collapse or cut the tubing. Supports must NOT have sharp edges which could damage the tubing.

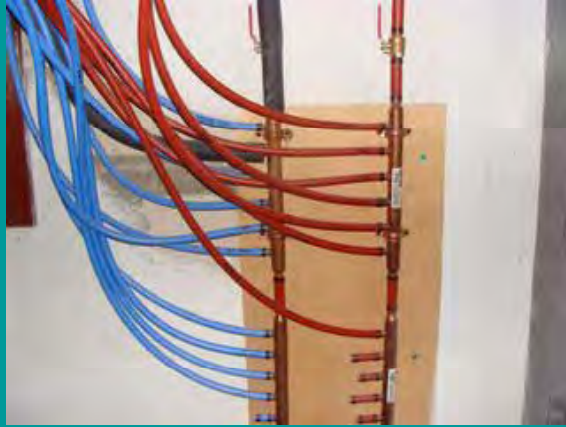
PEX with Incorrect Straps



Pex Manifold System



PEX Manifold System?



Advantages of PEX

- **Less friction loss = better flow**
- **Manifold systems have less pressure drop than conventional systems (fewer fittings)**
- **Easier to install (cost savings)**
- **Price – copper is expensive & no torch**
- **Fewer parts – shutoffs only needed at manifold, not at fixtures (ex. Toilet)**
- **Withstands freezing (expands -no bursting)**

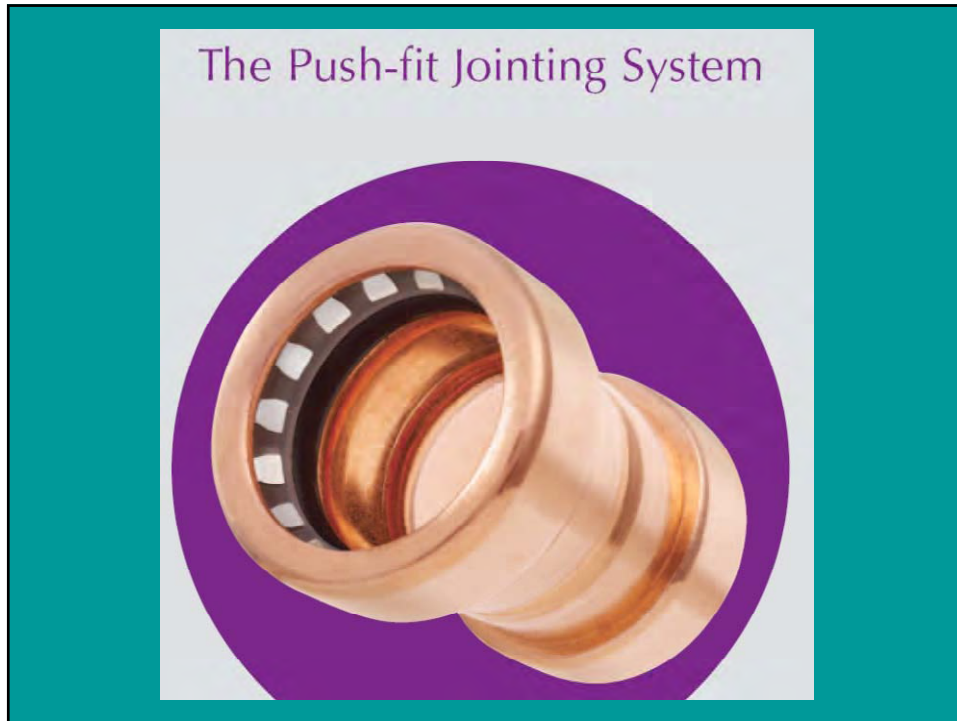
Disadvantages of PEX

- Some types discolor if exposed to sun
- Fittings improperly crimped/made often by installers
- Kinks if not properly laid out and supported but has good thermal memory
- Easily mechanically damaged
- Like PB, some lawsuits but not industry-wide

Disadvantages of PEX



Rodents!

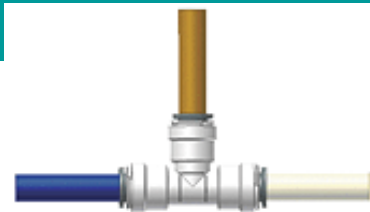


Quick Connect Fittings AKA "Shark Fittings"

Connect to Multiple Materials!

Watts Quick-Connect fittings incorporate Stainless Steel Gripping Teeth in the Collets. These corrosion resistant teeth allow the fittings to interconnect with multiple materials without the need for special tools or tube inserts.

- PEX, LDPE, MDPE, & HDPE Tubings
- Copper
- CPVC
- Polybutylene



Real Shark Bite Fittings

Wolverine Brass

Professional Contractors
Stock Assortment



To Place An Order:
Call: 1-800-944-9292 • Fax: 1-800-945-9292

Regulators and Pressure Tanks

- Many regulators prevent flow backwards toward the meter, or the street pressure is too high anyway
- As water temperature increases (water heater recovery) interior pressure rises
- If pressure can't bypass and equalize with street pressure, an expansion tank must be installed – the case nearly all the time

Thermal Expansion



Expansion Tank



Another way....



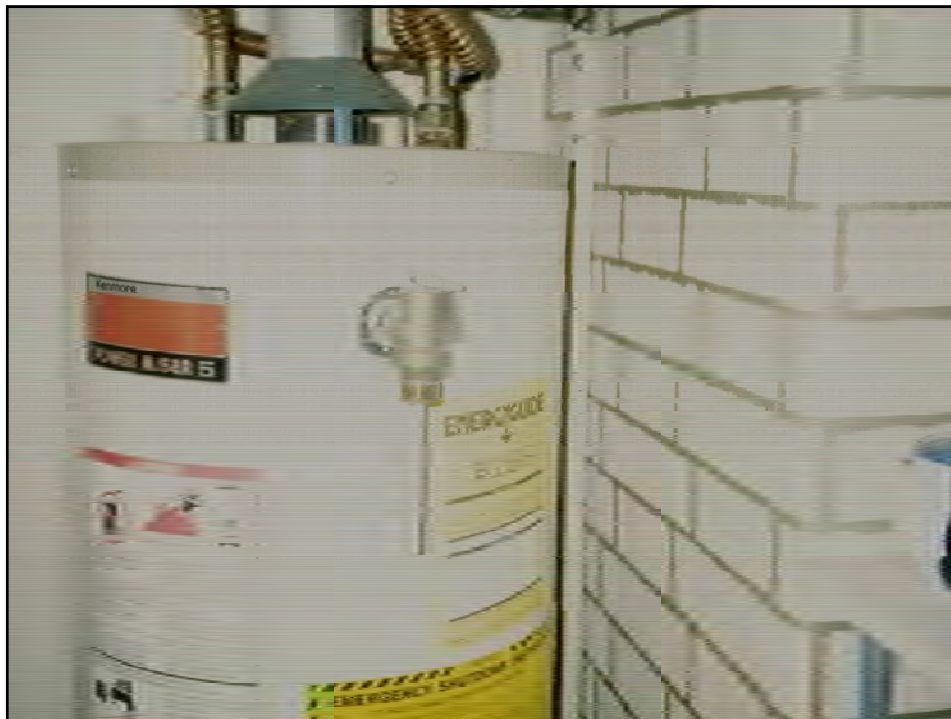
Description:Series Governor 80 Ball Cock and Thermal Expansion Relief Valves are triple-function devices: a toilet tank ball cock, an anti-siphon backflow preventer and a thermal expansion pressure relief valve. The Governor 80 limits the domestic water system's preset static pressure, protects the temperature and pressure relief valve on the water heater, reduces the requirement for a thermal expansion tank or an auxiliary relief valve and prevents backflow from water closets. Relief Valve Set At: 80psi.

Another way....



Combination Ball Valve and Relief (PRESSURE NOT TEMPERATURE) Valves are used in commercial and residential applications on water heater installations. It consists of a bronze body construction with a full port (reduced port with PEX connection), nickel-plated brass ball, blowout-proof brass stem, PTFE seats, stem packing, and stem thrust bearing, Viton relief ball, stainless steel relief spring, brass adapter, and steel handle (the relief valve outlet includes a drain tube connection with PEX or compression fitting models). Series BRV has a low profile design and can be installed in any position. It is for applications that require a means to shut off the water supply to the water heater and for providing protection from excess water pressure caused by thermal expansion. Pressure Rated: 400psi. Relief Valve Pressure Settings: 75, 80, 100 or 125psi

Thermal Traps – WH inlet and outlet



Not Tankless Water Heater



Tankless Water Heaters



Tankless Water Heaters



Tankless Water Heater Flue



Tankless Water Heaters Flue

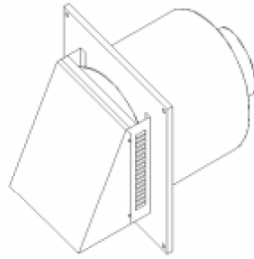


Tankless Water Heaters Flue



Tankless Water Heaters

ACCESSORIES CAN BE ORDERED THROUGH YOUR DEALER OR CONTROLLED ENERGY.



- Back draft prevention vent terminator for horizontally vented installations. Prevents cold air from blowing into the heat exchanger and harming the unit. Part number: **FXHOOD** See installation template below.

Tankless Water Heaters

Vent Connections

This Category III water heater is listed for use with single wall stainless (AL29-4C) or galvanized vent pipe of 26 minimum gauge and must maintain a 3" clearance to combustibles. Use of a special gas vent listed for Type II, III and IV is recommended but not required. Manufacturers include FasNSeal, Z-Flex and Heat-Fab. Follow clearances and sealing methods specified by those manufacturers. If local codes supercede national codes (NFGC and IFGC), a greater clearance to combustibles may be required. Always check with your local plumbing or mechanical inspector before installing.

The vent system must be gas tight. All seams and joints must be sealed with silicone sealant that has a minimum temperature rating of 350° F. For best results, horizontal and vertical vent systems should be as short and straight as possible.

Double wall type B-vent is not permitted or approved for Category III Appliances. Do not common vent the 240FX with any other vented appliance.

Tankless Water Heaters PRV or TPRV?

PRESSURE RELIEF VALVE

This unit is supplied with a listed pressure relief valve. The pressure relief valve must be installed on the hot water outlet. A "Tee" fitting should be used to attach the pressure relief valve. The pressure relief valve must not exceed the following:

| | |
|-----------------|---------|
| Pressure Relief | 150 psi |
|-----------------|---------|

The discharge capacity must be at least 165,000 Btu/hr and the discharge opening shall be piped to a suitable drain to prevent water damage should discharge occur.

If the pressure relief valve on the appliance discharges periodically, this may be due to the thermal expansion in a closed water supply system or excessive building water pressure. Contact the water supplier or local plumber on how to correct this situation.

Do not plug the pressure relief valve. The relief line should have no reduced fittings or other restrictions and should allow for complete drainage of valve and line. The pressure relief valve must be manually operated once a year to check for correct operation.

Tankless Water Heaters



Tankless Water Heaters



Tankless Water Heater w/recirc

Some Tankless Heaters are recirc Compatible and do not need the small tank



Cross Connections USC Survey

Introduction and Results

The University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC-FCCCHR) performed a study in late 2002 and early 2003 to determine the degree of protection against backflow that is present in today's homes.

The results are summarized as follows:

- 9.6% of the homes surveyed had direct health hazard cross-connections
- 73% of the homes' water uses were unprotected cross-connections
- 95.7% of the homes had either a direct or indirect cross-connection to a health hazard
- 91% of the homes had unprotected hose bibbs
- 43.6% of the homes had heating/cooling system health hazard cross-connections

Watts reminds you to check the following common cross-connections in homes to ensure the proper protection against backflow:

Cross Connections

- **Cross connections: RPZ (reduced pressure zone backflow preventer) AKA RPD (reduced pressure principle device)**
- **Different from DCVA (double check valve) which do not have the reduced pressure zone and relief**

This is a Cross Connection



Water softener regeneration discharge to soil pipe

Reduced Pressure Zone Backflow prevention



Reduced Pressure Zone Backflow prevention



Reduced Pressure Zone Flood prevention



Sump Pump

Vacuum Breaker at Frost-Proof Hose Bibb (new built-in, not screw-on)

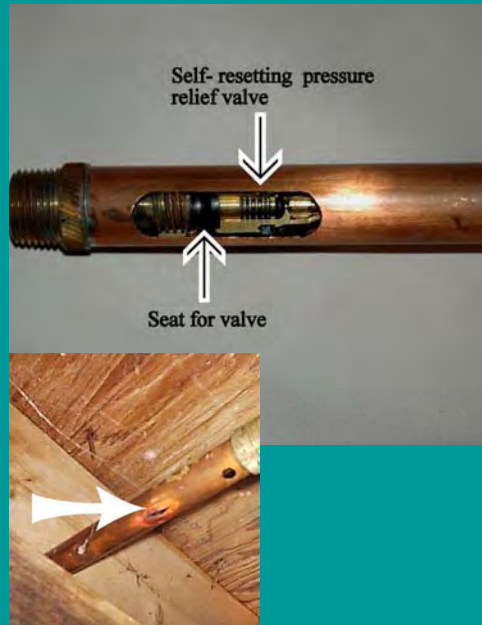


Ordinary Hose Bibbs Not OK in Freezing Climates

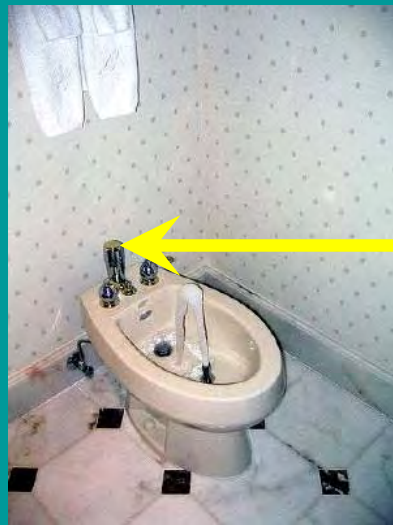


**“Frost Free” type
has valve inside
warm wall**

Frost – Free Hose Faucet



“Frost Free” type has valve inside warm wall – this one has a relief valve which opens if the hose is left on to release expansion when water inside freezes!



Backflow Preventer required for under-rim Bidet water supply

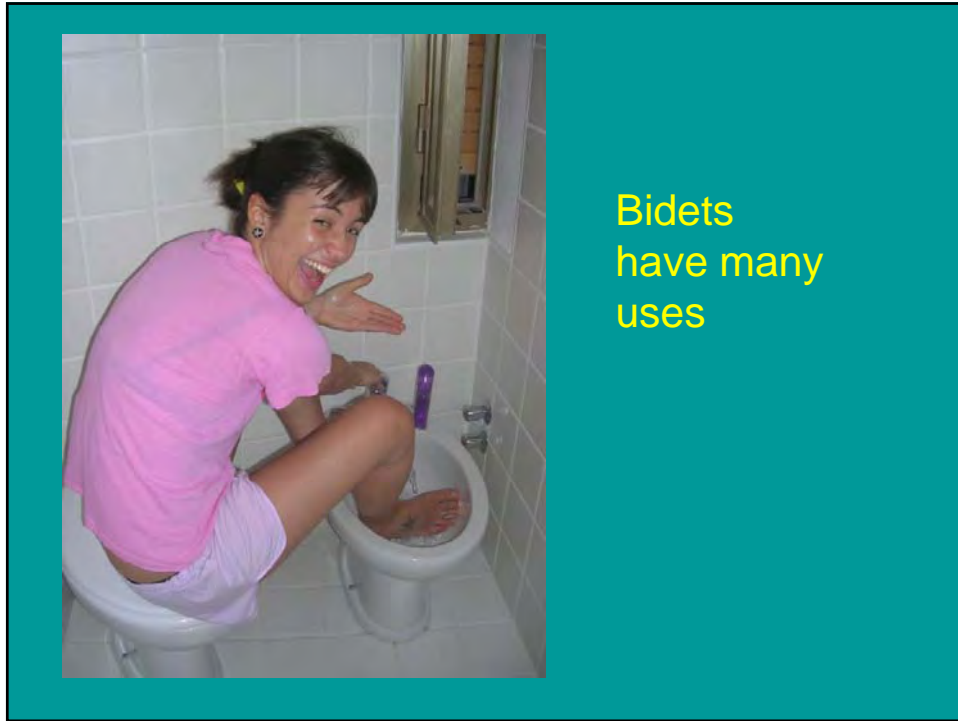


Backflow Preventer required for under-rim Bidet water supply - missing

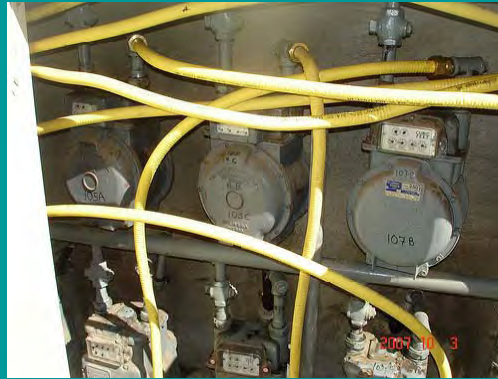


Backflow Preventer not required for over-rim Bidet water supply

Be sure hot's on the left!



CSST



CSST Striker Plates

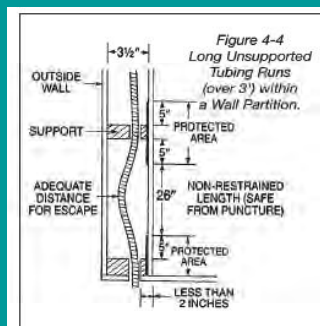
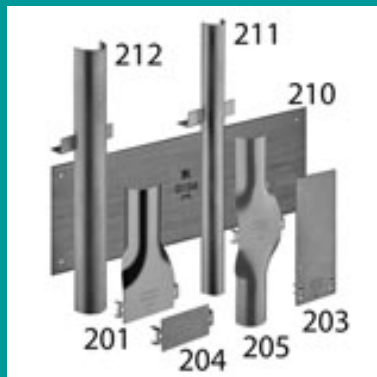


Figure 4.4. Courtesy of Omegaflex Inc. Always follow your manufacturer's installation instructions.

Regulator in house



Bonding CSST and other metal piping systems

- Bonding of metal piping systems is required by the NEC to safeguard against electric potential (i.e. the metal becomes energized) by causing the OCPD for the faulting circuit to trip. Ref 250.104(B)
- This can be done with equipment grounding conductors which are rather small.

Bonding CSST and other metal piping systems

- Proximity lightning strike surges can be 100+ times greater than household current faults.



Bonding CSST and other metal piping systems

- Nearly all CSST manufacturers NOW require bonding of their pipe directly to the grounding system close to the service entrance with minimum #6 copper as an attempt to handle the intensity of direct or indirect lightning strikes. The intent is to dissipate the current to ground (dirt).

Proposed new NFGC wording

- 7.13.1 Each aboveground portion of a gas piping system that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path. Gas piping shall be considered to be bonded when it is connected to appliances that are connected to the appliance grounding conductor of the circuit supplying that appliance.
- CSST gas piping systems shall be bonded to the electrical service grounding electrode system at the point where the gas service enters the building. The bonding jumper shall not be smaller than 6 AWG copper wire.
- 7.13.2 Gas piping shall not be used as a grounding conductor or electrode.
- Add the following two new definitions:
- Bonding Jumper: A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected. [NFPA 70]
- Grounding Electrode: A device that establishes an electrical connection to the earth.
- If the proposed change to the NFGC on CSST bonding is approved, there will be a significant difference between the 2009 NFGC and the 2008 NEC that will have to be addressed by the NEC committees when they consider changes for the 2011 edition.

Auto Gas shutoffs



Safety+PLUS® Excess Flow Valves - a new line of patented, magnet-based excess flow valves from BrassCraft. In the event of a gas line rupture or disconnection, the Safety+PLUS® valve immediately restricts gas flow to a non-hazardous level (bypass flow) to avert the potential for a dangerous release of gas into the home. Gas flow is inhibited only at the appliance where the problem exists; the rest of the home's system will continue to function. Only once the gas line is properly repaired, the bypass flow automatically resets the device to restore gas flow to the appliance. CSA design certified, Safety+PLUS excess flow valves are available for gas range, furnace, water heater, space heater, dryer and gas log fireplace applications.

Auto Water shutoffs FloodSafe™ Connectors

Watts is pleased to introduce its new line of FloodSafe™ Auto-Shutoff Connectors. The FloodSafe's patented design protects against catastrophic water damage caused by burst, broken or ruptured water supply hoses and fittings. FloodSafe™ connectors include a standard braided stainless steel flexible hose and a FloodSafe™ shutoff device located on the inlet.



Auto Temperature Water shutoffs



High Temperature Shutoff Device is designed to provide thermostatic protection for the shower. If the temperature during the shower reaches 115°F (46°C) this device instantly reduces the flow to less than 0.25 gpm (from 2.5 gpm). Once the temperature drops below 115°F (46°C), the WHT115 automatically resets and resumes full flow within seconds. It is ideal for use with two handle, single handle control valves. It is easy to install and can be used for new or existing applications.

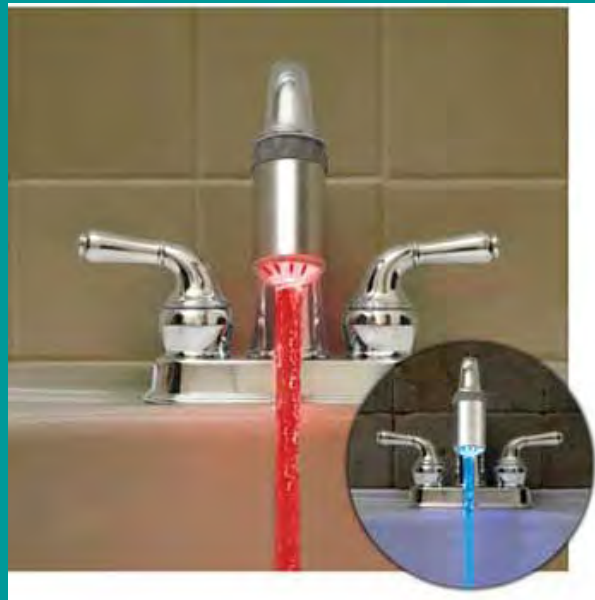
Famous Folding Urinal



Actual Ad Wording:

Besides taking up a lot less space, the urinal also uses a lot less water, only 10 ounces per flush. In fact, the urinal doesn't even need to be installed in your bathroom. Now you can have a place to pee in your kitchen if you want, while remaining sanitary. Washing hands is still encouraged.

H2glow Faucet



Your Faucet is Watching

This cool gadget has facial recognition system so when you get near to the faucets, it serves water temperature according to a user's taste.



Incorrect method
of repair

Temporary repair??



Not New Plumbing



Taipei (Taiwan) Plumber Restaurant



Taipei Plumber Restaurant it gets better!



Taipei Plumber Restaurant



Taipei Plumber Restaurant

So, not only
does Taiwan
Have the tallest
building
In the world they
have the
Toilet restaurant!



