

# CHAPTER 9: VENTS.

2021 Code changes are highlighted.

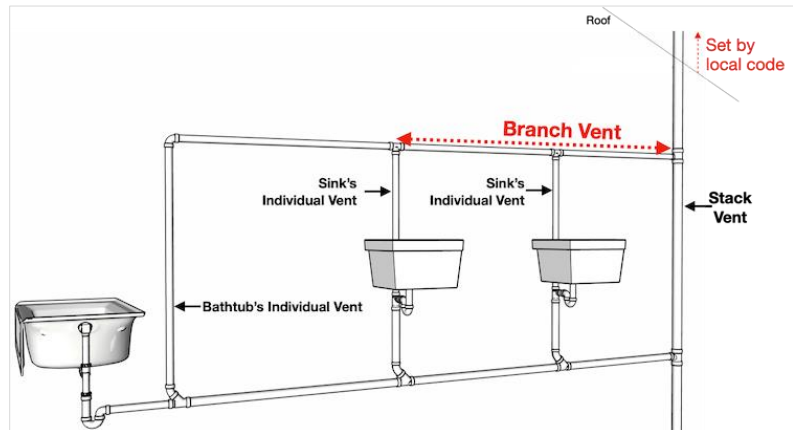
## 901. General.

### 901.1 Applicability.

This chapter shall govern the materials, design, and installation of plumbing vent systems.

### 901.2 Vents Required.

Unless otherwise indicated in the UPC, every plumbing fixture trap must be protected against siphonage, and backpressure. Vents and vent pipes must be installed to ensure air circulation throughout the entire system.



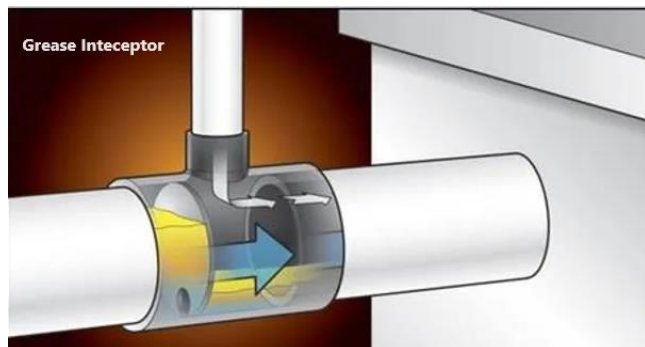
### 901.3 Trap Seal Protection.

The vent system must be designed and installed to prevent a trap seal from being exposed to a pressure differential that exceeds 1 inch water column (0.24 kPa) on the outlet side of the trap.

## 902. Vents Not Required.

### 902.1 Interceptor.

When two interceptors are installed, the first is used as a primary settling tank, and second as the end of a horizontal indirect waste pipe. One of these interceptors can be omitted.



### 902.2 Bars, Soda Fountains, and Counter.

Bar, soda fountain, and counter sinks with a trap in their assembly do not need to be vented when their installation and location make it impossible to do so. When this situations occurs, a sink must be installed to discharge through approved indirect waste pipes into a floor sink or other approved type of receptor.

## 903. Materials.

### 903.1 Applicable Standards.

Vent pipe and fittings must comply with the applicable standards referenced in Table 701.2 that specifies the following:

1. Galvanized steel or 304 stainless steel pipe must be installed above ground and be at least 6 inches (152 mm) in diameter. The pipe must not be installed underground.
2. Except for individual single-family dwelling units, materials exposed within ducts or plenums must have a flamespread index of not more than 25, and where tested a smoke-developed index of not more than 50. Plastic piping installed in plenums must be tested.

### 903.2 Use of Copper or Copper Alloy Tubing.

Copper or copper alloy tube for underground drainage and vent piping must be of a weight not less than the copper or copper alloy drainage tube type DWV.

#### 903.2.1 Aboveground.

Copper or copper alloy tube for aboveground drainage and vent piping must be of a weight that is not less than that of copper or copper alloy drainage tube type DWV.

#### 903.2.2 Prohibited Use.

Copper or copper alloy tube cannot not be used for chemical or industrial wastes.

#### 903.2.3 Marking.

Copper or copper alloy tubing, in addition to the required incised marking, must be marked. The types and colors are below:

- Type K, green
- Type L, blue
- Type M, red
- Type DWV, yellow



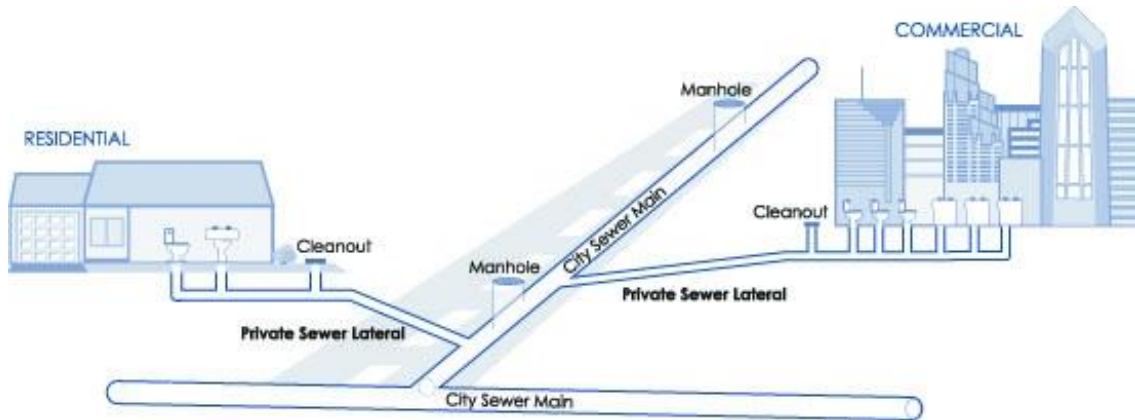
### 903.3 Changes in Direction.

Changes in the direction of vent piping must be made by the appropriate use of approved fittings. Pipe must not be strained or bent, and burred ends must be reamed to the full bore of the pipe.

## 904. Size of Vents.

### 904.1 Size.

The size of vent pipe must be determined by using the measurement of its length and total number of fixtures to be connected (see Table 703.2). The diameter of an individual vent must be at least 1 1/4 inches (32 mm) and not less than one-half of the diameter of the drain to be connected.



Every drainage pipeline that is in a building, connection to a public sewer, or a private sewage disposal system, must be vented by installing one or more vent pipes. The aggregate cross-sectional area must be of a size comparable to the largest required building sewer (see Table 703.2).

*"Vent pipes from fixtures located upstream from pumps, ejectors, backwater valves, or other devices that obstruct the free flow of air and other gases between the building sewer and the outside atmosphere shall not be used for meeting the cross-sectional area venting requirements of this section."*<sup>1</sup>

**Exception:**

Where connected to a common building sewer, the drainage piping of two or more buildings located on the same lot and under one ownership can be vented with pipe sizing (see Table 703.2), as long as the aggregate cross-sectional area of vents is not less than that of the largest required common building sewer.

**904.2 Length.**

Not more than one-third of the total permitted length of a minimum-sized vent can be installed in a horizontal position.

**Exception:**

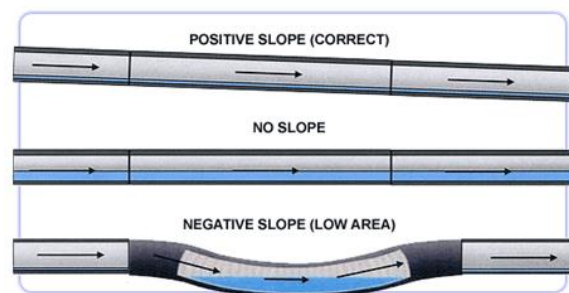
Where a minimum-sized vent is increased one pipe size for its entire length, the maximum length limitation does not apply.

**905. Vent Pipe Grades and Connections.**

**905.1 Grade.**

Vent and branch vent pipes cannot have drops or sags. The vent must be level or be graded and connected so it drips back by gravity to the drainage pipe it serves.

**905.2 Horizontal Drainage Pipe.**

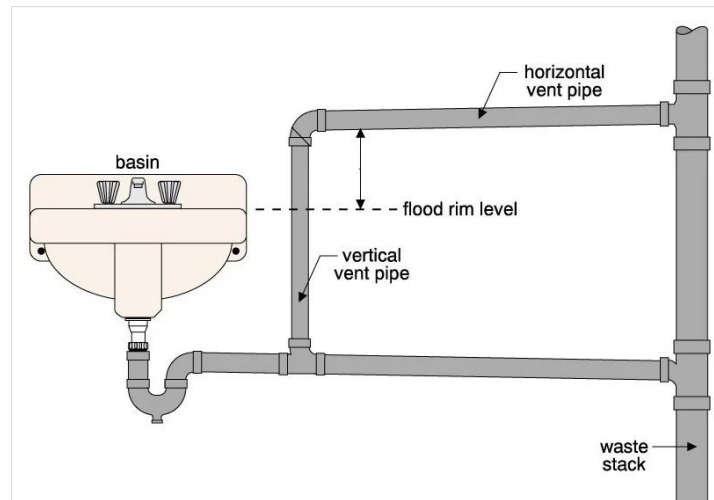


Where vents connect to a horizontal drainage pipe, each vent pipe must have its invert taken off above the drainage centerline of such pipe downstream of the trap served.

### 905.3 Vent Pipe Rise

Unless prohibited by structural conditions, each vent must rise vertically to a point of being at least 6 inches (152 mm) above the flood-level rim of a fixture served before offsetting horizontally.

Where two or more vent pipes converge, before being connected, each vent pipe must be raised to at least 6 inches (152 mm) in height above the floodlevel rim of the plumbing fixture it serves. Vents at a height of less than 6 inches (152 mm) above the flood-level rim of the fixture must be installed with an approved drainage fitting, material, and grade to the drain.



### 905.4 Roof Termination.

Vent pipes must extend undiminished in size above the roof, or be reconnected with a soil or waste vent of proper size.

### 905.5 Location of Opening.

The vent pipe opening from a soil or waste pipe must not be below the weir of the trap.

**Exception:**

Water closets and similar fixtures

### 905.6 Common Vertical Pipe.

Two fixtures can be served by a common vertical pipe where each fixture discharges wastes separately into an approved double fitting with an inlet openings at the same level.

## 906. Vent Termination.

### 906.1 Roof Termination.

Each vent pipe or stack must extend through flashing and terminate vertically at least 6 inches (152 mm) above the roof. It cannot be less than 1 foot (305 mm) from a vertical surface. ABS and PVC pipe must be protected from sunlight exposure with water based synthetic latex paints.

### 906.2 Clearance.

Each vent must be terminated at least 10 feet (3048 mm) from, or not less than 3 feet (914 mm) above, an openable window, door, opening, air intake, or vent shaft, or not less than 3 feet (914 mm) in every direction from a lot line, alley and street.

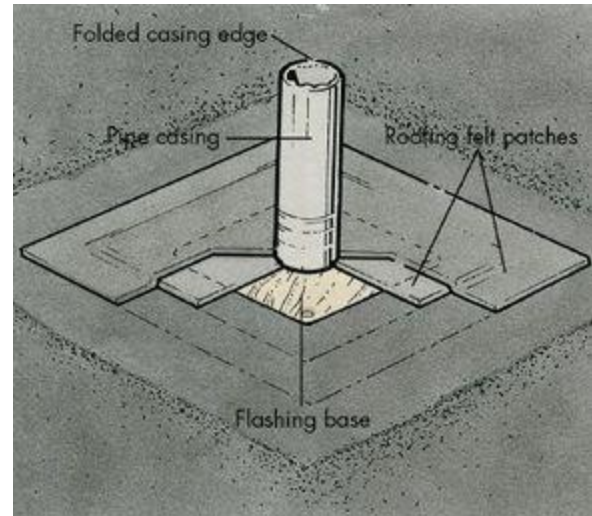
### 906.3 Use of Roof.

Vent pipes must be extended separately or combined, of full required size, not less than 6 inches (152 mm) above the roof or firewall. Flagpoling of vents cannot be done.

#### Exception:

Flagpoling of vents can be done where the roof is used for assembly purposes or parking.

Vents within 10 feet (3048 mm) of roof area used for assembly purposes or parking must extend not less than 7 feet (2134 mm) above the assembly roof area and stay secure.



### 906.4 Outdoor Installations.

Vent pipes for outdoor installations must extend at least 10 feet (3048 mm) above the surrounding ground and shall be securely supported.

### 906.5 Joints.

Joints around roof vent pipes must be installed so they are watertight using approved flashings or flashing material.

### 906.6 Lead.

Sheet lead must comply with the following:

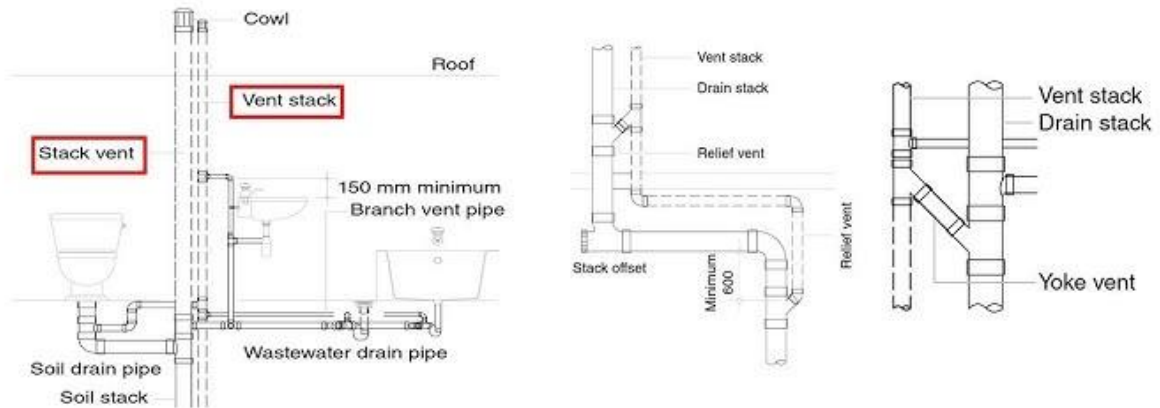
1. Safe pans must be at least 4 pounds per square foot (lb/ft<sup>2</sup>) (19 kg/m<sup>2</sup>) or 1/16 of an inch (1.6 mm) thick.
2. Flashings or vent terminals must be at least 3 lb/ft<sup>2</sup> (15 kg/m<sup>2</sup>) or 0.0472 of an inch (1.2 mm) thick.
3. Lead bends and lead traps must be at least 1/8 of an inch (3.2 mm) in wall thickness.

### 906.7 Frost or Snow Closure.

*"Where frost or snow closure is likely to occur in locations having minimum design temperature below 0°F (-17.8°C), vent terminals shall be not less than 2 inches (50 mm) in diameter, but in no event smaller than the required vent pipe. The change in diameter shall be made inside the building not less than 1 foot (305 mm) below the roof in an insulated space and terminate not less than 10 inches (254 mm) above the roof, or in accordance with the Authority Having Jurisdiction (AHJ)."*<sup>1</sup>

# 4 Methods of Stack Ventilation

## 1. Stack Vent    2. Vent Stack    3. Relief Vent    4. Yoke Vent



### 907. Vent Stacks and Relief Vents.

#### 907.1 Drainage Stack.

Each drainage stack that extends 10 or more stories must have a parallel vent stack, that extends undiminished in size from its upper terminal and connect to the drainage stack at or immediately below the lowest fixture drain.

Each such vent stack must also be connected to the drainage stack at each fifth floor, counting down from the uppermost fixture drain, using a yoke vent, in a size not smaller in diameter than either the drainage or vent stack.

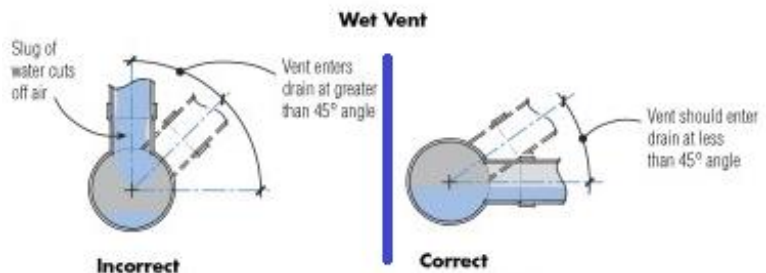
#### 907.2 Yoke Vent.

The yoke vent connection to the vent stack must be installed at least 42 inches (1067 mm) above the floor level. The yoke vent connection to the drainage stack must have a wye-branch fitting below the lowest drainage branch connection serving that floor.

### 908. Wet Venting.

#### 908.1 Vertical Wet Venting.

Wet venting is limited to vertical drainage piping that receives discharge from a trap arm with one or two fixtures. A wet vents cannot have more than four fixtures.



Wet-vented fixture must be on the same story, and have a vent continuously discharging into the wet vented fixture.

No wet vent can exceed 6 feet (1829 mm) in developed length.

**908.1.1 Size.**

The vertical piping between two consecutive inlet levels must be considered a wet-vented section. Each wet-vented section must be not less than one pipe size exceeding the required minimum waste pipe size of the upper fixture. Or it can be one pipe size that exceed the minimum pipe size required for the sum of the fixture units served by the wet-vented section, whichever is larger, but in no case can it be smaller than 2 inches (50 mm) in diameter.



**908.1.2 Vent Connection.**

Vent size is calculated using the number of total fixtures served, and none of the numbers can be smaller than the minimum vent pipe size required for a fixture served.

**908.2 Horizontal Wet Venting for a Bathroom Group.**

A bathroom group located on the same floor level can be vented by a horizontal wet vent if conditions are met in Sections 908.2.1 through 908.2.5.

**908.2.1 Vent Connection.**

A dry vent connection to a wet vent must be an individual vent for a bidet, shower, or bathtub. For a bathroom group, a wet vent can serve one or two vented lavatory(s). Only one wet-vented fixture drain or trap arm must discharge upstream of the dry-vented fixture drain connection.

**908.2.2 Size.**

The wet vent must be sized based on the fixture discharge into a wet vent and comply with the following specifications based on Table 702.1 and Table 703.2.

- 4 drainage fixture units (drug) - at least 2 inches (50 mm) in diameter
- 5 drainage fixture units (due) – at least 3 inches (80 mm) in diameter

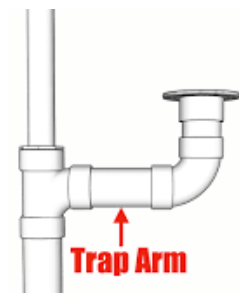
**908.2.3 Trap Arm.**

The vent pipe opening from the horizontal wet vent must not be below the weir of the trap.

**Exceptions:**

Water closets and similar fixtures

**908.2.4 Water Closet.**



*"The water closet fixture drain or trap arm connection to the wet vent shall be downstream of fixture drain or trap arm connections to the horizontal wet vent."*<sup>1</sup>

### 908.2.5 Additional Fixtures.

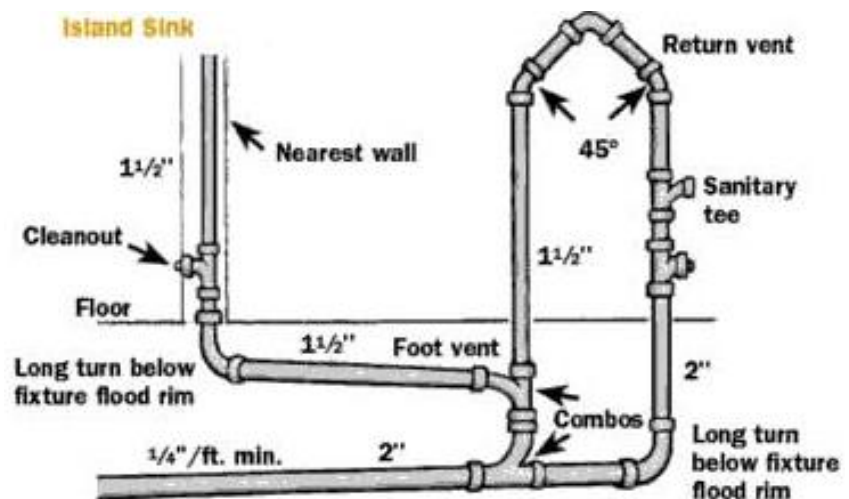
Additional fixtures must discharge downstream from the wet vent system and be conventionally located. Only bathroom group fixtures can be connected to a wet-vented horizontal branch.

## 909. Special Venting for Island Fixtures.

### 909.1 General.

Trap sinks and fixtures must comply with several specifications. Some are listed below.

- Traps must be roughed in above the floor.
- Venting can be extended by raising the vent higher as long as it stays below the drainboard height.
- The routing must return downward and be connected immediately downstream from the vertical fixture to the horizontal sink drain.
- The foot of the vent must be taken off the vertical fixture vent and a wye branch must be installed immediately below the floor.
- The venting must extend to the nearest partition and then continue either through the roof to open air or to other vents at a point of not less than 6 inches (152 mm) above the flood-level rim of the fixtures served.
- There must be a slope of not less than 1/4 inch per foot (20.8 mm/m) back to the drain.
- The return bend under the drainboard must be a one-piece fitting or an assembly of a 45 degree (0.79 rad), a 90 degree (1.57 rad), and a 45 degree (0.79 rad) elbow in the order named.
- The island sink drain, upstream of the returned vent, cannot serve other fixtures.
- An accessible cleanout must be installed in the vertical portion of the foot vent.





## 910. Combination Waste and Vent Systems.

### 910.1 Where Permitted.

Combination waste and vent systems can be installed where structural conditions make it impractical to install conventional systems specified in the UPC.

### 910.2 Approval.

The AHJ must approve construction documents for combination waste and vent system before installation.

### 910.3 Vents.

Each combination system must have an installed vent or vents that ensure free circulation of air.

A separate vent must be installed for each branch that exceeds 15 feet (4572 mm) in length.

The installation area for a combination waste and vent system must be the size of at least one-half the inside cross-sectional area of the drain pipe served. The vent connection must be downstream of the uppermost fixture.

### 910.4 Size.

Every waste pipe and trap in a combination waste and vent system must not be less than two pipe sizes exceeding a fixture tailpiece or connection.

### 910.5 Vertical Waste Pipe.

Vertical waste pipe is not permitted except for the tailpiece or connection between the outlet of a plumbing fixture and the trap. Such tailpieces or connections must be as short as possible, and not exceed 2 feet (610 mm).

#### Exception:

Branch lines can have 45 degree (0.79 rad) vertical offsets.

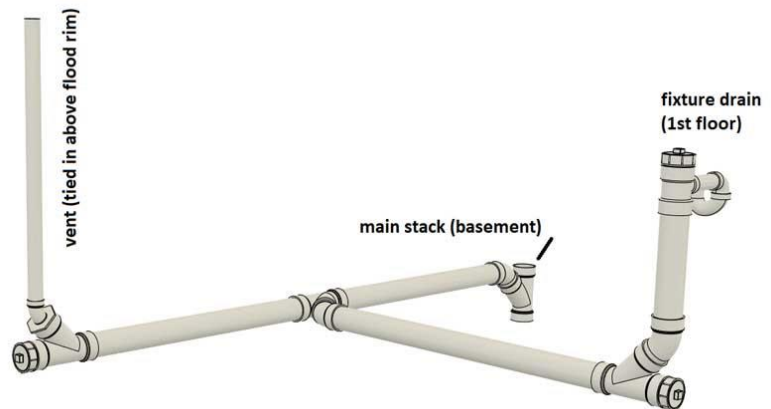
### 910.6 Cleanouts.

Accessible cleanouts must be installed in each vent for the combination waste and vent system. Cleanouts are not required on a wet-vented branch serving a single trap where the fixture tailpiece or connection are at least 2 inches (50 mm) in diameter. The cleanout must provide easy access for cleaning through the trap.

### 910.7 Fixtures.

No water closet or urinal can be installed on a combined waste and vent system.

Other one, two, or three unit fixtures remotely located from the sanitary system and adjacent to a combination waste and vent system can be connected to such



system in the conventional manner by means of waste and vent pipes of regular size.

## 911. Circuit Venting.

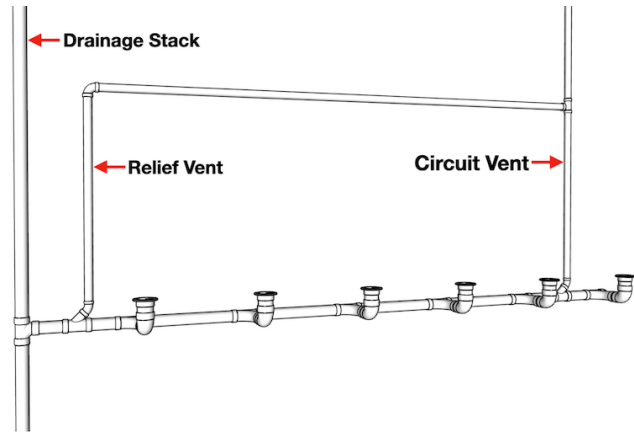
### 911.1 Circuit Vent Permitted.

A maximum of eight floor outlet water closets, showers, bathtubs, or floor drains connected to a horizontal branch can be circuit vented. Each trap arm must connect horizontally to the horizontal branch being circuit vented.

The horizontal branch must be classified as a drain. There must be a vent for the most downstream trap arm connection to the most upstream trap arm connection to the horizontal branch.

#### Exception:

If there are no floor-outlet fixtures connected to the same horizontal branch, back-outlets and wall-hung water closets can be circuit vented.



### 911.2 Circuit Vent Size and Connection.

The size of the circuit is based on the number of circuit vented fixtures connected to the horizontal branch.

The circuit vent must be at least 2 inches (50 mm) in diameter, and it must connect to the horizontal branch on the vertical between the two most upstream trap arms.

Circuit vent pipe must not receive soil or waste discharge.

#### 911.2.1 Multiple Circuit Vents.

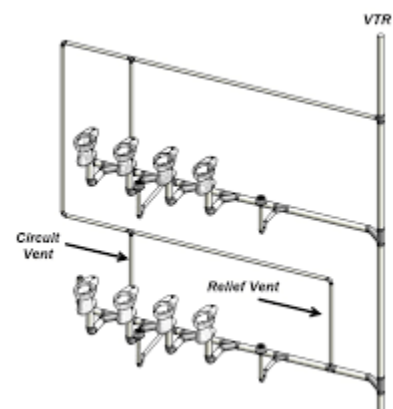
When multiple circuit vents are interconnected each individual circuit vent and vent pipe must be sized as specified by UPC tables.

### 911.3 Relief Vent.

A 2-inch (50 mm) relief vent must be installed for circuit-vented horizontal branches that receive discharge from four or more water closets when connecting to a drainage stack that receives the discharge of soil or waste from upper horizontal branches.

#### 911.3.1 Connection and Installation.

The relief vent must be connected to the horizontal branch between the stack and most



downstream trap arm of the circuit vent. The relief vent must be installed on the vertical to horizontal branch.

### 911.3.2 Fixture Drain.

The relief vent can serve as a fixture drain.

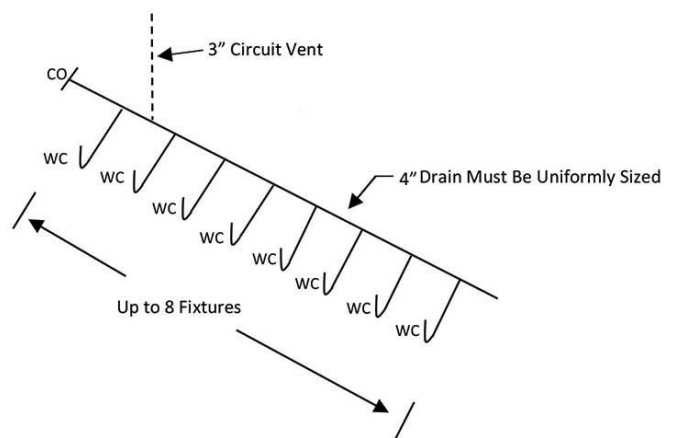
Fixture discharges to relief vents must be one or two unit fixtures, and not exceed a total of 4 fixture units.

### 911.4 Slope and Size of Horizontal Branch.

The vented section of the horizontal branch must be uniformly sloped and not more than 1 inch per foot (83.3 mm/m). The entire length of the vented section of the horizontal branch must be sized for the total drainage discharge to the branch (see Table 703.2).

#### 911.4.1 Multiple Circuit-Vented Branches.

Circuit vented horizontal branches can be connected. Each group that has the maximum of eight fixtures must be considered a separate circuit vent and comply with Section 911.4.1.1 and Section 911.4.1.2.



#### 911.4.1.1 Size of Parallel Horizontal Branches.

Parallel horizontal circuit vented branches can be connected on the same floor level. Each separate circuit-vented horizontal branch that is interconnected must be sized independently according to the specifications in Section 911.4.

#### 911.4.1.2 Size of Continuous Horizontal Branches.

If two or more circuit vented systems are continuous on the same horizontal branch they must be uniformly sized for the total discharge into the branch.

### 911.5 Additional Fixtures.

Fixtures, other than the circuit vented fixtures, can be installed for discharge to the horizontal branch drain. Such fixtures must be located on the same floor as the circuit-vented fixtures and must be either individually vented or share a common vent.

## 912. Engineered Vent System.

### 912.1 General.

The design and size of a vent system must be created with accepted engineering practices. The system must be designed by a registered design professional and approved (see Section 301.5).

**912.2 Minimum Requirements.**

An engineered vent system must protect the trap seal in accordance with Section 901.3.

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Reference:

<sup>1</sup> 2021 Uniform Plumbing Code (UPC), The International Association of Plumbing and Mechanical Officials (IAPMO) & The American National Standards Institute (ANSI)