

CHAPTER 9 VENTS

901 GENERAL

901.1 Scope

The provisions of this chapter shall govern the materials, design, construction, and installation of vents.

901.2 Protection of Trap Seals

The protection of trap seals from siphonage or back pressure shall be accomplished by the appropriate use of soil or waste stacks, vent, revents, back vents, loop vents, circuit or continuous vents or combination thereof, installed in accordance with the requirements of this chapter and the limitations set forth in Section 303.8.3.

901.4 Tests

The venting system shall be tested in accordance with 311.2.

901.5 Engineered Systems

Engineered sanitary drainage and venting systems shall conform to the provisions of Chapter 12, Alternate Designed Plumbing Systems.

902 DEFINITIONS

902.1 The following definition has been deleted without substitution: AIR ADMITTANCE VALVE.

902.2 The following definitions have been moved to Chapter 2: ACCESS COVER, BATTERY VENTING, BRANCH INTERVAL, BRANCH VENT, CIRCUIT VENT, COMMON VENT, CONTINUOUS VENT, CROWN OF TRAP, DEPTH OF WATER SEAL, INDIVIDUAL VENT, LOOP VENT, MAIN VENT, RESIDENTIAL BUILDINGS, SIDE VENT, WET VENT, YOKE VENT.

902.3 The following definitions have been moved to Appendix L: DISCHARGE PIPE, DISCHARGE UNIT, VENTILATING PIPE.

903 MATERIALS

903.1 Vents

Pipe, tubing, and fittings for the vent piping system shall comply with the provisions of Chapter 7.

903.2 Specific Type

Standards given in Table 703 apply to the specific materials approved for use and as indicated in the various sections in this chapter.

903.3 Piping Above Ground

Vent piping shall be of cast iron, galvanized steel, brass or copper pipe, copper tube of a weight not less than that of

copper drainage tube Type DWV, Schedule 40 plastic piping, or borosilicate glass.

903.4 Piping Underground

Vent piping placed underground shall be of cast iron, copper tube of a weight not less than that of Type DWV, Schedule 40 plastic piping or heavy schedule borosilicate glass, provided that other materials may be used for underground vents when found adequate and installed as directed by the Plumbing Official. Materials subject to corrosion shall be protected when installed in corrosive soil.

903.5 Fittings

Fittings shall be compatible to the type of pipe used in the vent system as required by 903.2 and 903.3.

903.6 Acid System

Vent piping on acid-waste systems shall conform to 703.6.

904 VENT STACKS

904.1 Installation

A vent stack or main vent shall be installed with a soil or waste stack whenever back vents, relief vents or other branch vents are required in two or more branch intervals. No fixture shall be permitted to drain into any stack above any vent connection.

904.2 Terminal

The vent stack shall terminate independently above the roof of the building or shall be connected with the extension of the soil or waste stack (stack-vent) at least 6 inches (152 mm) above the flood-level rim of the highest fixture.

904.3 Main Stack

904.3.1 Every building in which plumbing is installed shall have at least one main vent stack or stack vent, of not less than 3-inch (76 mm) diameter, for each building drain, when connected separately to a building sewer, septic tank, or other disposal system approved by the plumbing official. Such vent shall run undiminished in size and as directly as possible from the building drain through to the open air above the roof.

904.3.2 The main vent stack in a detached garage or other accessory building where only a washing machine or laundry tray is installed may be 1 1/2 inches (38 mm).

905 VENT TERMINALS

905.1 Roof Extension

Extensions of vent pipes through a roof shall be terminated at least 6 inches (152 mm) above the roof, except that where a roof is to be used for any purpose other than weather protection,

the vent extension shall be run at least 7 ft (2134 mm) above the roof.

905.2 Frost Closure

Where there is possibility of frost closure, the vent extension through a roof shall be at least 3-inch diameter. When it is found necessary to increase the size of the vent terminal, the change in diameter shall be made at least 1 ft (305 mm) inside the building.

905.3 Flashings

The juncture of each vent pipe with the roof line shall be made watertight by proper flashing.

905.4 Flag Poling

Vent terminals shall not be used to support flag poles, TV aerials, or similar items, except when the piping has been anchored to the construction and approved as safe by the plumbing official.

905.5 Location of Vent Terminal

A vent terminal from a drainage system shall not be located directly beneath any door, window or other fresh air intake opening of the building or of an adjacent building, nor shall any such vent terminal be within 10 ft (3048 mm) horizontally of such an opening unless it is at least 2 ft (610 mm) above the top of such opening.

905.6 Extensions Through Wall

Vent terminals extending through a wall shall terminate at least 6 inches (152 mm) above the roof and the opening shall face upward. Vent terminals shall not terminate under the overhang of the building.

905.7 Air Admittance Valves for Venting Plumbing Fixtures and Fixture Branches

Air admittance valves are not approved for venting of plumbing fixture traps.

906 VENT GRADES AND CONNECTIONS

906.1 Grade

All vent and branch vent pipes shall be so graded and connected as to drip back to the soil or waste pipe by gravity.

906.2 Vertical Rise

906.2.1 Where vent pipes connect to a horizontal soil or waste pipe, the vent shall be taken off above the center line of the soil pipe, and the vent pipe shall rise vertically, or at an angle not exceeding 45° (0.785 rad) from the vertical, before offsetting horizontally.

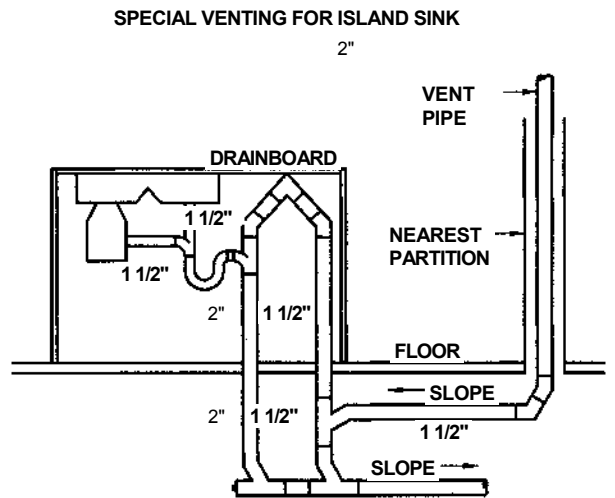
906.2.2 Where vent pipes connect at or below the lowest fixture connection, to a vertical soil or waste pipe, such vent shall be taken off at an angle not exceeding 45° (0.785 rad) to the vertical to a point at least 6 inches (152 mm) above the flood level rim of the lowest fixture it is venting before offsetting horizontally.

906.3 Height Above Fixtures

A connection between a vent pipe and a vent stack or stack vent shall be made at least 6 inches (152 mm) above the flood level rim of the highest fixture served by the vent. Horizontal vent pipes forming branch vents, relief vents, or loop vents shall be at least 6 inches (152 mm) above the flood level rim of the highest fixture served

907 BAR AND FOUNTAIN SINK TRAPS

Traps serving sinks which are part of the equipment of island bars, island soda fountains, island counters and similar equipment need not be conventionally vented when the location and construction of such bars, soda fountains and counters make it impossible to do so. When these conditions exist, traps which are roughed in above the floor shall be vented by extending the vent as high as possible, but not less than the drainboard height and then returning it downward and connecting it to the horizontal sink drain immediately downstream from the vertical fixture drain. The return vent shall be connected to the horizontal branch through a wye-branch fitting and shall, in addition, be provided with a foot vent taken off the vertical fixture vent by means of a wye-branch immediately below the floor and extending to the nearest partition and then through the roof to the open air or may be connected to other vents at a point not less than 6 inches (152 mm) above the flood level rim of the fixtures served. Drainage fittings shall be used on all parts of the vent below the floor level and a minimum slope of 1/4 inch per foot back to the drain shall be maintained. The return bend used under the drainboard shall be a 45 degrees, a 90 degrees and a 45 degrees elbow in the order named. Pipe sizing shall be as elsewhere in this code. The island sink drain, upstream of the returned vent, shall serve no other fixtures. An accessible cleanout shall be installed in the vertical portion of the foot vent. For food service establishments, drainage shall be in accordance with 804.1.



(COPYRIGHT BY THE AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) - FIG 4.6 OF ASSE'S RESIDENTIAL PLUMBING INSPECTOR'S MANUAL USED WITH PERMISSION)

Figure 907.A

908 FIXTURE VENTS

**Table 908.1 Distance of
Fixture Trap from Vent**

908.1 Distance of Trap from Vent

Each fixture trap shall have a protecting vent so located that the slope and the developed length in the fixture drain from the trap weir to the vent fitting are within the requirements set forth in Table 908.1, except as permitted by 913.1. (See Figure 908.1.)

Size of Fixture Drain (in)	Size of Trap (in)	Fall (in/ft)	Max. Distance From Trap
1/4	1/4	1/4	3 ft 6 in
1 1/2	1/4	1/4	5ft
1 1/2	1 1/2	1/4	5ft
2	1 1/2	1/4	6ft
2	2	1/4	8ft
3	3	1/8	10ft
4	4	1/8	12 ft

1 in = 25.4 mm

1 ft = 0.3048 m

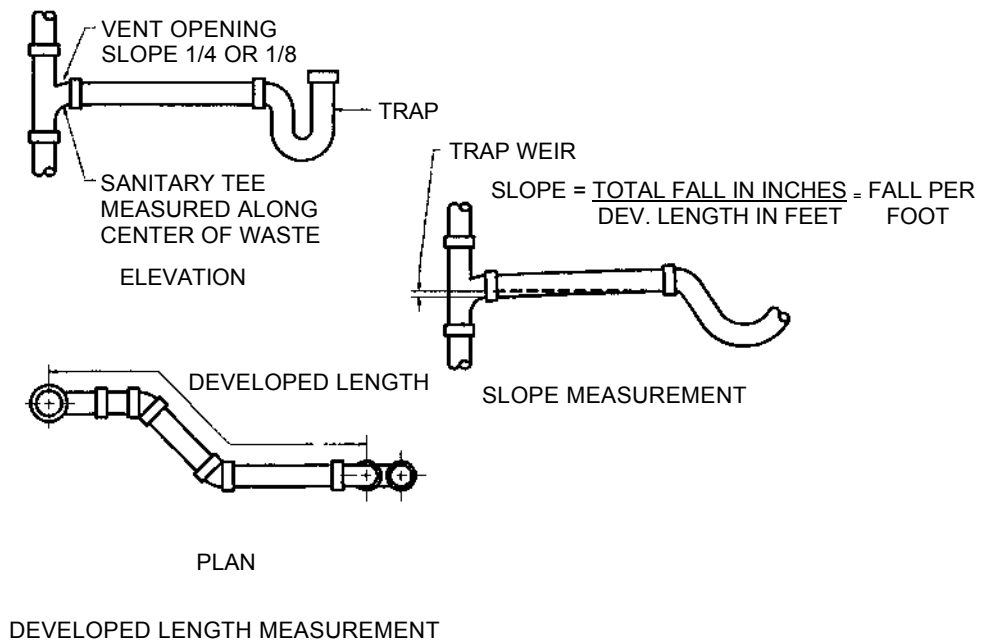


Figure 908.1

Distance of Fixture Trap From Vent

908.2 Trap Sea! Protection

The plumbing system shall be provided with a system of vent piping which will permit the admission or emission of air so that under normal and intended use the seal of any fixture trap shall not be subjected to a pressure differential of more than 1 inch of water (249 Pa).

908.3 Trap Dip

The vent pipe opening from a soil or waste pipe, except for water closets and similar fixtures, shall not be below the top weir of the trap.

908.4 Crown Vent

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

909 COMMON VENT

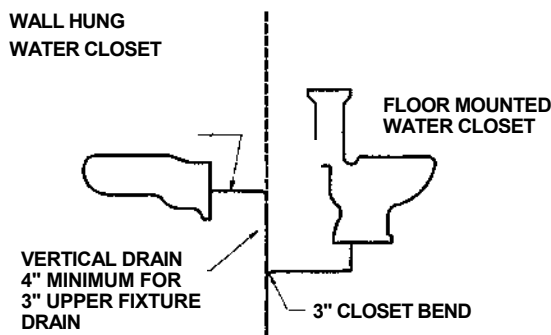
909.1 Individual Vent

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.

909.2 Fixtures on Same Floor

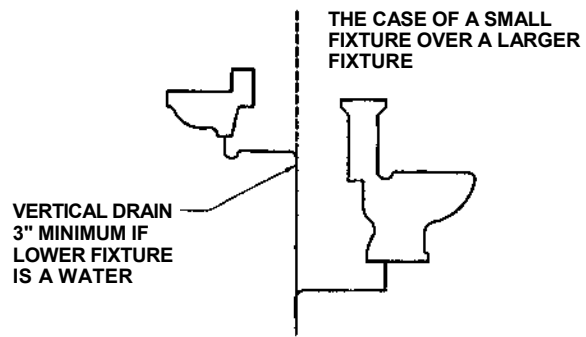
A common vent may be used for two fixtures set on the same floor level but connecting at different levels in the stack, provided the vertical drain is one pipe size larger than the upper fixture drain but in no case smaller than the lower fixture drain, whichever is the larger, and that both drains conform to Table 908.1.

THE CASE OF WATER CLOSET ONE ABOVE ANOTHER



WATER CLOSET FIXTURE DRAINS NEED NOT BE CONSIDERED LARGER THAN 3" DUE TO MAXIMUM SIZE OF TRAP-WAY

Common Vent Figure 9-29A



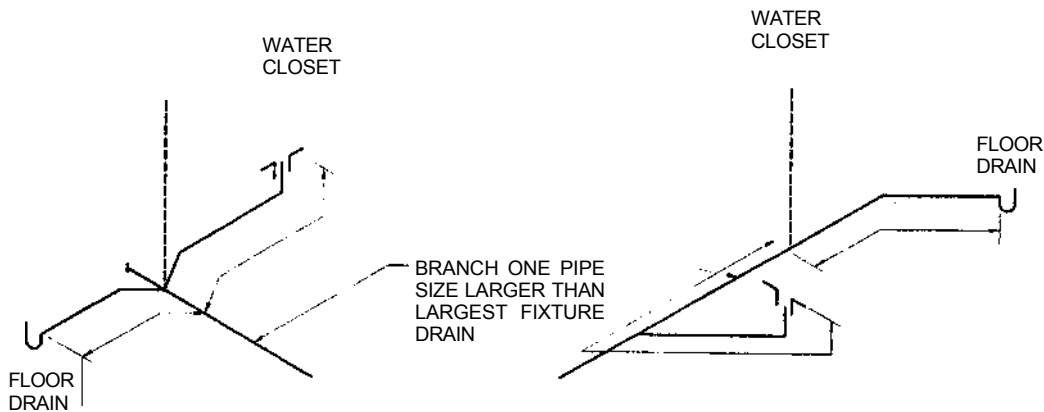
IN ANY CASE THE VERTICAL DRAIN MUST BE ONE PIPE SIZE LARGER THAN THE UPPER FIXTURE DRAIN BUT IN NO CASE SMALLER THAN THE LOWER FIXTURE DRAIN

Common Vent Figure 9-29B

909.3 Distance

909.3.1 Two fixtures set back-to-back, or side by side within the distance allowed between a trap and its vent, may be served with one continuous soil or waste vent-pipe, provided that each fixture wastes separately into an approved double fitting having inlet openings at the same level. (See 909.2.)

909.3.2 When not more than two fixtures are set back-to-back or side-by-side, within the distance allowed between a trap and its vent, they may be connected to a common horizontal branch served by a common vertical vent located between the two fixtures, provided the branch is one pipe size larger than either of the fixture drains, except as permitted by 913.1. This vent shall not serve as a waste for any other fixture.



ALL MEASUREMENTS ALONG THE CENTER LINE

Common Vent
Figure 9-31

909.3.3 For the purpose of this section, 3-inch (76 mm) or 4-inch (102 mm) floor or shower drains, 4-dfu water closets or pedestal urinals shall be considered as having 3-inch (76 mm) drains. For more than two fixtures on a common horizontal branch, see 914.1.

910 VENTS FOR FIXTURE TRAP BELOW TRAP DIP

910.1 Hydraulic Gradient

Fixture drains shall be vented within the hydraulic gradient between the trap outlet and vent connection, but in no case shall the unvented drain exceed the distance provided for in Table 908.1.

910.2 Different Levels

If any stack has fixtures entering at different levels, the fixtures other than the fixture entering at the highest level shall be vented, except as may be permitted in other sections of this chapter.

911 WET VENTING

911.1 Single Bathroom Groups

A single bathroom group of fixtures may be installed with the drain from a back vented lavatory, kitchen sink or combination fixture serving as a wet vent for a bathtub or shower stall and for the water closet, provided that the wet vent is one pipe size larger than the upper fixture drain but in no case smaller than the lower fixture drain, whichever is the larger, and that both drains conform to Table 908.1. No urinals or washing machine drain shall discharge into any wet vent.

911.2 Double Bath

Bathroom groups back-to-back on top floor consisting of two bathtubs or shower stalls 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 and for the water closets, provided that the wet vent is one pipe size larger than the upper fixture drain but in no case smaller than the lower fixture drain, whichever is the larger, and that both

drains conform to Table 908.1. No urinals or washing machine drain shall discharge into any wet vent.

911.3 Multistory Bathroom Groups

On the lower floors of a multistory building, the waste pipe from one or two lavatories may be used as a wet vent for one or two bathtubs or showers provided that:

1. The wet vent and its extension to the vent stack is not less than 2-inch (51 mm) diameter, and
2. Each water closet below the top floor is individually back vented, and
3. The vent stack is sized in accordance with Table 911.3.

Table 911.3 Size of Vent Stack

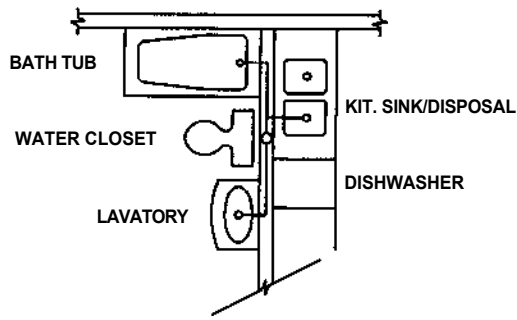
Number of Wet Vented Fixtures	Diameter of Vent Stacks (In.)
1 or 2 bathtubs or showers 3 to 5	2
6 to 9 bathtubs or showers	2 1/2
10 to 16 bathtubs or showers	3
17 or more bathtubs or showers	4

1 in = 25.4 mm

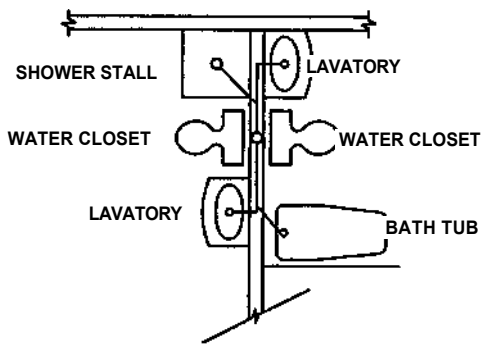
912 STACK VENTING

912.1 Fixture Groups

A single bathroom group of fixtures, consisting of a water closet, basin, shower or tub and a kitchen sink (with disposal and dishwasher) located back-to-back to the bathroom, or two bathrooms back-to-back each consisting of one toilet, basin, shower or tub may be installed without individual fixture vents in a one story building or on the top floor of a building provided each fixture drain connects independently to the stack and that the tub and/or shower and water closet enter the stack at the same level and in accordance with the requirements in Table 908.1. The wet vent portion of the stack vent shall be one pipe size larger than the upper fixture drain but in no case smaller than the lower fixture drain, whichever is the larger.



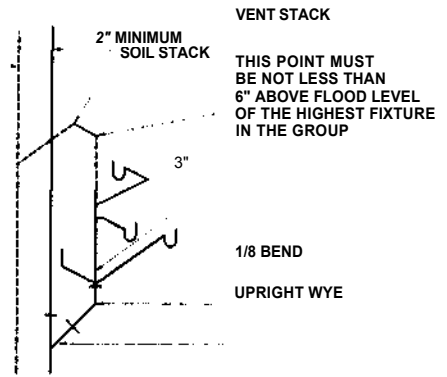
**Stack Venting
Figure 9-37**



**Stack Venting Double Bathroom Groups
Figure 9-38**

912.2 Lower Floors

Lower floors may be vented as in 912.1 provided that a separate wye and upright one-eighth bend is installed in the stack and that the stack group is installed above the one-eighth bend and that a 2-inch (51 mm) vent is installed 6 inches (152 mm) above the flood line of the top fixture.



**Stack Vent Lower Floors
Figure 9-39**

913 INDIVIDUAL FIXTURE REVENTING

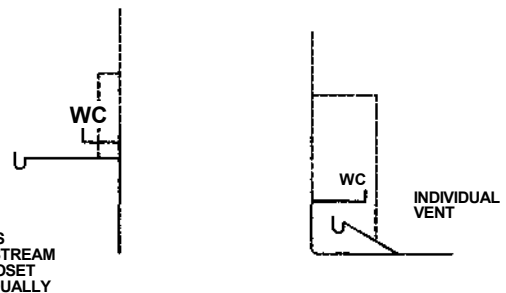
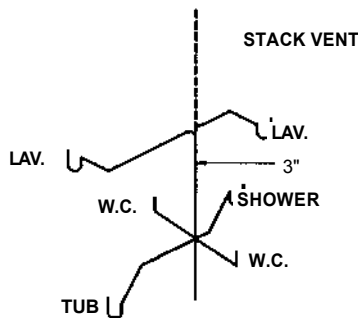
913.1 Horizontal Branches

913.1.1 One sink and one lavatory or one tub, or one shower, or three lavatories within 8 ft (2438 mm) developed length of a main vented line may be installed on a 2-inch horizontal waste branch, or two lavatories within 5 ft (1524 mm) developed length of a main vented line may be installed on a 1 1/2-inch horizontal waste branch, without reventing, provided the branch is full size throughout its length, and provided the wastes are connected with a pitch of not more than 1/4 inch per ft (21 mm per meter), and provided that a 2-inch "P" trap shall be the minimum for tubs and showers.

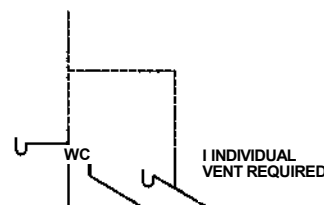
913.1.2 Waste openings in the horizontal branch shall not be less than 1 1/4 inches for lavatories and 1 1/2 inches for a sink. One drinking fountain shall be considered as one lavatory.

913.2 Where Required

All fixtures discharging downstream from a water closet shall be individually vented.



**Required Individual Vents
Figure 9-41**



913.3 Limits of Fixture Units Above Bathtubs and Water Closets

A total of three fixture units may be placed on a soil or waste stack on floors above the highest water closet or bathtub connection without the use of revents provided:

1. The soil or waste stack is not less than 3-inch diameter.
2. The total fixture unit load on the stack does not exceed the limitations of Table 714.2.
3. The largest fixture drain opening into the stack does not exceed the nominal diameter of the trap of the fixture to be connected except as permitted in 913.1. Such opening for multiple fixture connections shall be limited to use on one floor only.
4. Each fixture above the highest tub or water closet is no farther from the stack than permitted in Table 908.1.
5. All fixtures on lower floors are vented as otherwise required by this chapter.

914 CIRCUIT AND LOOP VENTING

914.1 Battery Venting

A branch soil or waste pipe of uniform diameter throughout its length, to which are connected in battery a number of fixtures not exceeding 50% of the fixture units allowed by column two of Table 714.2, may be vented by a circuit or loop vent system connected in front of the last upstream fixture drain. In addition, battery vented branches serving three or more fixtures shall be provided with a relief vent connected in front of the first fixture connection. When lavatories or similar fixtures having a fixture unit rating of four or less and a maximum 2-inch fixture drain discharge from above such branches, each vertical branch shall be provided with a continuous vent. Fixtures having fixture unit ratings greater than four shall not discharge into such branch from above unless all fixtures in the battery group are individually vented. Fixtures from an upper floor shall not discharge into a battery vented branch. Floor level fixtures, including but not limited to floor drains, discharging downstream from a water closet shall be individually vented.

EXCEPTION: The relief vent may be omitted provided a stack vent or vent stack is located downstream of the first horizontal fixture connection.

914.2 Vent Connections

When the circuit, loop, or relief vent connections are taken off the horizontal branch, the vent branch connection shall be taken off at a vertical angle or from the top of the horizontal branch.

Exception: The vent branch connection may be taken off horizontally provided it is washed by not more than four fixture units, other than water closets, and the wet portion of the vent is not smaller than the horizontal battery branch.

914.3 Fixtures Back-to-Back in Battery (See Figure 914.3)

914.3.1 A fixture connected to a horizontal branch through a vertical drain and a sanitary tee shall be vented in accordance with 908.1.

914.3.2 Back-to-back fixtures connected to a horizontal branch through a single vertical drain shall enter the drain through a sanitary cross, and a common vent for each two fixtures shall be provided. The common vent shall be installed as a continuation of the vertical drain.

914.3.3 A fixture connected to a horizontal branch through a wye or combination wye and one-eighth bend installed in a horizontal position need not be individually vented.

914.3.4 Back-to-back fixtures connected to a horizontal branch through a double wye or combination double wye and one-eighth bend installed in the horizontal position need not be provided with a common vent at the connection to the horizontal branch, except for the last two fixtures upstream. The vent shall be installed in a vertical position through a side inlet fitting.

914.3.5 In spite of sections 914.3.3 and 914.3.4, all floor level fixtures, including but not limited to floor drains, discharging downstream from a water closet shall be individually vented.

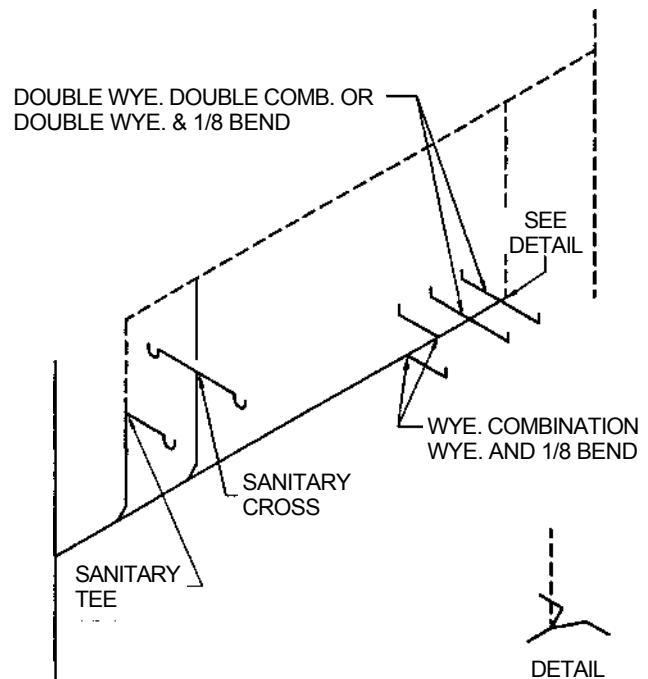


FIGURE 914.3
FIXTURES BACK-TO-BACK IN BATTERY

915 PNEUMATIC EJECTORS

Relief vents from a pneumatic ejector shall be carried separately to the open air.

916 RELIEF VENTS—STACKS OF MORE THAN 10 BRANCH INTERVALS

Soil and waste stacks in buildings having more than ten branch intervals shall be provided with a relief vent at each tenth interval installed, beginning with the top floor. The size

of the relief vent shall be equal to the size of the vent stack to which it connects. The lower end of each relief vent shall connect to the soil or waste stack through a wye below the horizontal branch serving the floor, and the upper end shall connect to the vent stack through a wye not less than 3 ft (914 mm) above the floor.

917 OFFSET VENTS

917.1 General

In buildings five or more stories in height, offsets in vertical drainage piping having less than a 45° (0.785 rad) slope shall be vented in accordance with 917.2 or 917.3, except as otherwise permitted by 715.

917.2 Separate Venting

Such offsets may be vented as two separate soil or waste stacks, namely the stack section below the offset and the stack section above the offset.

917.3 Offset Reliefs

Such offsets may be vented by installing a relief vent as a vertical continuation of the lower section of the stack or as a side vent connected to the lower section between the offset and next lower fixture or horizontal branch. The upper section of the offset shall be provided with a yoke vent. The diameter of the vents shall be not less than the diameter of the main vent, or of the soil and waste stack, whichever is the smaller.

918 MAIN VENTS TO CONNECT AT BASE

All main vents or vent stacks shall connect full size at their base to the building drain within ten pipe diameters of the main soil or waste pipe or to the main soil or waste pipe, at or below the lowest fixture branch. All vent pipes shall extend undiminished in size to the vent terminal, or shall be reconnected with the main soil or waste vent.

919 VENT HEADERS

Stack vents and vent stacks may be connected into a common vent header at the top of the stacks and then terminate as required by this code. This header shall be sized in accordance with the requirements of Table 920.2, the number of units being the sum of all units on all stacks connected thereto, and the developed length being the longest vent length from the intersection at the base of the most distant stack to the vent terminal as a direct extension of one stack.

920 SIZE AND LENGTH OF VENTS

920.1 Length of Vent Stacks

The length of the vent stack or main vent shall be its developed length from the lowest connection of the vent system with the soil stack, waste stack, or building drain to the vent stack terminal, if it terminates separately, or to the connection of the vent stack with the stack vent, plus the developed length of the stack-vent from the connection to the terminal, if the two vents are connected together with a single extension.

920.2 Size of Stack-Vents, Vent Stacks, Relief Vents, Individual Vents or Branch Vents

The diameter of a stack-vent, vent stack, relief vent, individual vent or branch vent shall not be less than one-half of the diameter of the drain served, but in no case less than 1 1/4 inches, and shall be determined from its length and the total of fixture units connected thereto, as provided in Table 920.2. All water closets vents shall be a minimum of 2 inches in diameter. This shall not be interpreted to allow the alteration or elimination of the need for at least one 3 inch vent stack or stack vent on the building drain as required under 904.3.1.

920.3 Size of Battery Vents

The diameter of a battery vent shall be not less than one-half the pipe size of the horizontal waste line it is venting, but in no case less than 1 1/2 inches, and shall be determined from its length and the total of fixture units connected thereto, as provided in Table 920.3. The diameter and horizontal length of a battery vent shall in no case be less than permitted in Table 920.3. (See 914.)



**Table 920.2
Maximum Length of Vents
(Other than Battery Vents) (ft)
(See Table 920.3 for Battery Venting)**

Size of Soil or Waste Stack (in)	Fixture Units Connected	Diameter of Vent Required (in)								
		1 1/4	1 1/2	2	2 1/2	3	4	5	6	8
1 1/4	2	30								
1 1/2	8	50	150							
1 1/2	10	30	100							
2	12	30	75	200						
2	20	26	50	150						
2 1/2	42	-	30	100	300					
3	10	-	30	100	200	600				
3	30	-	-	60	200	500				
3	60	-	-	50	80	400				
4	100	-	-	35	100	260	1000			
4	200	-	-	30	90	250	900			
4	500	-	-	20	70	180	700			
5	200	-	-	-	35	80	350	1000		
5	500	-	-	-	30	70	300	900		
5	1100	-	-	-	20	50	200	700		
6	350	-	-	-	25	50	200	400	1300	
6	620	-	-	-	15	30	125	300	1100	
6	960	-	-	-	-	24	100	250	1000	
6	1900	-	-	-	-	20	70	200	700	
8	600	-	-	-	-	-	50	150	500	1300
8	1400	-	-	-	-	-	40	100	400	1200
8	2200	-	-	-	-	-	30	80	350	1100
8	3600	-	-	-	-	-	25	60	250	800
10	1000	-	-	-	-	-	-	75	125	1000
10	2500	-	-	-	-	-	-	50	100	500
10	3800	-	-	-	-	-	-	30	80	350
10	5600	-	-	-	-	-	-	25	60	250

1 in = 25.4 mm
1 ft = 0.3048 m

**Table 920.3
Battery Vent Sizing Table
Maximum Horizontal Length (ft)**

Soil or waste pipe daim. (in)	Maximum No. Fixture units	Diameter of circuit or loop vent (in)					
		1 1/2	2	2 1/2	3	4	5
2	3	15	40				
2 1/2	6	10	30				
3	10	-	20	40	100		
4	80	-	7	20	52	200	
5	180	-	-	-	16	70	200

1 in = 25.4 mm
1 ft = 0.3048 m

924 APPENDIX REFERENCES

Additional provisions for vents are contained in Appendix G - Medical Facilities Plumbing Systems and Appendix J - Illustrations. These provisions are applicable only where specifically included in the body of the code sections or in the adopting ordinance



