

## ICC Water Leaks Roundtable Summary

On April 27, 2019, the International Code Council hosted a special Plumbing, Mechanical and Fuel Gas Roundtable discussion titled, Mitigating Water Leaks in Premise Plumbing Systems. Plumbing industry expert participants addressed a variety of water leak prevention solutions. Below are summarized discussion points from each panel and key takeaways.

### 1. Are water leaks due to a lack of guidance in the plumbing code? What areas of the code could be added or modified in the IPC or IRC to better address these failures?

#### *Panel A: Sanitary Drainage, Indirect Waste, and Storm Drainage*

- Overall plumbing requirements are adequate.
- The referenced standards must be readily available to the “contractor universe”.
- Big box retailers are making it too easy for unlicensed plumbers and homeowners to do just about anything.
- Purchasing referenced standards are expensive.
- Failures are typically caused by a misapplication of certain materials.
- Must understand means and methods and nuisances to avoid catastrophic failures.
- Home and building owners do not properly maintain their plumbing systems.
- Lack of education to installers.
- Possible language barriers.
- The IPC terminology “adequate conditions” is too subjective.
- Concerns of low-flow fixtures and velocity of flow.
- Low flow fixtures mean we are oversizing drainage systems.
- International Property Maintenance Code if adopted/implemented, would help mitigate numerous common problems.
- Propose a code change to include a “blueprint” or “as-built” document to homeowners/building owners to help identify possible maintenance areas.

#### *Panel B: Water Supply & Distribution, Fixtures, Appliances, and Solar*

- Standards are for products; codes are for minimum installation requirements.
- Codes are minimum standards. Drainage fixture units are not up to date.
- This is an employee/contractor issue in many cases; the code has adequate provisions.
- Misapplication of materials are many times reasons for failure.
- Maintenance issues also need to be addressed.
- Drain line sizing and water supply pipe sizing is from the 1940’s or 1950’s and needs to be updated. Oversizing of drain lines is an issue.
- Piping failures related to frost depth or freezing or pressure fluctuations.
- Substandard workmanship and inappropriate materials, which the code already addresses.
- Manufacturer’s installation instructions and operation manuals need to be provided.
- Current systems we have are getting more complex and homeowners are not educated on these new systems.
- TX has issues with chlorine disinfectant. Percentage of chlorine at temperature is an issue in warmer climates. The issue is addressed in the standard however the homeowner isn’t protected based upon the standard.
- Standard information must be in the code as the code official is not enforcing the standard requirements.
- Emergency repairs are addressed in the code.
- Building departments should issue annual permits for leak repairs versus on a per incident basis.

### *Panel C: Landscape Irrigation and Rainwater Harvesting*

- The code does a good job of covering the minimum requirements.
- Installation, operation and maintenance manuals are not provided and are key to the prevention of leaks.
- When your rainwater system goes down, who cares? It is not a mandatory or critical system.
- Proper owner maintenance is key to preventing leaks and there isn't much the codes can cover to impact this.
- The complexity of systems has become the biggest impediment.
- Inconsistency in design and over-regulation, or complexity of the systems.
- Rainwater harvesting systems are water conservation systems, but just as much, are stormwater management tools.
- The code needs to address some things, such as dye.
- We're seeing enormous changes in climatic conditions; seeing extremes for hot and cold weather and as a result, our design loads are changing.
- The IPC requires that we design for 100-year event. As design loads change, the codes need to adjust to that.
- The code rainfall tables are out of date and need to be updated.
- The water quality of rainwater systems is different than potable water systems, yet we're mixing them in the same pipes. The codes need to be aware of the different water chemistry.
- Rainwater systems impact the sanitary drain system as well; more solids, less liquid, due to water conservation.

## **2. What do you see as the three most common causes of failure and what could the Code Council do to mitigate failures other than modify their plumbing codes?**

### *Panel A:*

- Backwater valve failure.
- Insufficient pipe supports causing "flat" or "bank-pitching" in drainage flow.
- Improper usage, for example "Grease/Fats" dumping into sanitary waste drains.
- Improper use of food grinders/garbage disposals.
- Improper installation throughout industry. (Installer training)
- Utilize the International Property Maintenance Code. If adopted and implemented properly, it will help prevent a lot of common failures.

### *Panel B:*

- Insufficient support of piping and maintenance issues.
- The International Property Maintenance Code (IPMC) addresses these maintenance and repair issues, but it needs to be adopted.
- Improper materials and installation are the leading cause.
- IPC Chapter 8 in regard to chemical waste needs to be updated.
- Improper training on what the code states and what the manufacturers installation instructions state. Manufactures train, but not sure what the code officials are trained for.
- Adequate protection from freezing needs to be further defined in the code.
- Leak detection devices don't have to be a code requirement but should be offered as an option to homebuyers.
- Education is key and the owner or homeowner must be educated. All parties such as NAHB, Realtors must be part of this education. Many parts of the plumbing system are not known to the owners.
- Drain pans under washing machines are not a code requirement but a good preventive measure.

- Wholesalers and distributors are trying to educate the contractor and ultimately the consumer. Online training of the products is available. As long as the product has the certification mark it is fine to the contractor or inspector. Homeowner needs the education also.
- Common failure is improper installation practices.
- Hire licensed professional for installation and repair. Plumbers protect the health, safety and welfare of the public and just because the homeowner can do these repairs does not mean they should.
- Plumbing systems are out of sight out of mind until it's a problem.
- Partner with ICC and with the manufactures to provide online training.

*Panel C:*

- These systems are outdoors, so pathogens and mosquito growth in cisterns is more of a concern than building damage.
- There are leakage detection devices that are available for piping systems, may want to look their use in landscape irrigation systems.
- Consumers are investing a lot of money in landscape designs and vegetation that can be damaged from water leakage or water quality.

**3. It has been stated that homes in southern climates are more vulnerable to winter cold spells. Do the IPC and IRC adequately address climate variation?**

*Panel A:*

- The IPC does an adequate job on covering basic concerns.
- Need specific requirements for various climate zones, modify code language as needed.

*Panel B:*

- Need to look at IPC 305.4 for possible better wording on what are “adequate provisions” for protection from freezing.
- Orlando does drop below freezing and piping systems are installed outside.
- Appendix D needs reevaluated.
- The code addresses frost protection.
- Field inspection need to address this, especially piping systems that are installed in a ventilated attic space.
- Insulation is not installed properly to protect piping in exterior walls.
- Maybe plumbing systems should not be installed in exterior wall assemblies.
- Piping should not be installed in areas where affected by freezing temperatures.
- Seems like the code covers it.
- The existing code language “adequate provisions” is not prescriptive and subjective.
- Frost depth may need adjusted back to 12” below frost depth.
- Piping in FL must be prevented from UV degradation. Listing is for storage of materials, but not for installation in exposed areas.
- Do not to use spray foam insulation as vermin can eat it and destroy the intended purpose.

*Panel C:*

- We do have devices for protection in cold climates, but lack code clarification of when these devices should be used.
- The Chapter 13 verbiage is not definitive.
- We should have tables showing where these devices should be installed.
- Pipe material should be looked at for landscape irrigation; some materials are more suitable for freezing climates than others.

**4. Do you believe that water security systems (leak detection, or other means) should be mandatory in the plumbing codes to monitor and provide early detection of water leaks?***Panel A:*

- Panel agreed unanimously that these devices should not be mandatory.

*Panel B:*

- Code should not be mandatory for these systems, but these devices should be highlighted to the industry to the builders and homeowners.
- Shouldn't be a code requirement, but a savvy plumber should be marketing based upon cost saving and water saving.
- It should be in the code due to the extensive damage reports.
- Shouldn't be in the code, but market driven.
- Shouldn't be a requirement, but could be used in certain parts of the system, such as in water heater pans
- Could be a code requirement possibly for a pan installed in a water heater replacement with no drain being installed to exterior.

**5. Certain building elements of homes are more prone to water damage, such as crawl spaces, basements and attics. What can be done in these areas to reduce the likelihood of water damage?***Panel A:*

- Biggest exposure to loss would be commonly basements and 2nd story laundry rooms.
- What causes the initial failure? Poor Installations.
- Provide an owner's operation and maintenance manual.

*Panel B:*

- Homeowner must take onus in looking at areas such as crawl spaces and other areas for water leaks.
- Education to homeowners is key. Look at the plumbing system before a problem happens.
- IPMC possible should require periodic inspections.

**6. What precautionary measures can homeowners take to avoid preventable water damage?***Panel A:*

- Allowing the end user access to product and equipment to further "damage" the plumbing system.
- Homeowners knowledge of the plumber/professional in the industry they are dealing with.
- Homeowners responsibility to "hire" a professional person to do the necessary repairs to their dwelling.
- Homeowners need to take responsibility for hiring uneducated/unlicensed individuals.
- Possibly work with industry partners to develop a "homeowners' maintenance manual".

*Panel C:*

- Follow owner’s operation and maintenance manual, required in IPC Chapter 13.

**7. Do you believe that the Code Council should do more outreach to the public to help prevent water damage from failures in premise plumbing systems?**

*Panel A:*

- Yes, boots on the ground type of campaign. Grass Roots. Incumbent upon the whole industry. But ICC should take a responsibility to provide education to its’ adopted states and the people/public that are directly affected by these codes.

**8. As rainwater harvesting and landscape irrigation systems become more prevalent, what do you see as the areas of most concern that may cause property and or building damage? What can the Code Council do to mitigate these failures other than modify their plumbing codes?**

*Panel C:*

- These systems are outdoors, so pathogens and mosquito growth in cisterns is more of a concern than building damage.
- There are leakage detection devices that are available for piping systems, that we may want to look at for landscape irrigation systems.
- Consumers are investing a lot of money in landscape designs and vegetation that can be damaged from water leakage or water quality.

**9. While many stormwater systems are designed to be relatively passive with minimal oversight needed, harvesting and use systems require managed operation where the goal is to move water from the storage unit to a point of use so that there is sufficient storage available to receive run-off from subsequent rainfall events. How important is an operational and maintenance plan in the prevention of landscape Irrigation and rainwater harvesting system failure?**

*Panel C:*

- Very important!
- Half of systems that fail are due to lack of operations/maintenance plans.
- Owners don’t know how these systems work; having maintenance plans is critical to proper operation.
- The code needs to evolve requiring an I&O manual for these systems.

**10. Open Discussion**

*Panel C:*

- Science is needed for tying stormwater management and rainwater harvesting together into a single system. Same problem exists with gray water systems combined with rainwater systems.
- The code council could look at the integration of the different types of systems.
- Code could help define “swimmable water”; an outdoor water standard that would be safe to atomize.
- Water quality is critical – it could have its own chapter.
- There is a question of safety for use of potable water as backup to rainwater irrigation systems, and in general for tie-in of potable water to any irrigation or rainwater system.

## Key Takeaways

1. Residential installations seem to be the major areas of concern; however, still need to address all other building types. A public safety campaign directed at consumers should be jointly developed by the plumbing industry and the Code Council.
2. Installation, Operation and Maintenance Manuals for homeowners should be provided to home buyers. There are a few operation and maintenance requirements in the I- Codes, which may not be adopted or enforced in some of the areas.
3. Water supply system sizing needs to be updated based upon plumbing fixture usage. Oversizing of water distribution is an issue. (Possible code change)
4. Proper education of both contractors and inspectors. Plumbing manufacturers should provide additional training on proper materials and installation.
5. Adequate protection from freezing needs to be better developed in the code. Introduce climate zones with specific freeze protection requirements.
6. Water leak detection systems – Should be addressed in the code, but the requirements should be limited to “where installed”.
7. Water quality currently only addresses health effects. Need further research to determine the effects of water quality on the strength and durability of piping materials and plumbing fixtures.
8. Need to establish national water quality standards for nonpotable reuse systems, such as rainwater and graywater.
9. Need to establish revised storm water management requirements when property owners are also utilizing rainwater and/or gray water systems.