12.2 PROTECTION OF TRAP SEALS

12.2.1 Protection Required

a. The protection of trap seals from siphonage, aspiration, or back pressure shall be accomplished by the appropriate use of sanitary drain stacks with adequate venting in accordance with the requirements of this Code.

b. Venting systems shall be designed and installed so that at no time will trap seals be subjected to a pneumatic pressure differential of more than one inch of water column under design load conditions.

c. If a trap seal is subject to loss by evaporation, means shall be provided to prevent the escape of sewer gas. (See Section 5.3.6.)

See Figures 12.2.1-A and 12.2.1-B

**Figure 12.2.1 - A**
TRAP SEAL REDUCTION FROM 1” NEGATIVE PRESSURE

**NOTES:**
1. Trap at rest with 2” trap seal.
2. Trap subjected to 1” suction from building drain piping.
3. Trap at rest with 1/2” loss of trap seal. Trap will continue to spillover and lose trap seal when subjected to 1” suction until the trap seal is reduced to 1”. The 2” initial trap seal permits the trap to withstand 1” suction and still maintain a trap seal of at least 1”.
12.3 VENTING OF DRAIN STACKS

12.3.1 Stack Vents and Vent Stacks

a. Stack vents shall extend from the top of a drain stack to an outdoor vent terminal.

b. A vent stack shall be provided for drain stacks having five or more branch intervals.

c. Where vent stacks are provided, their lower connection near the base of the drain stack for pressure relief, shall be either:
   1. to the drain stack at or below its lowest branch connection or,
   2. to the building drain within 10 pipe diameters downstream from the base of the drain stack.

d. The upper connection of vent stacks shall be to the stack vent for the drain stack or to an outdoor vent terminal.

e. Vent stacks shall be permitted to be provided for drain stacks having less than five branch intervals.

f. Stack vents and vent stacks shall be sized in accordance with Section 12.16.4.

See Figure 12.3.1

Figure 12.3.1 - B
TRAP SEAL REDUCTION FROM 1” POSITIVE PRESSURE

NOTES:
1. Trap at rest with 2” trap seal.
2. Trap subjected to 1” positive pressure from building drain piping.
3. When pressure is removed, some spillover occurs from the momentum of the trap legs equalizing.
4. Trap will continue to spillover and lose trap seal when subjected to 1” positive pressure until the trap seal is reduced to 1”. The 2” initial trap seal permits the trap to withstand 1” positive pressure and still maintain a trap seal of at least 1”.

See Figure 12.3.1
12.3.2 Relief Vents for Stacks Having Ten or More Branch Intervals

a. Where drain stacks have ten or more branch intervals, a relief vent shall be provided for each ten branch intervals, starting at the top of the stack.

b. The lower end of each relief vent shall connect to the drain stack as a yoke vent below its tenth branch interval.

c. The upper end of the relief vent shall connect to the vent stack at an elevation not less than 3 feet above the floor level served by the branch interval.

See Figure 12.3.2
NOTES:
1. A branch interval is the vertical distance between branch connections to a drain stack, generally a story height, but never less than 8 feet. The drain stack has 14 branch intervals.
2. A relief vent is required for the upper ten branch intervals.
3. The relief vent connects as a yoke vent below the 5th Floor branch drain connection and connects to the vent stack at least 3 feet above the floor on the 5th Floor.
4. The 3-foot vertical rise in the yoke vent keeps pressure surges in the drain stack from causing spill-over of drainage into the vent stack.
5. Stack relief vents must be the same size as the vent stack. See Section 12.16.4 for sizing vent stacks.

Figure 12.3.2
RELIEF FOR DRAIN STACKS HAVING 10 OR MORE BRANCH INTERVALS
12.3.3 Horizontal Offsets

a. Horizontal offsets in stacks having five or more branch intervals discharging above the offset shall be vented either:

1. by considering the stack as two separate stacks, one above and one below the offset, and venting each separately.
2. by providing a yoke vent from the drain stack below the offset to the vent stack required by Section 12.3.1 not less than 3 feet above the offset. This relief vent may be a stack vent for the lower portion of the drain stack.

See Figures 12.3.3-A and 12.3.3-B

---

**NOTES:**
1. The vent stack must be sized for the entire DFU load on the drain stack per Table 12.16.4.
2. The pressure relief vents for the upper and lower portions of the drain stack are required to relieve pressure from the hydraulic effect of the offset. The relief vents must be the same size as the vent stack.
3. The vent stack must connect to the base of the drain stack, either below the lowest branch connection above the base of the stack or within 10 pipe diameters downstream from the base of the stack.

**Figure 12.3.3 - A**

ONE STACK VENT FOR HORIZONTAL OFFSETS IN DRAIN STACKS
NOTES:
1. The drain stack has separate vent stacks for the upper and lower portions of the stack.
2. The vent stack for the upper portion of the drain stack can be sized for only the DFU load on the upper portion of the stack. Only vents for upper floor fixtures can be connected to the upper vent stack.
3. The lower portion of the drain stack carries the DFU load of the upper and lower portions of the stack. Its vent stack must be sized for the entire DFU load on the drain stack.
4. The relief vent for the lower portion of the drain stack must be the same size as the vent stack for the lower portion of the stack.
5. The vent stacks must connect to the base of each drainage stack, either below the lowest branch connection above the base of the stack or within 10 pipe diameters downstream from the base of the stack.

Figure 12.3.3 - B
TWO VENT STACKS FOR HORIZONTAL OFFSETS IN DRAIN STACKS
12.3.4 Vertical Offsets
Where vertical offsets in drain stacks having five or more branch intervals above the offset have branch connections within 2 feet above or below the offset, a relief vent shall be provided for the lower portion of the stack below the offset.

12.3.5 Vent Headers
Vents may be connected into a common header at the top of one or more stacks and then be extended to the open air at one point.

12.3.6 Other Use Prohibited
The plumbing vent system shall not be used for purposes other than venting of the plumbing system.

12.4 VENT TERMINALS

12.4.1 Extension Above Roofs
Vent pipes shall terminate not less than 6 inches above the roof, measured from the highest point where the vent intersects the roof.
EXCEPTION: Where a roof is used for any purpose other than weather protection and maintaining equipment, vents within ten (10) feet of the area being utilized shall extend at least seven (7) feet above the roof, shall be properly supported, and shall also comply with Section 12.4.4 for location.
See Figure 12.4.1

12.4.2 Waterproof Flashings
Vent terminals shall be made watertight with the roof by proper flashing.

12.4.3 Flag Poling Prohibited
Vent terminals shall not be used for the purpose of flag poling, TV aerials, or similar purposes.

NOTES:
1. Refer to Section 12.5 for provisions to prevent frost closure.

Figure 12.4.1
VENT EXTENSIONS THROUGH THE ROOF
12.4.4 Location of Vent Terminal

a. Vent terminals shall not be located where vapors can enter the building.

b. No vent terminal shall be located directly beneath any door, window, or other ventilating opening of a building or of another building, nor shall any such vent terminal be within 10 feet horizontally of such opening unless it is at least 2 feet above the top of such opening.

c. Where a vent terminal is within 10 feet horizontally and less than 2 feet above a ventilation opening described in Section 12.4.4b and the line-of-sight from the vent terminal to the ventilation opening is interrupted by the continuous ridge of a roof, the ridge shall be at least 2 feet above the top of the opening. Otherwise, the vent terminal shall comply with Section 12.4.4b.

d. Where a vent terminal is within 10 feet horizontally and less than 2 feet above a ventilation opening described in Section 12.4.4b and the line of sight from the vent terminal to such ventilation opening is interrupted by a solid wall or solid barrier, the top of the wall or barrier shall be at least 2 feet above the top of the ventilation opening and the shortest travel distance around the wall or barrier from the vent terminal to the nearest edge of the ventilation opening shall be at least 10 feet. Otherwise, the vent terminal shall comply with Section 12.4.4b.

See Figure 12.4.4

NOTES:
1. The separation of vent terminals from doors, windows, and air intake and exhaust openings keeps foul odors from entering the building.
2. The vent terminal is less than 2 feet above the window, but the window is 10 feet or more from the vent terminal horizontally.
3. The air intake or exhaust opening can be within 10 feet horizontally from the vent terminal if the vent terminal is 2 feet or more above the top of the opening.

Figure 12.4.4
ALLOWABLE LOCATIONS FOR VENT TERMINALS

12.4.5 Sidewall Venting

Vent terminals shall be permitted to extend through a wall on an existing building. They shall be at least 10 feet horizontally from any lot line, 10 feet above existing grade, and terminate with a corrosion-resistant bird screen. Vent terminals shall not terminate under an overhang of a building. They shall be located in accordance with Section 12.4.4.
12.4.6 Extensions Outside Building
No sanitary drain or vent pipe extension shall be installed on the outside of a wall of any new building, but shall be carried up inside the building.
EXCEPTION: In those localities where the outdoor temperature does not drop below 32°F, the Authority Having Jurisdiction may approve the installation outside the building.

12.4.7 Flashing Roof Vent Terminals
   a. Vent terminals through the roof shall be made watertight to the roof by sealing the flashing to either the exterior or interior of the vent terminal.
   b. Vent terminals that are externally sealed shall employ manufactured vent stack flashing sleeves, roof couplings, or no-caulk roof vent flashings.
   c. Where vent terminals are sealed by counter-flashing over the top of the vent terminal, the counter flashing shall not decrease the interior free area of the minimum required vent terminal size. Vent terminals shall be increased at least one pipe size when counter-flashed. Interior counter flashing shall be sealed gas-tight to prevent the entrance of sewer gas into the building through the flashing.

12.5 FROST CLOSURE
Where the Authority Having Jurisdiction requires protection against frost closure, vent terminals less than 3" pipe size shall be increased at least one pipe size to not less than 3" size. Where an increase is necessary, the increase in size shall be made inside the building at least one foot below a roof or ceiling that is thermally insulated and in an area not subject to freezing temperatures.

12.6 VENT SLOPES AND CONNECTIONS
12.6.1 Vent Slope
Vent and branch vent pipes shall be free from drops and sags and be sloped and connected as to drain by gravity to the drainage system.
See Figure 12.6.1

![Figure 12.6.1 VENT PIPING SLOPE](image_url)

NOTES:
1. Vent piping that is sloped allows condensation and moisture that may form in the piping to drain to the drainage system.
2. Vent piping must not have any trapped sections. Water may collect in trapped piping, fill the piping, and render the vent ineffective.
3. Vent piping can slope back to the fixture served or forward away from the fixture, as long as it drains to the drainage system.
12.6.2 Vertical Rise

Every vent shall rise vertically to a minimum of 6 inches above the flood level of the rim of the fixture being served before connecting to another vent.

EXCEPTIONS:
(1) Horizontal portions of a vent below the flood level rim of the fixture served that are installed in accordance with Sections 12.6.2.1, 12.6.2.2, and 12.6.2.3.
(2) Island sink vents in accordance with Section 12.18.

See Figures 12.6.2-A and 12.6.2-B

NOTES:
1. Connecting the vent above the centerline of a horizontal drain reduces the possibility of the vent connection being fouled by the flow in the drain.

Figure 12.6.2 - A
VENT PIPE CONNECTIONS TO HORIZONTAL DRAINS

NOTES:
1. A separate vent will be required for the bathtub if the developed length of its trap arm exceeds the maximum allowable length in Table 12.8.1.
2. If a vent is required for the bathtub, it can have a horizontal offset below the flood level rim of the bathtub, but it must be 6 inches above the flood level rim of the lavatory before it connects to another vent. The horizontal offset below the flood level rim must be sloped so that it drains to the drainage system.

Figure 12.6.2 - B
HORIZONTAL VENT PIPING BELOW THE FLOOD LEVEL RIM OF FIXTURES
12.6.2.1 Horizontal Vent Below Fixture Flood Level Rim
Where a vent pipe connects to a horizontal fixture drain branch, and conditions require a horizontal offset in the vent below the flood level rim of the fixture served, the vent shall be taken off so that the invert of the horizontal portion of the vent pipe is at or above the centerline of the horizontal sanitary drain pipe.

12.6.2.2 Slope of Horizontal Vent
The portion of the horizontal vent installed below the flood level rim as permitted in Section 12.6.2.1 shall be installed with the required slope to drain by gravity to the drainage system. See Figure 12.6.2-B

12.6.2.3 Cleanouts
Cleanouts shall be provided in the vent piping so that any blockages in the vent piping below the flood level rim of the fixture served can be cleared into the drainage system.

12.6.3 Vent Connection Height Above Fixtures
Connections between any horizontal vent pipe, including individual vents, branch vents, relief vents, circuit vents or loop vents, and a vent stack or stack vent shall be made at least 6 inches above the flood level rim of the highest fixture on the floor level.

12.6.4 Side-Inlet Closet Bends
a. Side-inlet closet bends shall be permitted only in cases where the fixture connection thereto is vented.
   b. In no case shall the side-inlet be used to vent a bathroom group without being washed by a fixture.
EXCEPTION: As allowed in Sections 12.10 and 12.11.

12.7 ADJACENT FIXTURES
Two fixtures set adjacent within the distance allowed between a trap and its vent, may be served with one common vent, provided that each fixture connects separately into an approved double fitting having inlet openings at the same level. (See Section 12.9.2 for inlet openings at different levels.)

See Figure 12.7

Comment: Suitable double fittings for connecting adjacent fixtures such as lavatories, sinks, tubs, showers, urinals, or floor-outlet water closets to a stack are double sanitary tees, double fixture fittings (plastic), and sanitary crosses. These fittings have high branch openings into the stack that keep the top of the vent opening above the weir of the traps to prevent self-siphonage.
12.8 FIXTURE VENTS

12.8.1 Venting of Fixture Drains

Fixture drains shall have a vent so located that the vent connects above the top weir of the trap and the developed length of the trap arm is within the limits set forth in Table 12.8.1.

EXCEPTIONS:
(1) Water closets and similar siphonic fixtures.
(2) Combination waste and vent systems. (see Section 12.17)
(3) Vents may be connected below the top weir of the fixture trap if the following conditions are met:
   a) The vertical section of the drain pipe shall be at least one pipe size larger than the trap inlet size.
   b) The horizontal pipe connected to the trap outlet shall be at least two pipe diameters long.
   c) The developed length of the trap arm shall not exceed the values in Table 12.8.1.
12.8 FIXTURE VENTS

12.8.1 Venting of Fixture Drains

Fixture drains shall have a vent so located that the vent connects above the top weir of the trap and the developed length of the trap arm is within the limits set forth in Table 12.8.1.

EXCEPTIONS:

1. Water closets and similar siphonic fixtures.
2. Combination waste and vent systems. (see Section 12.17)
3. Vents may be connected below the top weir of the fixture trap if the following conditions are met:
   a) The vertical section of the drain pipe shall be at least one pipe size larger than the trap inlet size.
   b) The horizontal pipe connected to the trap outlet shall be at least two pipe diameters long.
   c) The developed length of the trap arm shall not exceed the values in Table 12.8.1.

NOTES FOR TABLE 12.8.1:

1. Trap arm lengths are limited by Table 12.8.1 to prevent self-siphonage of the fixture trap.
2. The top of the opening at the vent pipe must not be below the elevation of the trap weir. The maximum trap arm lengths in Table 12.8.1 are based on using sanitary tees or other short turn fittings to connect trap arms to the drainage system. Long turn fittings should not be used with Table 12.8.1.
3. The trap arm length is the developed length along its centerline, including any changes in direction.

Figure 12.8.1 - A
THE MAXIMUM LENGTH OF TRAP ARMS

<table>
<thead>
<tr>
<th>Size of Trap Arm (Inches)</th>
<th>Length – Trap Arm to Vent</th>
<th>Slope – Inches per Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- 1/4</td>
<td>3’6”</td>
<td>1/4</td>
</tr>
<tr>
<td>1-1/2</td>
<td>5’</td>
<td>1/4</td>
</tr>
<tr>
<td>2</td>
<td>8’</td>
<td>1/4</td>
</tr>
<tr>
<td>3</td>
<td>10’</td>
<td>1/8</td>
</tr>
<tr>
<td>4</td>
<td>12’</td>
<td>1/8</td>
</tr>
</tbody>
</table>

NOTES FOR TABLE 12.8.1:

This table has been expanded in the “length” requirements to reflect expanded application of the wet venting principles. Slope shall not exceed 1/4” per foot.
12.8.2 Provision for Venting Future Fixtures

On new construction of residential dwelling units with basements, a 2" minimum size vent shall be installed between the basement and attic or tied into an existing, properly sized vent and capped for future use.

12.8.3 Crown Venting Limitation

A vent shall not be installed within two pipe diameters of the trap weir. See Figure 12.8.3

NOTES:
1. “A” is the trap pipe size.
2. “B” is the horizontal pipe between the trap outlet and the vertical leg. Its length must be at least two times the trap pipe size to avoid creating an “S” trap.
3. “C” is the vertical drop. It must be one size larger than the trap pipe size.
4. “D” is the connection to a vented drain line. The horizontal portion of “D” must be the same size as “C”. The distance from the weir of the trap to the vent connection at “D” must be within the limits of Table 12.8.1, based on the size of the trap.
12.8.4 Water Closets and Other Siphonic Fixtures

For water closets and other fixtures that operate by siphonic action, the distance between the outlet of the fixture and its vent connection shall not exceed 3 feet vertically and 9 feet horizontally.

12.9 COMMON VENTS

12.9.1 Individual Vent as Common Vent

An individual vent, installed vertically, may be used as a common vent for two fixture traps when both fixture drains connect with a vertical drain at the same level.

12.9.2 Fixtures Drains Connected at Different Levels

A common vent may be used for two fixtures installed on the same floor but connecting to a vertical drain at different levels, provided that the vertical drain is one pipe size larger than the upper fixture drain but in no case smaller than the lower fixture drain. See Figure 12.9.2

![Figure 12.9.2](image)

NOTES:
1. When the upper fixture is 3 DFU and the lower is 1 DFU, the vertical drain must be 3" instead of 2" so that the 1 DFU fixture is wet vented during the heavier discharge from the 3 DFU fixture.

12.10 WET VENTING

12.10.1 Single Bathroom Groups

a. An individually vented lavatory in a single bathroom group shall be permitted to serve as a wet vent for the water closet, the bathtub or shower stall, or the water closet and bathtub/shower if all of the following conditions are met.

1. The wet vent is 1-1/2" minimum pipe size if the water closet bend is 3" size or it shall be 2" minimum pipe size if the water closet bend is 4" pipe size.

2. A horizontal branch drain serving both the lavatory and the bathtub or shower stall is 2" minimum pipe size.
3. The length of the trap arm for the bathtub or shower stall is within the limits of Table 12.8.1. If not, the bathtub or shower stall shall be individually vented.

4. The distance from the outlet of the water closet to the connection of the wet vent is within the limits established by Section 12.8.4. Otherwise, the water closet shall be individually vented.

5. A horizontal branch serving the lavatory and the bathtub or shower stall shall connect to the stack at the same level as the water closet, or it may connect to the water closet bend, or the lavatory and bathtub or shower stall may individually connect to the water closet bend.

6. When the bathroom group is the topmost load on a stack, a horizontal branch serving the lavatory and the bathtub or shower stall may connect to the stack below the water closet bend, or the lavatory and the bathtub or shower stall may individually connect to the stack below the water closet bend. 

See Figures 12.10.1-A through -C

**Figure 12.10.1 - A**

**A WET VENTED BATHROOM GROUP WITH A 3” CLOSET BEND**

NOTES:
1. The vent for the bathroom group is 1-1/2”, which is 1/2 the size of the 3” drain for the bathroom group.

**Figure 12.10.1 - B**

**A WET VENTED BATHROOM GROUP WITH A 4” CLOSET BEND**

NOTES:
1. The vent for the bathroom group is 2”, which is 1/2 the size of the 4” drain for the bathroom group. Even though the bathroom group could have had a 3” drain with a 1-1/2” vent, installing a 1-1/2” vent on the 4” drain would cause unnecessary confusion for the installer and inspector.
12.10.2 Double Bathtubs and Lavatories

Two lavatories and two bathtubs or showers back-to-back may be installed on the same horizontal branch with a common vent for the lavatories and with no back vent for the bathtubs or shower stalls provided the wet vent is 2" in size and the lengths of the tub/shower drains conform to Table 12.8.1. See Figure 12.10.2

Figure 12.10.2
WET VENTED BACK-TO-BACK BATHROOM GROUPS (SINGLE STORY OR TOP FLOOR)

12.10.3 Multi-Story Bathroom Groups

a. On the lower floors of a stack, the waste pipe from one or two lavatories may be used as a wet vent for one or two bathtubs or showers as provided in Section 12.10.2.

b. Each water closet below the top floor shall be individually back vented.

EXCEPTION: The water closets in bathroom groups shall not be required to be back vented if the following conditions are met:

(1) The 2" waste serving the tubs/showers and lavatories connect directly into the water closet bend with a 45° wye tap in the direction of flow or,
(2) A special stack fitting is used that consists of a 3” or 4” closet opening and two side inlets each 2” in size and the inverts of which are above the center, and below the top of the water closet opening; and one of the 2” inlets is connected to the tub/shower drains, and the other is connected to the waste pipe from a maximum of two lavatories that are vented to a vent stack or stack vent; or,

(3) In lieu of the special stack fitting of Section 12.10.3b(2) above, 4” closet bends with two 2” wye taps may be used.

See Figures 12.10.3-A through -E

![Figure 12.10.3 - A](image)

**Figure 12.10.3 - A**

WET VENTED BACK-TO-BACK BATHROOM GROUPS ON A LOWER FLOOR WITH BACK VENTED WATER CLOSETS (ONE ARRANGEMENT)

![Figure 12.10.3 - B](image)

**Figure 12.10.3 - B**

WET VENTED BACK-TO-BACK BATHROOM GROUPS ON A LOWER FLOOR WITH BACK VENTED WATER CLOSETS (ANOTHER ARRANGEMENT)
**NOTES:**
1. This is an example of Exception #1 to Section 12.10.3.
2. Two adjacent bathroom groups are shown but individual bathroom groups can also be wet vented in this manner.
3. A lower floor is shown, but the arrangement can be used at the top of a drain stack.

**Figure 12.10.3 - C**

ADJACENT BATHROOM GROUPS WET VENTED WITH 45 DEGREE WYE TAPS

**NOTES:**
1. This is an example of Exception #2 to Section 12.10.3.
2. The side inlet to the special stack fitting are slightly higher than the water closet connection and the side connection that is wet vented vents all of the fixtures that are connected to the fitting.
3. A lower floor is shown, but the special stack fitting can be used at the top of a stack.

**Figure 12.10.3 - D**

A BATHROOM GROUP WET VENTED WITH A SPECIAL STACK FITTING
12.10.4 Bathtubs and Water Closets

a. An individually-vented bathtub in a single bathroom group shall be permitted to serve as a wet vent for the water closet if all of the following conditions are met:

1. The wet vent is 2" minimum size.
2. The distance from the outlet of the water closet to the connection of the wet vent is within the limits established by Section 12.8.4. Otherwise, the water closet shall be individually vented.

See Figure 12.10.4

NOTES:
1. This is an example of Exception #3 to Section 12.10.3.
2. The oversized 4" water closet fixture drain permits the tub/shower on one side of the drain to be wet vented by the lavatory on the other side of the drain.
3. Two adjacent bathroom groups are shown, but individual bathroom groups can be wet vented in this manner.
4. A lower floor is shown, but the arrangement can be used at the top of a drain stack.

Figure 12.10.3 - E
ADJACENT BATHROOM GROUPS WET VENTED WITH 4" CLOSET BENDS HAVING TWO 2" WYE TAPS

Figure 12.10.4
A WATER CLOSET WET VENTED BY A BATHTUB
12.10.5 Reserved

12.10.6 Floor Drains and Floor Sinks

a. A lavatory or sink shall be permitted to serve as a wet vent for a floor drain or floor sink if all of the following conditions are met:
   1. The wet vent shall be not less than 1-1/2" size for a 1 DFU lavatory or 2" for a 2 DFU sink.
   2. The wet vent shall be larger than 1/2 the size of the drain for the floor drain or floor sink.
   3. The distance from the outlet of the floor drain or floor sink to the connection of the wet vent shall be within the limits established by Table 12.8.1.

12.11 STACK VENTING

12.11.1 Fixture Groups

a. A single bathroom group and a kitchen sink (with or without a disposer and/or dishwasher) located back-to-back, or two bathroom groups back-to-back may be installed without individual fixture vents in a one-story building or on the highest branch of a stack in a multi-story building provided that the following conditions are met:
   1. Each fixture drain connects independently to the stack.
   2. The tub and/or shower and water closet enter the stack at the same level.
   3. The requirements of Table 12.8.1 are met.
   4. A side inlet connection into a 4" closet bend shall be considered to be an independent connection to the stack.

See Figures 12.11.1-A and 12.11.1-B

![Diagram of stack venting](https://example.com/diagram.png)

**NOTES:**

1. The arrangement shown is permitted in a one-story building or at the top of a stack.
2. Each fixture must connect independently to the stack except that the tub/shower connection to the 4” water closet fixture drain is considered to be a connection to the stack because the 4” drain is oversized for the water closet.
3. The length of all trap arms from their trap weir to their vent opening at the stack must not exceed the limits in Table 12.8.1. The vent distance for the water closet must be in accordance with Section 12.8.4.
4. Bathroom groups without kitchen sinks can also be stack vented as shown.
5. If the drain stack has 5 or more branch intervals, the drain stack and stack vent must be full size of the base of the drain stack or 4” minimum for the branch connection from the water closet and tub/shower.

**Figure 12.11.1 - A**

STACK VENTING A BATHROOM GROUP AND AN ADJACENT KITCHEN SINK
12.11.2 Lower Floors

a. Lower floor bathroom groups may be vented as provided in Section 12.11.1, provided the following conditions are met:
   1. A wye is installed in the stack with an upright one-eighth bend continuing from the wye branch to serve the stack group.
   2. A 2" relief vent is connected to the wye branch at least 6 inches above the flood level rim of the highest fixture on the wye branch.

See Figures 12.11.2-A and 12.11.2-B
NOTES:
1. Each fixture in the stack group must connect independently to the sub-stack except that the connection to the 4" water closet fixture drain is considered to be a connection to the sub-stack because it is over-sized for the water closet.
2. The length of all trap arms from their trap weir to their stack must not exceed the limits in Table 12.8.1. The vent distance for the water closet must be in accordance with Section 12.8.4.

Figure 12.11.2 - A
STACK VENTING A BATHROOM GROUP ON A LOWER FLOOR OF A DRAIN STACK
12.12 FIXTURE REVENTING

12.12.1 Reserved

12.12.2 Horizontal Branches
Three lavatories or one sink within 8 feet developed length of a main-vented line may be installed on a 2" horizontal waste branch without reventing, provided the branch is not less than 2 inches in diameter throughout its length, and provided the wastes are connected into the side of the branch and the branch leads to its stack connection with a grade of not more than 1/4 inch per foot.
See Figure 12.12.2
12.12.3 Fixtures without Revents Above Highest Bathtubs and Water Closets

a. Fixtures without revents may be connected to a sanitary drain stack above the highest water closet or bathtub connection if all the following conditions are met:
   1. The total load does not exceed 3 dfu’s.
   2. The soil or waste stack is 3” or larger.
   3. The total load on the stack is in accordance with Table 11.5.1B.
   4. The waste piping of the fixture above the water closet or bathtub connection is in accordance with Sections 12.8.1 and 12.12.2.

See Figure 12.12.3

Figure 12.12.2
FIXTURES ON HORIZONTAL BRANCHES OF A STACK WITHOUT REVENTS

NOTES:
1. The horizontal branch must have not more than 8 feet developed length, be 2” minimum size, and be sloped not more than 1/4” per foot to avoid self-siphonage of the fixture trap.
12.12.4 Vent Washdown

a. Fixtures other than kitchen sinks or food waste disposers shall be permitted to wash down a vertical loop vent, circuit vent or relief vent associated with a battery-vented drain branch without reventing, provided that:
   1. Not more than 2 drainage fixture units (DFU) are drained to a 2” vent, nor more than 4 drainage fixture units (DFU) are drained to a 3” vent;
   2. The fixture trap arm lengths comply with Section 12.8.1;
   3. The fixtures drained to the vent are within the same branch as the other fixtures served by the vent; and
   4. No other fixtures are drained to the vent.

NOTES:
1. One or more fixtures totaling up to 3 DFU can be connected to a 3” minimum stack above the highest bathtub or water closet without individual vents (revents) if the horizontal waste branch(s) from the fixture(s) is 2” size with 8 feet maximum developed length and sloped no more than 1/4” per foot.
2. The stack must be larger than 3” size if required by Table 11.5.1.B.

Figure 12.12.3
UNVENTED FIXTURES ABOVE THE HIGHEST BATHTUBS AND WATER CLOSETS
12.13 CIRCUIT AND LOOP VENTING

12.13.1 Battery Venting

   a. A maximum of eight floor-outlet water closets, showers, bathtubs, or floor drains connected in battery on a horizontal drain shall be permitted to be battery vented.

   EXCEPTION: Blowout type water closets.

   b. Each fixture drain shall connect horizontally to the horizontal drain being so vented.

   c. The horizontal battery-vented drain shall be considered as a vent extending from the most downstream fixture drain connection to the most upstream fixture drain connection.

   d. Back-outlet water closets and wall-mounted urinals shall be permitted to be battery vented provided that no floor-outlet fixtures are connected to the same horizontal battery-vented drain.

   EXCEPTION: Back-outlet blowout type water closets.

   e. The battery vent shall be a circuit or loop vent connected to the horizontal drain between the two most upstream fixture drains and shall be installed in accordance with Section 12.6.

   f. The entire length of the vented section of the horizontal battery-vented drain shall be uniformly sized for the total drainage fixture units (DFU) connected thereto.

   g. The maximum slope of the horizontal battery-vented drain shall be 1 inch per foot.

   h. A relief vent shall be provided on battery-vented horizontal drains that have four or more water closets connected on the lower floors of a drain stack or connect to the building drain or a branch of the building drain.

   i. The relief vent shall connect to the horizontal battery-vented drain between its most downstream fixture drain connection and its connection to a drain stack, the building drain, or branch of the building drain.

   j. Relief vents shall be installed in accordance with Section 12.6.

   k. Circuit, loop, and relief vents shall be permitted to connect to a fixture drain, common vent, or continuous vent for fixtures located within the same branch interval as the battery-vented horizontal drain.

   EXCEPTION: Fixture vents for more than four drainage fixture units (DFU) shall not connect to a battery vent.

   l. Lavatories and similar fixtures shall be permitted to connect to the horizontal battery-vented drain, either horizontally or vertically, provided that,

      (1) the fixtures are on the same floor as the battery-vented drain, and

      (2) the fixtures have individual, common, or continuous vents.

   m. Batteries of more than eight battery-vented fixtures shall have a circuit or loop vent for each group of eight or less fixtures.

   n. Where there are two or more groups of battery-vented fixtures, the horizontal drain for each downstream group shall be sized for the total drainage fixture units (DFU) into that group, including any upstream groups and the fixtures within the group being sized.

   o. Horizontal battery-vented drains that connect to drain stacks shall be sized as horizontal fixture branches in accordance with Table 11.5.1B.

   p. Horizontal battery-vented drains that connect to the building drain or a branch of the building drain shall be sized as a branch of the building drain in accordance with Table 11.5.1A.

See Figure 12.13.1 and the definitions of “Battery of Fixtures”, “Vent, Circuit”, and “Vent, Loop”. 
NOTES:
1. Battery vented horizontal drains can serve a mixture of two to eight water closets, floor drains, bathtubs, shower stalls, and other floor-outlet fixtures.
2. The fixtures must connect horizontally to the horizontal battery-vented drain.
3. The entire length of the horizontal battery-vented drain must be sized for the total connected DFU load. The slope of the drain must not exceed 1 inch per foot.
4. The developed length of fixture trap arms must be within the limits of Table 12.8.1 for the size of the trap arm.
5. Lavatories and sinks can connect horizontally or vertically to the horizontal battery-vented drain, but they must be independently vented.
6. Relief vents are required where horizontal battery-vented drains serve more than four water closets on the lower floors of a drain stack or connect to the building drain or a branch of the building drain.
7. Fixtures are permitted to drain into circuit, loop and relief vents. A 2” vent can drain 2 DFU. A 3” vent can drain 4 DFU.
8. Back-outlet water closets and wall-mounted urinals must connect horizontally to the horizontal battery-vented drain with no vertical piping.

Figure 12.13.1
CIRCUIT AND LOOP VENTING BATTERIES OF FIXTURES
12.13.2 Joining Parallel Branches
Where parallel branches of up to eight battery-vented fixtures each are joined prior to connecting to a stack or building drain, the common downstream piping shall be sized for the combined total fixture unit (DFU) load of both branches. A relief vent shall be provided on the common downstream piping when the parallel branches serve a combined total of four or more water closets and connect to a stack receiving drainage from an upper floor.

12.13.3 Vent Connections
Circuit, loop, and relief vent connections to horizontal battery-vented drains shall be taken off at a vertical angle or from the top of the horizontal drain. See Figure 12.16.2

12.13.4 Fixtures Back-to-Back in Battery
When fixtures are connected to one horizontal battery-vented drain through a double wye or a sanitary tee in a vertical position, a common vent for each two fixtures back-to-back or double connected shall be provided. The common vent shall be installed in a vertical position as a continuation of the double drain connection.

12.14 VENTING OF BUILDING SUBDRAIN SYSTEMS

12.14.1 Fixture Venting
Fixtures and gravity drain piping in a building subdrain system shall be vented in the same manner as a conventional gravity drainage system and shall be permitted to connect to vent piping for fixtures and gravity drain piping that are not part of the subdrain system.

12.14.2 Subdrain Sump Pits for Atmospheric Pumps
   a. The vent pipe for an atmospheric subdrain sump pit shall be sized based on the discharge capacity of its sewage pump or ejector and the drainage load (DFU) connected to the pit, whichever is larger.
      1. The required vent pipe size and length based on the sewage pump or ejector capacity (GPM) shall be determined from Table 12.14.2.
      2. The required vent pipe size and length based on the connected drainage load (DFU) shall be determined from Table 12.16.4.
   b. The atmospheric vent pipe from a sump pit shall be permitted to be connected to gravity vent piping for fixtures other than those served by the sump pit. The sump pit vent shall carry the DFU load on the pit if it is connected to other vent piping and combined with their DFU loads.
### Table 12.14.2
SIZE AND LENGTH\(^1\) OF SUMP VENTS

<table>
<thead>
<tr>
<th>Discharge Capacity of Sump Pump (gpm)</th>
<th>Diameter of Vent (inches)</th>
<th>1-1/4</th>
<th>1-1/2</th>
<th>2</th>
<th>2-1/2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
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<td>NL(^2)</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
</tr>
<tr>
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<td>270</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
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<td>NL(^2)</td>
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<td>NL(^2)</td>
<td>NL(^2)</td>
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<tr>
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<td>75</td>
<td>270</td>
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<td>NL(^2)</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
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<tr>
<td>80</td>
<td>16</td>
<td>41</td>
<td>150</td>
<td>380</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
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<td>97</td>
<td>250</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
<td>NL(^2)</td>
</tr>
<tr>
<td>150</td>
<td>NP(^4)</td>
<td>&lt;10(^3)</td>
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<td>370</td>
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<td>NP(^4)</td>
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<td>NL(^2)</td>
<td>NL(^2)</td>
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<td>250</td>
<td>NP(^4)</td>
<td>NP(^4)</td>
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<td>36</td>
<td>132</td>
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<td>NL(^2)</td>
</tr>
<tr>
<td>300</td>
<td>NP(^4)</td>
<td>NP(^4)</td>
<td>&lt;10(^3)</td>
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<td>88</td>
<td>380</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>NP(^4)</td>
<td>NP(^4)</td>
<td>NP(^4)</td>
<td>&lt;10(^3)</td>
<td>44</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>NP(^4)</td>
<td>NP(^4)</td>
<td>NP(^4)</td>
<td>NP(^4)</td>
<td>24</td>
<td>130</td>
<td></td>
</tr>
</tbody>
</table>

NOTES FOR TABLE 12.14.2:
1. The lengths in the table are the developed lengths of the vent pipes in feet. An allowance has been made for entrance losses and friction for the pipe and fittings.
2. No Limit; actual values greater than 500 feet.
3. Less than 10 feet.

#### 12.14.3 Pneumatic Sewage Ejectors

a. When a pneumatic sewage ejector requires a surge tank in Section 11.7.4, the tank shall be vented the same as an atmospheric sump pit. The vent shall be sized based on its connected DFU load.

b. Pressure release vents for pneumatic sewage ejectors shall extend to an outdoor vent terminal that is separate from any gravity system vents. Such pressure release vents shall be of sufficient size to reduce the ejector tank to atmospheric pressure within 10 seconds after discharge, but not less than 1-1/4" pipe size.

#### 12.15 SUDS PRESSURE VENTING

##### 12.15.1 Relief Venting

Where fixture or branch drains connect to a sanitary drain stack within a suds pressure zone as described in Section 11.11.2, a suds relief vent shall be provided for the fixture or branch drain. Suds relief vents shall be 2" minimum size but not less than one pipe size smaller than the drain branch that they serve. Such relief vents shall connect to the drain branch between the suds pressure zone and the first fixture trap on the branch.
### Table 12.15.1

**SUDS PRESSURE RELIEF VENTS**

<table>
<thead>
<tr>
<th>Drain Size (inches)</th>
<th>Relief Vent Size (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2</td>
<td>2</td>
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<tr>
<td>2</td>
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<td>3</td>
<td>2</td>
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<td>6</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

*Comment: Suds pressure relief vents in Section 12.15 are larger than ordinary vents for drainage systems because the suds are heavier than air. Suds can weight from 2 to as much as 19 pounds per cubic foot.*

### 12.15.2 Prohibited Vent Connections

Connections shall not be made within the suds pressure zone of a vent stack that connects at or downstream from the base of a sanitary drain stack, as described in Section 11.11.2.d.

### 12.16 SIZE AND LENGTH OF VENTS

#### 12.16.1 Size of Fixture Vents

Vents for individual fixtures shall be not less than 1-1/4" size nor less than one-half the size of the fixture drain that they serve.

*See Figure 12.16.1*

---

**Figure 12.16.1**

**THE SIZE OF INDIVIDUAL FIXTURE VENTS**

NOTES:

1. Vents for individual fixtures must be at least 1/2 of the size of the drain that they serve, but not less than 1-1/4"
12.16.2 Size of Circuit or Loop Vents
Circuit or loop vents shall be not less than one-half the size of the horizontal drain that they serve.

See Figure 12.16.2

![Diagram showing circuit and loop vents](image)

NOTES:
1. A lower floor is shown. It requires a relief vent because there are more than 4 water closets on the branch.
2. The horizontal battery-vented drain is 4” size.
3. The circuit vent must be 2” minimum size per Section 12.16.2.
4. The relief vent must be 2” minimum size per Section 12.16.3.

Figure 12.16.2
THE SIZE OF CIRCUIT AND LOOP VENTS

12.16.3 Size of Relief Vents
a. The size of relief vents for circuit or loop vented branches of the drainage system shall be not less than one-half the size of the horizontal battery-vented drain being served.

b. Relief vents for drain stacks having ten or more branch intervals and relief vents for horizontal offsets in such drain stacks shall be the same size as the vent stack to which they connect.

12.16.4 Size of Stack Vents and Vent Stacks
a. Stack vents shall be not less than the pipe size of the top of the drain stack that they are connected to.

b. Vent stacks, where required, shall be sized in accordance with Table 12.16.4, based on the total drainage fixture unit load (DFU) at the base of the drain stack that they serve. Connections of branch vents to the vent stack from fixtures on floor levels above the base of the drain stack shall not affect the size of the vent stack.

COMMENT: Where a vent stack is required for a drain stack, the drain stack and its stack vent must be the full size of the drain stack at its base.
### Table 12.16.4
SIZE AND LENGTH OF VENT STACKS

<table>
<thead>
<tr>
<th>Size of Drain Stack (inches)</th>
<th>Drainage Fixtures Units (DFU) Connected</th>
<th>Maximum Developed Length of Pipe (feet) for Vent Stack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-1/4&quot;</td>
<td>1-1/2&quot;</td>
</tr>
<tr>
<td>2&quot;</td>
<td>6</td>
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<td></td>
</tr>
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</tr>
<tr>
<td>15&quot;</td>
<td>13,000</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES FOR TABLE 12.16.4:**

1. The maximum developed lengths of pipe in the table are based on a 1" wg pressure drop for a single vent stack from its connection at the base of its drain stack to its connection to its stack vent or to its outdoor vent terminal.
2. The maximum developed length of pipe is the total length of the pipe alone. The pipe lengths in the table include an allowance for pipe fittings. The total equivalent length of pipe used in the calculations for 1" wg pressure drop is 2/3 pipe and 1/3 fittings.
3. For the purpose of sizing vent stacks, the length of a vent stack in Table 12.16.4 shall be its developed length from its pressure relief connection near the base of the drain stack being vented to its connection to the stack vent at the top of the drain stack. If not connected to the stack vent, the vent stack shall extend to an outdoor vent terminal.
12.16.5 Size of Vent Headers

a. Vent headers and portions thereof shall be sized according to Table 12.16.6.
b. The number of drainage fixture units (DFU) used to size sections of vent headers shall be the sum of all
   fixture units (DFU) for all drain stacks served by that section of the header.
c. The total developed length of all sections of a vent header shall be the longest vent length from the vent
   stack connection at the base of the most distant drain stack to the outdoor vent terminal.
d. Where two or more vent headers are connected before reaching an outdoor vent terminal, each vent
   header shall have its own total developed length to the outdoor vent terminal with regard to sizing per
   Table 12.16.6.

Table 12.16.6
SIZE OF BRANCH VENTS (1) AND VENT HEADERS (2)

<table>
<thead>
<tr>
<th>DFU Being Vented</th>
<th>Vent Pipe Size (minimum) For 40 Feet Maximum Total Developed Length</th>
<th>Vent Pipe Size (minimum) For Greater than 40 Feet Total Developed Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-1/4&quot;</td>
<td>1-1/2&quot;</td>
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<tr>
<td>3</td>
<td>1-1/4&quot;</td>
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</tr>
<tr>
<td>7000</td>
<td>8&quot;</td>
<td>10&quot;</td>
</tr>
</tbody>
</table>

NOTES FOR TABLE 12.16.6:
1. The total developed length of branch vents shall comply with Section 12.16.6.c.
2. The total developed length of vent headers shall comply with Section 12.16.5.c or d.

12.16.6 Size of Branch Vents

a. Branch vents and portions thereof shall be sized according to Table 12.16.6.
b. The number of drainage fixture units (DFU) used to size sections of branch vents shall be the sum of all
   drainage fixture units (DFU) for the individual fixture vents or branch vents served by that section of the branch vent.
c. The total developed length of all sections of a branch vent shall be the longest length from its
   connection to the most distant individual fixture vent being vented to its connection to an outdoor vent terminal.

12.16.7 Underground Vent Piping

The minimum size of vent piping installed underground shall be 1-1/2".

12.16.8 Aggregate Size of Vent Terminals

a. Each building sewer shall be vented by one or more vents extending from the drainage system, or
   branches thereof, to the outside air.
b. The aggregate cross-sectional area of all vent terminals serving a sewer shall be not less than the
   cross-sectional area of the minimum required size of the building drain that they serve, at the point where it
   connects to the building sewer. (See Table 12.16.8 for the cross-sectional areas of pipes).
   EXCEPTION: The aggregate cross-sectional area requirement shall be exclusive of any requirements to
   increase the size of a vent terminal to prevent frost closure under Section 12.5.
c. One or more vent terminals having the aggregate cross-sectional area of a 3" vent terminal shall be permitted to vent a 4" building drain if the drainage fixture unit load (DFU) and number of bathroom groups served by the building drain does not exceed the maximum number allowed on a 3" building drain, as permitted by Section 11.5.6.c.

12.17 COMBINATION WASTE AND VENT SYSTEM

12.17.1 Where Permitted
   a. A combination waste and vent system shall be permitted only where conditions preclude the installation of a conventionally vented drainage system as otherwise required by this Code.
   b. Combination waste and vent systems shall be limited to floor drains and other floor receptors, sinks, lavatories, and standpipes.

12.17.2 Trap Size
Traps in a combination waste and vent system shall be the normal size for the particular fixture. See Table 5.2.

12.17.3 Trap Arms
   a. Fixtures shall be considered to be vented at the point that they connect to a combination waste and vent system.
   b. Where fixtures have conventionally sized trap arms, the maximum length of the trap arm from the weir of its trap to the point of connection to the combination waste and vent systems shall be as limited in Table 12.8.1.
   c. In the case of fixtures with above-the-floor outlets, the vertical drop at the end of the trap arm shall be one size larger than the trap arm and be considered as the beginning of the combination waste and vent system.
   d. Floor-outlet fixtures shall also be permitted to drop into a vertical combination waste and vent that is at least one size larger than the trap arm.
   e. Where a fixture trap arm is sized as a combination waste and vent, its length shall not be limited and it shall be considered as a branch of the combination waste and vent system.
   f. The maximum vertical drop from a fixture trap arm to a horizontal drain below shall be 6 feet.

12.17.4 Pipe Sizing
The piping in a combination waste and vent system shall be sized according to Table 12.17.4, based on the number of drainage fixture units (DFU) served and the slope of the piping.
EXCEPTION: No pipe shall be smaller than any section of piping upstream, including vertical drops from trap arms.

### Table 12.16.8
NOMINAL PIPE CROSS SECTIONAL AREA (Sq. Inches)

<table>
<thead>
<tr>
<th>Nominal Pipe Size (ID)</th>
<th>Cross Sectional Area (sq in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/4&quot;</td>
<td>1.2</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
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</table>
12.17 COMBINATION WASTE AND VENT SYSTEM

12.17.1 Where Permitted

a. A combination waste and vent system shall be permitted only where conditions preclude the installation as otherwise required by this Code.

b. Combination waste and vent systems shall be limited to floor drains and other floor receptors, sinks, lavatories, and standpipes.

12.17.2 Trap Size

Traps in a combination waste and vent system shall be the normal size for the particular fixture. See Table 5.2.

12.17.3 Trap Arms

a. Fixtures shall be considered to be vented at the point that they connect to a combination waste and vent system.

b. Where fixtures have conventionally sized trap arms, the maximum length of the trap arm from the weir of its trap to the point of connection to the combination waste and vent systems shall be as limited in Table 12.8.1.

c. In the case of fixtures with above-the-floor outlets, the vertical drop at the end of the trap arm shall be one size larger than the trap arm and be considered as the beginning of the combination waste and vent system.

d. Floor-outlet fixtures shall also be permitted to drop into a vertical combination waste and vent that is at least one size larger than the trap arm.

e. Where a fixture trap arm is sized as a combination waste and vent, its length shall not be limited and it shall be considered as a branch of the combination waste and vent system.

f. The maximum vertical drop from a fixture trap arm to a horizontal drain below shall be 6 feet.

12.17.4 Pipe Sizing

The piping in a combination waste and vent system shall be sized according to Table 12.17.4, based on the number of drainage fixture units (DFU) served and the slope of the piping.

**EXCEPTION:** No pipe shall be smaller than any section of piping upstream, including vertical drops from trap arms.

<table>
<thead>
<tr>
<th>Load</th>
<th>slope 1/8” per ft</th>
<th>slope 1/4” per ft</th>
<th>slope 3/8” per ft</th>
<th>slope 1/2” per ft</th>
</tr>
</thead>
<tbody>
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<td>2”</td>
<td>2”</td>
<td>2”</td>
</tr>
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<td>4”</td>
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<tr>
<td>1600 dfu</td>
<td>10”</td>
<td>10”</td>
<td>8”</td>
<td>8”</td>
</tr>
<tr>
<td>1920 dfu</td>
<td>12”</td>
<td>10”</td>
<td>10”</td>
<td>10”</td>
</tr>
</tbody>
</table>

12.17.5 Maximum Slope

All piping in a combination waste and vent system shall be horizontal and sloped at not greater than 1/2 inch per foot.

**EXCEPTIONS:**

(1) Vertical drops at the end of trap arms.

(2) Vertical drops of not greater than 45 degrees from horizontal where the vertical drop is not greater than 6 feet and the offset is at least 10 pipe diameters from any turn or branch connection.

12.17.6 Branch Connections

a. Connections to mains and branches within combination waste and vent systems shall be made horizontally at a slope not greater than 1/2 inch per foot.

b. Branch connections shall not be made in vertical drops or offsets.

12.17.7 Minimum Distances

The distance between turns, offsets, and branch connections in combination waste and vent piping shall be not less than 10 pipe diameters.

12.17.8 Connections to Conventional Drainage Systems

a. Combination waste and vent systems shall extend to the point of connection to a conventionally sized and conventionally vented drainage system.

b. At the point of connection, the pipe size of the conventional system shall be at least as large as the combination system, and sized to accept the added drainage load from the combination system.

c. Such connection from the combination system to the conventional system shall be made at an angle above horizontal of not less than 22-1/2 degrees nor more than 45 degrees.

12.17.9 Connection of Individual Fixtures

Where drains from individual fixtures are designed as a combination waste and vent and are connected to a conventional drainage system, the connection from the fixture to the conventional system shall be made according to Section 12.17.8.
12.17 Combination Waste and Vent System

12.17.1 Where Permitted

a. A combination waste and vent system shall be permitted only where conditions preclude the installation of a conventionally vented drainage system as otherwise required by this Code.

b. Combination waste and vent systems shall be limited to floor drains and other floor receptors, sinks, lavatories, and standpipes.

12.17.2 Trap Size

Traps in a combination waste and vent system shall be the normal size for the particular fixture. See Table 5.2.

12.17.3 Trap Arms

a. Fixtures shall be considered to be vented at the point that they connect to a combination waste and vent system.

b. Where fixtures have conventionally sized trap arms, the maximum length of the trap arm from the weir of its trap to the point of connection to the combination waste and vent systems shall be as limited in Table 12.8.1.

c. In the case of fixtures with above-the-floor outlets, the vertical drop at the end of the trap arm shall be one size larger than the trap arm and be considered as the beginning of the combination waste and vent system.

d. Floor-outlet fixtures shall also be permitted to drop into a vertical combination waste and vent that is at least one size larger than the trap arm.

e. Where a fixture trap arm is sized as a combination waste and vent, its length shall not be limited and it shall be considered as a branch of the combination waste and vent system.

f. The maximum vertical drop from a fixture trap arm to a horizontal drain below shall be 6 feet.

12.17.4 Pipe Sizing

The piping in a combination waste and vent system shall be sized according to Table 12.17.4, based on the number of drainage fixture units (DFU) served and the slope of the piping.

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Table 12.17.4

<table>
<thead>
<tr>
<th>Load</th>
<th>1/8” per ft</th>
<th>1/4” per ft</th>
<th>3/8” per ft</th>
<th>1/2” per ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 dfu</td>
<td>4”</td>
<td>2”</td>
<td>2”</td>
<td>2”</td>
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<tr>
<td>12 dfu</td>
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<tr>
<td>180 dfu</td>
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<tr>
<td>218 dfu</td>
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<tr>
<td>390 dfu</td>
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<td>1920 dfu</td>
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<td>10”</td>
<td>10”</td>
<td>10”</td>
</tr>
</tbody>
</table>
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12.18 Island Sink Venting

12.18.1 Where Permitted

Island sink venting shall be permitted for sinks and lavatories where the vent pipe cannot rise 6 inches above the flood level rim of the fixture before turning horizontal. Kitchen sinks in dwelling units with dishwasher connections, food waste disposer connections, or both, shall be permitted to be island vented.

See Figure 12.18

![Figure 12.18](image-url)

12.18.2 Arrangement of Vent Piping

The island vent pipe shall rise vertically under the sink at the end of the fixture trap arm up to the underside of the counter top for the sink. The vent shall then turn downward and connect to the horizontal drain line below the floor downstream from the fixture drain connection so that the vertical vent drop will drain by gravity to the drainage system. A horizontal vent pipe shall be extended under the floor from the vertical vent drop to a point where it can rise vertically. The vertical rise at the end of the horizontal vent portion shall extend upward to at least 6 inches above the flood level rim of the fixture being vented before turning horizontal and connecting to a vent to the outdoors. The horizontal portion of the vent under the floor shall pitch back toward the sink so that it will drain by gravity through the vertical vent drop connection to the drainage system.

12.18.3 Size of Island Vent Pipes

Island vent pipes shall be sized as individual or common vents in accordance with Section 12.16.1.

12.18.4 Cleanouts Required

Cleanouts shall be provided in the vertical vent drop under the sink and in the vertical rise beyond the horizontal portion of the vent so that any blockages in the vent piping can be rodded into the drainage system.
12.19 WASTE STACK VENTING

12.19.1 Permitted Fixtures
Lavatories, bathtubs, showers, kitchen sinks with and without food waste disposers and dishwashers, laundry sinks, clothes washer standpipes, drinking fountains, floor drains, and similar fixtures shall be permitted to be vented by a waste stack that is sized and installed in accordance with the requirements of this Section.

12.19.2 Prohibited Fixtures
Water closets and urinals shall not be vented by waste stacks.

12.19.3 Waste Stacks
a. Waste stacks shall be uniformly sized from top to bottom according to the total connected fixture drainage load in accordance with Table 12.9.5.
   b. Waste stacks shall be vertical for their entire height without offsets of any degree, except for the base of the stack below the lowest fixture connection.

12.19.4 Connections to the Stack
a. Each fixture shall individually connect to the stack through a single or double sanitary tee.
   b. The maximum length of the trap arms from the individual fixtures shall be in accordance with Table 12.8.1.

12.19.5 Waste Stack Sizes
Waste stack sizes shall be in accordance with Table 12.19.5.

<table>
<thead>
<tr>
<th>Stack Size (inches)</th>
<th>Total DFU into one Branch Interval</th>
<th>Total DFU into the Stack</th>
</tr>
</thead>
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<td>6</td>
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12.19.6 Waste Stack Vents
a. Each waste stack shall be vented by a stack vent that is the same size as the waste stack.
   b. Offsets shall be permitted in stack vents for waste stacks above the connection of the top-most fixture on the stack.

See Figure 12.19.6
12.20 OTHER DESIGNS

Venting systems not described in this Code may be permitted by the Authority Having Jurisdiction if they provide the protection required by Section 12.2.1 and are individually designed by a licensed professional engineer. (See Appendix E - SPECIAL DESIGN PLUMBING SYSTEMS.)