



Resiliency Provisions in 2021 *UPC* vs. 2021 *IPC*

The *UPC* contains provisions that account for unforeseen circumstances such as high winds, flooding, earthquakes, and fire to help the end user of the code make educated design decisions for resilient systems intended to last. The best practices and industry experience that are embedded in the *UPC* provisions promote plumbing systems that endure the tests of time and nature.

As you will notice below, the *UPC* and *IPC* both address resiliency in one way or another. The provisions found within the *UPC* either meet or exceed the provisions found in the *IPC*.

It worth noting that the *IPC* does not address leak detection, Legionella or the strapping requirements of water heaters. The ICC does not update plumbing piping sizing requirements in the *IPC*, leading to a more expensive system and a larger carbon footprint due to the unnecessary material being used.

The *UPC* has the necessary requirements to address:

- Affordability
- Social Resiliency
- Protection of Piping and Structures
- Fire
- Protection of Buried Piping
- Piping Supports
- Flooding
- Drought/Leak Detection
- Wind
- Heatwaves/UV Protection
- Blizzards/Freeze Protection
- Earthquake/Earth Movement
- Contamination of Water
- Best Practices for Properly Installed Systems
- Legionella Control

AFFORDABILITY

- **UPC:**
The *UPC* contains provisions for Appendix M (Water Demand Calculator) where the pipe sizing is greatly reduced, leading to a less costly plumbing system. A recent report created by Stantec found the *UPC*/Water Demand Calculator to be less expensive and use less material in comparison to the *IPC*. Less material also means a smaller carbon footprint for the environment.

APPENDIX M PEAK WATER DEMAND CALCULATOR

- **IPC:**
 - The *IPC* does not offer an updated method for estimating the peak demand load that would right-size the water supply system design. If the conditions of peak demand are overestimated, so also will the system design and pipe diameters be oversized, leading to higher material costs of construction.
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PROTECTION OF PIPING AND STRUCTURE

- **UPC:**
The *UPC* contains provisions that account for the protection of piping from damage, including corrosion.
312.0 Protection of Piping, Materials, and Structures.
 - **IPC:**
The *IPC* contains similar provisions.
305.0 Protection of Pipes and Plumbing System Components
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FIRE (RESIDENTIAL FIRE SPRINKLERS)

- **UPC:**
The *UPC* contains provisions for fire sprinklers. Fire within a structure is an unforeseen circumstance and fire sprinklers can help save lives and preserve the structure.
612.0 Residential Fire Sprinkler Systems.
 - **IPC:**
Not addressed in the *IPC*.
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PROTECTION OF BURIED PIPING (TRENCHING, EXCAVATION, AND BACKFILL)

The *UPC* and *IPC* address similar requirements for the backfill of plumbing piping. The main differences are the *UPC*'s inclusion of the thermoplastics and thrust blocking requirements, on which the *IPC* is completely silent.

- **UPC:**
The *UPC* contains provisions for the installation of thermoplastics installed below ground. Due to the nature of thermoplastics, it is crucial that the plumbing codes address the installations of thermoplastics below ground. The *IPC* does not address such a requirement.
314.4 Excavations.
314.4.1 Installation of Thermoplastic Pipe and Fittings.

The *UPC* contains requirements for the installation of thrust blocking for ductile iron pipe with elastomeric gasketed joints and fittings and PVC piping with solvent cemented or elastomeric gasketed joints for cold water supply. This is addressed in Appendix I of the *UPC*.
- **IPC:**
The *IPC* does not address installation requirements for thrust blocking or the underground installation of thermoplastics. The *IPC* has some backfill and trenching requirements, but they are not robust enough for a proper resilient plumbing system.

PIPING SUPPORTS

- **UPC:**
The *UPC* contains provisions for the support of piping, including seismic movements, in accordance with the relevant building code.
313.0 Hangers and Supports.
313.1 General.
 - **IPC:**
The *IPC* contains similar provisions.
SECTION 308 PIPING SUPPORT
308.1 General.
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FLOODING

- **UPC:**
The *UPC* contains provisions for the protection of floods with input from FEMA.
301.4 Flood Hazard Areas.
 - **IPC:**
The *IPC* contains similar provisions.
SECTION 309 FLOOD HAZARD RESISTANCE
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DROUGHT/LEAK DETECTION

- **UPC:**
The *UPC* contains provisions that account for devices used for leak detection. These devices are used to detect leaks and protect structures. They are not found in the *IPC*.
606.9 Leak Detection Devices. *Where leak detection devices for water supply and distribution are installed, they shall comply with IAPMO IGC 115 or IAPMO IGC 349.*
 - **IPC:**
Leak detection devices are not addressed in the *IPC*.
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WIND

- **UPC:**
Strong wind gusts passing over plumbing vent openings can cause pressure fluctuations in the drain, waste, and venting (DWV) system. The *UPC* requires the DWV system to be designed so that the pressure within the DWV system will only have a pressure difference of 1 inch water column at any given time (Section 901.3). Given that the DWV system is capable of allowing not more than 1 inch water column of pressure change in the system, the *UPC* requires traps to be sealed by water depth of 2 to 4 inches of water (Section 1005.1), creating a robust trap seal to resist the unforeseen changes in nature beyond the 1-inch seal already built into the DWV system.
901.3 Trap Seal Protection.
The *UPC* implements proactive provisions to protect the public from harmful gases and allows for a healthier environment. Winds can move harmful sewer gases from vents. The *UPC* takes wind conditions into account by requiring vent pipes above roofs to maintain minimum heights and distances that would prevent sewer gases from polluting occupied areas.
906.2 Clearance.
1005.0 Trap Seals.
1005.1 General.
- **IPC:**
The *IPC* addresses similar requirements.
901.2 Trap seal protection.
1002.4 Trap seals.

HEATWAVES/UV PROTECTION

UPC:

The use of water-based latex paints and appropriate wrapping extends the life of PVC and ABS materials. While the sun's energy is needed for life, it can also decrease the life of many materials when directly exposed to the sun's harmful UV rays, causing ABS and PVC to degrade and become brittle. The *UPC* requires that such exposed piping be protected for both water supply (Section 605.12) and venting piping (Section 906.1).

605.12 PVC Plastic Pipe and Joints.

906.0 Vent Termination.

906.1 Roof Termination.

IPC:

The *IPC* does not address the protection from UV rays.

BLIZZARDS/FREEZE PROTECTION

UPC:

Freezing temperatures can cause water to expand when changing from a liquid to a solid state, which can cause pipes to burst. The *UPC* requires protection from freezing (Section 312.6) and offers some methods of protecting potable water such as the use of anti-freezing valves as demonstrated in various parts of Chapter 6 (Water Distribution). The Earth is an excellent insulator and the *UPC* requires pipes to be buried below the local frost lines (Section 609.1). All exposed water piping is addressed in the *UPC* (Chapter 6).

312.6 Freezing Protection.

609.1 Installation.

603.4.7 Freeze Protection.

603.5.7 Outlets with Hose Attachments.

603.5.17 Potable Water Outlets and Valves.

Additionally, the *UPC* address the threat that vents can frost over, and includes frost buildup to prevent blockage of the vents. The *UPC* requires a minimum 2-inch vent terminating no fewer than 10 inches above the roof and the change in diameter to be made at least 12 inches below the roof as the minimum starting point to lessen the possibility of frost closure (Section 906.7). Some areas may require larger pipe sizes and local requirements should be considered.

906.7 Frost or Snow Closure. roof, or in accordance with the Authority Having Jurisdiction.

IPC:

The *IPC* addresses similar requirements.

305.4 Freezing.

608.15.2 Protection of backflow preventers.

802.1.2 Floor drains in food storage areas.

EARTHQUAKE/EARTH MOVEMENT

UPC:

Earthquakes can come at any time without warning. The *UPC* requires piping systems to be able to withstand extensive ground movement. The *UPC* prepares the plumbing system by bracing, hangers and supports. Minimum hanger supports are dictated by pipe material and how they are angled (horizontal or vertical). Table 313.3 contains the minimum supports required to prevent the movement of piping.

Earth movement is also taken into consideration for any leaks of piping buried underground. The *UPC* requires that potable water supply be above any nearby sewer line. If water were to leak, gravity would pull it down toward the drain line. The drain line is below the potable water line to prevent contamination (Section 609.2).

313.2 Material.

313.3 Suspended Piping.

The water heater must be properly restrained where seismic conditions are likely to occur in order to prevent fire by gas or electricity (Section 507.2). Additionally, in an emergency, the water heater may serve as an emergency source of drinking water.

507.2 Seismic Provisions.

Soil is considered for piping lying in the ground and the building and structures constructed upon it. It is critical to understand the soil to predict shifts or movement that can cause damage to the structure, foundation or the piping underneath. The *UPC* requires the pipes to be away from the load bearings of the building footers, and guides the user in Section 314.1. Additionally, the *UPC* does not allow trenches to be within a 45-degree angle from the foundation, as it may reduce the bearing capacity of the soil for the foundation. Therefore, trenches are prohibited within the radial shear zone.

314.1 Trenches.

609.2 Trenches.

IPC:

308.2 Piping seismic supports.

502.4 Seismic supports.

Strap locations are not addressed in the *IPC*.

The *IPC* does not have any supporting location requirements of water heaters.

CONTAMINATION OF WATER

UPC:

The prevention of contamination of food and potable water is taken very seriously in the *UPC*, and many methods are addressed through the plumbing system to protect food and water by methods such as an air gap, air break or the appropriate backflow prevention device (Section 602.1, 601.2). The *UPC* takes special care when dealing with food. For example, contamination of the food being prepared or stored below piping hanging on the ceiling could lead to sickness or death, should any leaks occur. The methods of pipe installation and protection against leakage required in Section 317.1 are only some of the methods that may be required.

317.0 Food-Handling Establishments.

317.1 General.

602.1 Prohibited Installation.

602.2 Cross-Contamination.

IPC:

602.3.1 Sources.

608.1 General.

The *IPC* has limited requirements for contamination of water.

BEST PRACTICES

Experience and best practices lead to reliable quality in the work being done. The *UPC* provides its users with installation standards, which give detailed guidance and instructions for various topics, ensuring a professional, properly installed system. Some topics covered under these IS standards are trenchless insertion of PE for sewer laterals, PEX tubing systems for hot and cold water distribution, thrust blocking for rubber gasketed and solvent cement joints. The TCNA Handbook for ceramic, glass and stone tile installations gives installers, inspectors and users the benefits of a trusted, long-term installation.

Not addressed by the *IPC*.

LEGIONELLA

The 2021 *UPC* contains a new Appendix N (Impact of Water Temperature on the Potential for Scalding and Legionella Growth) to protect the health and safety of public by increasing awareness of Legionella. Legionella is a concern we have not only today, but for the life of a water system, which is why the *UPC* intends to heighten awareness by creating provisions to implement best practices in plumbing systems to minimize such a threat.

Not addressed by the *IPC*.