Residential Plumbing Rough-In

This Tip Sheet reflects code requirements of the 2021 International Residential Code (IRC), 2021 Uniform Plumbing Code (UPC), 2023 National Electric Code (NEC) and the 2021 International Fire Code (IFC) with Washington State Amendments.

Please verify the following before calling for plumbing rough-in inspection.

Permits and Plans

- ☐ Job address shall be posted in a visible location. (R319.1)
- ☐ Permit and approved plans are on site and accessible to the inspector. (R105.7, R106.1.1, R106.3.1)
- ☐ Permit information is correct (e.g., address, permit number, description of work, etc.). (R106.1.1)
- ☐ Confirm that all fixtures are included. (UPC 104.3)
- ☐ Confirm that a licensed plumber is listed on the permit, unless the homeowner is installing plumbing. (RCW 18.106.400)

Underground Plumbing

- ☐ Only and all fixtures installed on a floor level lower than the next upstream manhole cover feed through accessible backwater valve (unless fixture is above manhole). (UPC 710.1)
- ☐ Cleanouts on piping with backwater valves shall be permanently labeled. (UPS 710.1)
- ☐ Backwater valves shall be accessible for inspection and repair. (UPC 710.6)
- ☐ No pipes shall be directly embedded in concrete. All pipes passing through concrete walls or floors shall be protected from breakage. Voids around piping passing through concrete floors on the ground shall be appropriately sealed. (UPC 312.1, UPC 312.2)
- ☐ Sleeves shall be used for piping passing through concrete or masonry that are not bored or drilled. (UPC 312.10 and Exception)
- ☐ In horizontal wet venting, vent pipe inverts are taken off above the center line of the drain. (UPC 905.2)
- ☐ Vents are installed downstream of traps. (UPC 905.2)
- ☐ Pipe trenches parallel and deeper than footings are offset a minimum 45 degrees from the footing bearing line or as approved in accordance with UPC 301.0. (UPC 314.1, UPC 301.0)
- ☐ Type L copper for water lines that are installed underground. Type M is allowed underground outside the building. Copper joints under a slab shall be brazed. (UPC 604.3, UPC 609.3(2))
- ☐ Drains, waste, and vents (DWV) are water-tested with a 10-foot head for 15 minutes or air tested at 5 psi for 15 minutes. Plastic pipe not allowed to be tested with air. (UPC 712.1, 2, 3)

- ☐ Water piping is tested to the working pressure or 50 psi for 15 minutes. Plastic water piping is not allowed to be tested with air, except PEX piping (per the manufacturer), which shall be tested with air when subject to freezing. (UPC 609.4)
- ☐ Piping shall be laid on firm bed. (UPC 313.5)

Sewage Ejectors

- ☐ Only fixtures on floor levels below crown level of the sewer may discharge through ejector. (UPC 710.2, UPC 709.1)
- ☐ Backwater and gate/ball valves are on the pump discharge. (UPC 710.4)
- ☐ Shall be sized for 2 fixture units per gallon per minute if using continuous flow. Shall be sized for discharging 20 fixture units minimum. (UPC 702.3, 710.3, 710.5)
- ☐ Min. 2-inch pressure rated pipe when a water closet discharges to the sump. (UPC 710.4)
- ☐ Lift to horizontal sewer then drain by gravity. If the connection is to a horizontal sewer, connect at the top with a wye type branch fitting. (UPC 710.2, UPC 710.4, UPC 710.7)
- ☐ Pump(s) have audio and visual alarms and are readily accessible. (UPC 710.9)
- ☐ Sump and receiving tank cover shall be provided with a vent sized for the amount of fixtures that the sump is serving per UPC Table 703.2. (UPC 710.10)

Drain Piping

- ☐ Drains, waste, and vents (DWV) are water-tested with a 10-foot head for 15 minutes or air tested at 5 psi for 15 minutes. Plastic pipe not allowed to be tested with air. (UPC 712.1, 2, 3)
- ☐ Drains are properly sized. (UPC Table 703.2)
- ☐ Back-to-back fixtures require approved double fixture fitting. (UPC 704.2)
- ☐ Change in direction from vertical-to-horizontal or horizontal-to-horizontal through wye branches or 45-degree wye branches or fittings of equal sweep. (UPC 706.3, UPC 706.4)
- ☐ Tub waste openings into crawl spaces must be closed off with metal collars or metal screens fastened to structure with openings no greater than 1/2-inch. (UPC 312.12.3)
- ☐ Double sanitary tees may be used when barrel of fitting is 2 pipe sizes larger than inlets, for connecting with a vertical stack. (UPC 706.2)
- ☐ Install 18-gauge nail plates 1-1/2 inches beyond the outside diameter of pipe when plastic or copper plumbing is within 1-inch of face of framing. (UPC 312.9)
- ☐ Hangers and straps do not compress, distort, cut, or abrade the piping and allow free movement of pipe. Pipes exposed to damage by sharp surfaces are protected. (Manufacturer's Installation Instructions, UPC 313.1)
- ☐ Support plastic piping at every 4 feet. Support at each horizontal branch connection. (UPC Table 313.3)

- ☐ Support vertical plastic piping at base and each floor. Provide mid-story guides. (UPC Table 313.3)
- ☐ Support horizontal Cast Iron Hubless at every other joint, unless over 4 feet, then support each joint. Support adjacent to joint, not to exceed 18 inches. Support at each horizontal branch connection. Hangers not placed on the coupling. (UPC Table 313.3)
- ☐ Support vertical Cast Iron Hubless at base and each floor not to exceed 15 feet. (UPC Table 313.3)
- ☐ Waste pipes installed outside or in exterior walls are protected from freezing where necessary, P-traps, for example. (UPC 312.6, WA Amendment)

Traps

- ☐ Each trap shall be protected by a vent; the vent system shall be designed to prevent a trap seal from being exposed to a pressure differential that exceeds 1-inch water column on the outlet side of the trap. (UPC 901.3)
- ☐ Each trap is protected by a vent. (UPC 1002.2)
- ☐ The developed length of the trap arm not to exceed the following limits. (UPC Table 1002.2)

Pipe Size (inches)	Max Length of Trap Arm(Inches)
1-1/4	30
1-1/2	42
2	60
3	72
4 and larger	120

- ☐ The developed length is the distance between the trap arm of a fixture to its vent (measured from the top of the trap weir to the inner edge of the vent). (UPC 1002.2, Table 1002.2)
- ☐ Trap arms less than 3-inches cannot change direction more than 90 degrees without the use of a cleanout. (UPC 1002.3)
- ☐ Trap arms 3 inches and larger cannot change direction more than 135 degrees without the use of a cleanout. (UPC 1002.3, Exception)
- ☐ Vertical distance between the fixture outlet and the trap is as short as practicable and not over 24 inches in length, except for clothes washer which can have maximum 30-inch standpipe. (UPC 1001.2, UPC 804.1)

Cleanouts

- ☐ Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal and each run of piping which is more than 100 feet in total developed length, provided with a cleanout for each 100 feet, or fraction thereof, in length of such piping. See exceptions. (UPC 707.4)

- ☐ Cleanouts not required at horizontal runs less than 5 feet, except sinks and urinals. (UPC 707.4, Exception 1)
- ☐ Cleanouts may be omitted on any horizontal drainage pipe installed on a slope of 72 degrees or less from the vertical angle. (UPC 707.4, Exception 2)
- ☐ Cleanouts not required above the floor level of the lowest floor of building (except building drain and its branches). (UPC 707.4, Exception 3)
- ☐ An approved two-way cleanout fitting, installed inside the building wall near the connection between the building drain and building sewer or installed outside of a building at the lower end of a building drain and extended to grade, may be substituted for an upper terminal cleanout. (UPC 707.4, Exception 4)
- ☐ Cleanouts are required at each aggregate horizontal change of direction exceeding 135 degrees. (UPC 707.4)
- ☐ Each cleanout is installed so that it opens to allow cleaning in the direction of flow of the soil or waste or at right angles thereto and, except in the case of wye branch and end-of-line cleanouts, installed vertically above the flow line of the pipe. (UPC 707.5)
- ☐ Underfloor cleanout shall not be located more than 20 feet from access door with an unobstructed 30-inch wide by 18-inch high pathway. (UPC 707.9, WA State Amendment)
- ☐ Cleanouts are accessible. 12-inch clearance is required at lines less than or equal to 2 inches; 18-inch clearance at lines greater than 2 inches. (UPC 707.9, WA State Amendment)
- ☐ Cleanouts can be extended above floor or outdoors if access limited. (UPC 707.9)

Island-Sink Venting

- ☐ Loop vent method requires drainage type fittings on the vent below floor level. (UPC 909.1)
- ☐ Drain serving the island serves no other fixtures upstream from return vent. (UPC 909.1)
- ☐ Accessible cleanout is required in vertical section of foot vent. (UPC 909.1)

Vents

- ☐ Unless prohibited by structural conditions, the vent must rise vertically 6 inches above the flood level rim before continuing to horizontal. (UPC 905.3)
- ☐ Vent pipe fittings located less than 6 inches above flood level of rim shall be installed with drainage type fittings, and pipe must have proper drainage slope. (UPC 905.3)
- ☐ Takeoffs for vents must be above the trap weir, except water closet and similar fixtures. (UPC 905.5)
- ☐ Vent pipe inverts are taken off above the center line of horizontal drainage pipe, except horizontal wet vents. (UPC 905.2)
- ☐ Aggregate vent areas must be greater than or equal to the building drain. (UPC 904.1, Table 703.2)

- ☐ Vents terminate a minimum 6 inches above roof line (10 inches in high snow load areas). (UPC 906.1, UPC 906.7)
- ☐ Vent clearance to building openings are 3 feet above or 10 feet horizontal. (UPC 906.2)

Air-Admittance Valves

- ☐ Verify with local jurisdiction if/when/where allowed.
- ☐ Minimum 4 inches above drain. (Per local jurisdiction and manufacturer's installation instructions)
- ☐ Minimum 6 inches above insulation in attic. (Per local jurisdiction and manufacturer's installation instructions)
- ☐ Must be accessible and open to air flow. (Per local jurisdiction and manufacturer's installation instructions)
- ☐ Limited use and install in vertical position as high as possible. (Per local jurisdiction and manufacturer's installation instructions)

Wet Vents

- ☐ Vertical wet vent not greater than 6 feet in developed length, all fixtures within the same story. (UPC 908.1)
- ☐ Minimum one pipe size larger than the required waste (upper fixture), and one size larger than the minimum vent size for fixture units (lower fixture), and minimum of 2 inches. (UPC 908.1.1)
- ☐ Limited to trap arms of one and two fixture units. (UPC 908.1)
- ☐ Not to serve as a vent exceeding four fixtures. (UPC 908.1)
- ☐ Horizontal wet venting is allowed for a bathroom group located on the same floor when installed in compliance with (UPC 908.2).

Water Service

- ☐ Verify pipe and meter size. (UPC Table 610.4 WA Amendment, Appendix A, Fire Sprinkler Plans.)
- ☐ Minimum service 3/4 inches. (UPC 610.8)
- ☐ Water pressure exceeding 80 psi requires a Pressure Reducing Valve (PRV). (UPC 608.2)
- ☐ Main valve on discharge side of the meter shall be of a full way type valve. (UPC 606.2)
- ☐ Dielectric fittings or other approved fittings shall be used between galvanized and copper piping, or other dissimilar metals. (UPC 605.15, UPC 605.16)
- ☐ Verify that the replacement of metal water service piping with plastic water service piping has not affected the building grounding system. (UPC 604.10, NEC 250.50)
- ☐ Verify that backflow prevention is installed for protection from fire-sprinkler, irrigation systems, or other cross connection/contamination hazards. (UPC 603; Washington State Cross-Control Manual)

- ☐ Water service is buried deep enough to protect from freezing. Minimum depth shall be 12 inches below the local average frost level (Consult local jurisdiction). (UPC 609.1)
- ☐ Materials: Copper, Polyethylene, PVC, CPVC, PEX, galvanized pipe, and all solvent cements, sealers, solder, thread sealants and flux, must all be approved by the AHJ, and meet the requirements of NSF 61. All shall be installed per manufacture's installation requirements (UPC 604, UPC 604.1, and UPC Table 604.1).
- ☐ Water lines are tested to the working pressure or 50 psi minimum for 15 minutes. Plastic water piping is not allowed to be tested with air, except PEX piping (per the manufacturer), which shall be tested with air when subject to freezing. For underslab Pex water line air pressure testing requirements, refer to product installation specifications. (UPC 609.4, Appendix I)
- ☐ Inside the building, barbed insert fittings with hose clamps on plastic water pipe are prohibited. (UPC 604.14,WA Amendment)
- ☐ If the water pressure exceeds 80 psi, a pressure reducing valve is required. Plastic water piping cannot be air tested (except PEX, at a minimum 50 psi, and per manufacturer specifications for underslab/radiant heating applications). (UPC 608.2.)
- ☐ Water pipes shall not be in same trench as building sewer or drainage piping constructed of clay or materials which are not approved for use within a building unless both of the following conditions are met: The bottom of the water pipe, at all points, shall be at least 12 inches above the top of the sewer or drain line, and the water pipe is placed on solid shelf excavated at one side of the common trench with a minimum clear horizontal distance of at least 12 inches from the sewer or drain line. (UPC 609.2.(1), UPC 609.2.(2))
- ☐ Water piping installed within a building and in or under a concrete floor or slab resting on the ground shall be installed per UPC 609.3.
- ☐ Ferrous piping shall have a protective coating of an approved type, machine applied and conforming with recognized standards. Field wrapping shall provide equivalent protection and is restricted to those short sections and fittings necessarily stripped for threading. Galvanized coating is not deemed adequate protection for piping or fittings. Approved non-ferrous piping shall not required to be wrapped. (UPC 609.3.(1))
- ☐ Underground copper tubing shall be installed without joints where possible. Where joints are permitted, they shall be brazed, and fittings shall be wrought copper (within the fixed limits of the building foundation). (UPC 609.3.(2))
- ☐ Valves, including pressure reducing valves, if installed in the ground require access boxes. (UPC 606.6)
- ☐ For the replacement of metallic water services metallic water pipe must be replaced with metallic pipe or an approved grounding system installed when installing plastic water pipe. Per the NEC electrical code, a minimum of 10 feet of copper piping is installed in the ground on the house side to maintain the existing electrical grounding system. If 10 feet of metallic piping

cannot be installed consult the building official for a viable option. Blue 18-gauge tracer wire, or another approved conductor, is required from meter to foundation. (UPC 604.10; NEC 250-52(A)I)

☐ Unsuitable bedding and backfill such as rock larger than 3/4-inch, asphalt, and debris cannot be installed below or above the water service. If backfill material is unacceptable, it would require select fill such as sand a minimum of 6 inches below and 12 inches above the water service. Inspect the fill prior to covering. (UPC 314.4)

☐ Building shutoff valves are required to be a full way type. (UPC 606.2)

Water Piping

☐ It is required to have adequate backflow prevention when the building has a fire sprinkler system that is not a flow through system. An RPBA (reduced pressure backflow assembly) is required when there is a water supply to a boiler or another high hazard. If a backflow device such as an RPBA or DCVA, verify that it has been tested and approved by a certified backflow tester. (UPC 603.2, WA Amendment)

☐ Water hammer arrestors to be installed on water supply systems where quick closing valves are installed. Devices are installed per manufacturer's specifications for location and installation. (UPC 609.11 & 609.11.1)

☐ Hot and cold-water lines installed outside the building or conditioned space insulated with minimum R-3. (UPC 312.6, WA Amendment)

☐ Water lines are tested to the working pressure or 50 psi for 15 minutes. Plastic water piping is not allowed to be tested with air, except PEX piping (per the manufacturer), which shall be tested with air when subject to freezing. (UPC 609.4, See Exception)

Laundry

☐ Standpipe receptors are greater than or equal to 18 inches and less than or equal to 30 inches above the trap. The minimum trap and drain size shall be 2 inches (UPC 804.1, Table 702.1)

☐ No trap for clothes washer standpipe is installed below the floor. (UPC 804.1)

☐ Trap weir roughed in minimum 6 inches and 18 inches maximum above the floor. (UPC 804.1)

☐ Water hammer arrestors shall be installed. Devices are installed per manufacturer's specifications for location and installation. (UPC 609.11, UPC 609.11.1)

Kitchen

☐ Dishwasher drain requires an approved air gap fitting on the discharge line. (UPC 807.3)

☐ Water hammer arrestors are installed. Devices are installed per manufacturer's specifications for location and installation. (UPC 609.11, 609.11.1)

Bathroom

- ☐ Rigidly support faucet and shower head fittings. (UPC 609.1, UPC 313.1)
- ☐ Minimum shower area is 900 square inches with a 30-inch clear diameter to 70 inches from the floor of the shower. (UPC 408.6, WA Amendment).
- ☐ Minimum shower rough pan is 30 inches by 30 inches. (UPC 408.6, WA Amendment).
- ☐ Listed Thermostatic/pressure balance valve is required on showers (120 degrees Fahrenheit maximum) (UPC 408.3, UPC 408.3.2)
- ☐ Water closet set a minimum of 15 inches to center from side wall with a total clear width of 30 inches and 21 inches at the front. (UPC 402.5)
- ☐ Flange secured with corrosion resistant fasteners. (UPC 402.6)
- ☐ Closet ring to vent is maximum distance of 6 feet. (UPC Table 1002.2)
- ☐ Slip joints used at tub drain shall be accessible. Access door is a minimum of 12 inches by 12 inches. (UPC 402.10)
- ☐ Over rim tub faucets are set with a minimum 1-inch air gap to tub rim. (UPC Table 603.3.1)
- ☐ Bathtub, whirlpool tubs filler unit temperature 120 degrees Fahrenheit by ASSE 1070/ASME A112.1070. (UPC 409.4)

Shower Subpans

- ☐ See previous section for minimum dimensions.
- ☐ Dam is greater than or equal to 2 inches and less than or equal to 9 inches. Exception: For accessible showers, 1/2-inch maximum for the dam. The dam is measured from the top of the drain to the top of the dam. (UPC 408.5; ANSI A117.1-2009)
- ☐ Approved listed pan liner, 3 layers hot mop type 15 lb. felt, or other approved membrane. (UPC 408.7)
- ☐ Liner minimum 3 inches above the finished dam. (UPC 408.7)
- ☐ Approved liners are required to be installed per manufacturer's installation instructions. (UPC 408.7)
- ☐ Slope/pitch of lining minimum 1/4-inch per foot. (UPC 408.7)
- ☐ No fasteners less than 1 inch above the finished dam. (UPC 408.7)
- ☐ Weep holes at drain are clear. (UPC 408.7)
- ☐ Doorway has a minimum finished opening of 22 inches wide. (UPC 408.5)
- ☐ Shower head cannot discharge directly at the entrance. (UPC 408.9)
- ☐ Test for shower pan receptor is required. For curbless shower pans, consult with Jurisdiction regarding testing requirements. (UPC 408.7.5, UPC 408.5)

Exterior

☐ Frost proof Vacuum breakers are required on all hose bib faucets. (UPC 603.5.7)

☐ Backflow protection is required on all irrigation systems. (UPC Table 603.2, UPC 603.5.6, WA Amendment)

☐ No valves downstream of vacuum breakers. (UPC Table 603.2)