Illustarted Code Series
Venting Systems for Plumbing
Based on the Ontario Building Code 2012, O. Reg. 332/12

Rainier Bratsch-Blundel
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As quick reference, various symbols on the side of the page are used to represent the specific type of text information.

Many of the articles included in the Building Code and the National Plumbing Code are written in a legal language that is hard to understand. Also, the sentences within an article may not be in any particular order that would explain a requirement. Therefore, an explanation is sometimes needed to clarify the original intent of the code.

With the release of the new Building Code, there are many regulations that have still not changed from the previous release of the code. **New changes are in Bold Lettering.**

There are many Articles that are for one particular topic, but are listed under different Clauses throughout the Building Code. Some of the Articles for a specific requirement are not listed in the Section being examined in the book, but must be included to complete the intent of the Article.

**Definitions** Article 1.1.4.1 lists specific defined terms that are used throughout the Building Code. Some terms used are specific to the trade and are not defined.
Section 5 – Venting Systems

The purpose of the venting system is to maintaining atmospheric pressure by supplying a free flow of air, preventing the creation of a siphon in the drainage system. This starts at the lowest point in the sanitary sewer extending upward to the stack vent above the connection of the highest fixture through to open air.

The venting systems used across Canada have now harmonized, making use of the same terminology (see Fig. 0.2) and tables within the Provincial Building and Plumbing codes to correspond to the National Plumbing Code. The Building Code defines a venting system as:

**Venting System** means an assembly of pipes and fittings that connects a drainage system with open air for circulation of air and the protection of trap seals in the drainage system.

Important factors for designing a venting system are the amount of fixture units the vent or branch vent is serving and its developed length. Sizing the vent has developed from common sense, physics, engineering, and the hydraulic gradient (see Fig. 0.1).

**Figure 0.1 HYDRAULIC GRADIENT** – A line drawn from the centre of the water level to the point where it falls vertically by gravity. This will show how a vent can possibly fill with water when the fixture discharges fully into the drainage system.
Figure 0.2 VENTING SYSTEM - The stack elevation shows several forms of individual venting and group venting.
1 – Vent Pipes for Traps

1.1 – Venting for Traps

Article 7.5.1.1.

(1) Except as provided in Sentences (3) and (4), every trap shall be protected by a vent pipe.

(2) Drainage systems shall be protected by the installation of a system as provided in Subsections 7.5.4. and 7.5.5. by the installation of,

(a) additional circuit vents,
(b) branch vents,
(c) circuit vents,
(d) continuous vents,
(e) dual vents,
(f) fresh air inlets,
(g) headers,
(h) individual vents,
(i) offset relief vents,
(j) relief vents,
(k) stack vents,
(l) vent stacks,
(m) wet vents, or
(n) yoke vents.

Noticeably missing is the term Back Vent, which is not listed in the definitions of the National Plumbing Code. The Building Code defines it as:

**Back Vent**

means a pipe that is installed to vent a trap off the horizontal section of a fixture drain or the vertical leg of a water closet or other fixture that has an integral siphonic flushing action and “back vented” has a corresponding meaning.
2 – Wet Venting

2.1 – Wet Venting

Part I – Single Storey

Wet venting is a form of group venting based on the simple principle that waste water clings to the side of a vertical waste pipe leaving the centre core of the pipe open. This means a pipe, properly sized can have open centre of a wet vent serve as a vent for fixtures downstream. This core of air will continue downstream to the upper horizontal section of a wet vent, if necessary, which is already sized at a maximum of 65% percent of its capacity. Wet vents can serve a group of fixtures on one level or fixtures on many levels.

![Diagram of Wet Venting](image)

Figure 2.1 WET VENTING - A bathtub being wet vented by a basin with the connection to the horizontal fixture drain within two fixture drain diameters using a WYE fitting. A shower wet vented by a basin to a vertical fixture drain using a TY fitting.

The terminology now used is a harmonization of the existing Wet Venting with the group venting formerly known as Stack Venting and Modified Stack Venting. The Building Code defines a Wet Vent as:

**Wet vent** means a waste pipe that also serves as a vent pipe.

In order to maintain an open core of air serving a Wet Vent, the highest connecting fixture must drain through a vertical Continuous Vent (formerly Continuous Waste and Vent). This type of connection is now defined in the Building Code as:

**Continuous vent** means a vent pipe that is an extension of a vertical section of a branch or fixture drain.
3 – Circuit Venting

3.1 – Circuit Venting

Circuit Venting is a form of group venting sometimes confused with Wet Venting. This is because a Circuit Vent looks like a Wet Vent. Instead of using the core of air in a vertical pipe, Circuit Venting uses the top of a horizontal drainage pipe to vent the fixtures connecting to the horizontal branch. The Circuit Vent starts at its lower end in front of the furthest upstream fixture and connects at its upper end into a Stack Vent or Vent Stack. The Building Code defines a Circuit Vent as:

| Circuit vent | means a vent pipe that serves a number of fixtures and connects them to the fixture drain of the most upstream fixture, and “circuit vented” has a corresponding meaning. |

![Diagram of Circuit Venting](image)

**Figure 3.1 CIRCUIT VENTING** - Horizontal branches with battery of water closets is a common form of commercial Circuit Venting. The Circuit Vent connects to the vent stack or the stack vent (formerly Loop Venting).

**Article 7.5.3.1.**

(a) A section of a horizontal branch may be circuit vented provided,

(b) all fixtures serve by the circuit vent are located in the same storey and located at the most distant upstream section of the horizontal branch, and

(c) no soil or waste stack is connected to it upstream of a circuit vented fixture.
7.5.4.1. Vent Pipes for Soil or Waste Stacks

4.1 – Stack Vents

The upper end of every soil or waste stack shall terminate in a stack vent and the stack vent shall terminate in open air outside the building, or connect directly or through a header to another stack vent or vent stack that does terminate in open air outside the building.

The upper end of every soil or waste stack becomes a stack vent above the connection or the highest fixture. The stack vent can extend individually to open air or connect in to another stack vent or vent stack becoming a header, then extending to open air. The Building Code defines a stack vent as:

**Stack vent** means a vent pipe that connects the top of a soil stack or waste stack to a header or open air and “stack vented” has a corresponding meaning.

Figure 4.1 STACK VENT – The upper end of a soil or waste stack terminates into a stack vent extending to open as a stack vent or through a header collecting stack vents and vent stacks.

When two or more stack vents and vents stacks connect, the vent extending to open are is refered to as a header. The Building Code defines a header simply as:

**Header** means a vent pipe that connects two or more vent stacks or stack vents to open air.

4.2 – Vent Stacks

A Vent Stack is a vent installed in conjunction with a soil or waste stack used to limit the pressure differential that is created between the drainage and venting systems. The Vent Stack starts below the lowest discharge into a soil or waste stack extending upward to above the flood level rim of the highest connecting fixture into the stack vent. The Building Code defines a Vent Stack as:

**Vent Stack** means a vent pipe that is connected at its upper end to a header or is terminated in open air and that is used to limit pressure differential in a soil or waste stack.
5 – Miscellaneous Vent Pipes

5.1 – Venting of Sanitary Sewage Sumps

Article 7.5.5.1.

(1) Every sump or tank that receives sanitary sewage shall be provided with a vent pipe that is connected to the top of the sump or tank.

The lower end of the vent serving a sanitary sewage sump or tank connects to the lid or the upper side extending upward to any other part of the venting system. The size of the vent is found in Article 7.5.7.7.

7.5.7.7. (1) Except as provided in Sentences (2) and (3), the minimum size of the vent pipe for a sanitary sewage sump or tank, or dilution tank shall be one size smaller than the size of the largest branch or fixture drain draining to the sump or tank.

(2) The size of every vent pipe for a sanitary sewage sump or tank, or dilution tank shall be not less than 2 in., but need not be greater than 4 in.

(3) The size of every vent pipe for a macerating toilet system with a sump or tank shall be not less than 1 ½ in.

Figure 5.1 VENTING OF SANITARY SUMPS/TANKS – The vent serving a sanitary sewage sump or tank connects to the sump extending upward into the venting system.

5.2 – Venting of Interceptors

An oil interceptor functions the same as a grease interceptor except that there are flammable fumes that must be expelled using natural air currents. This is done by connecting the top area of adjacent compartments to allow air flow up through to individual “fume” vents extending to open air. A Sanitary vent is required on the outlet of the interceptors to prevent the outlet drop pipe from siphoning out the interceptor.

Article 7.5.5.2.

(1) Every oil interceptor shall be provided with 2 vent pipes that,

(a) connect to the interceptor at opposite ends,

(b) extend independently to open air,

(c) terminate not less than 2 000 mm above ground and at elevations differing by at least 300 mm, and

(d) do not connect to each other or any other vent pipe.

(2) Adjacent compartments within every oil interceptor shall be connected to each other by a vent opening.
6 – Arrangement of Vent Pipes

6.1 – Drainage of Vent Pipes

When venting systems are installed, the vents should have a small amount of grade in the downstream direction to allow condensation to drain. Vents cannot be installed in a trapped position; this will fill up with condensation and close off the vent. Vents may loop up and down in any arrangement as long as condensation can make way to the drainage system keeping the venting system free-flowing.

![Figure 6.1 ALTERNATE DRAINAGE OF VENT PIPES](image)

- A vent may be installed with an upward or downward position provided the condensation can drain to the drainage system. Every waste pipe must have at least a back vent installed at the same time.

**Article 7.5.6.1.**

1. Every vent pipe shall be installed without depression in which moisture can collect.
2. Every waste pipe shall be installed and back vented at the same time.
7 – Minimum Size of Vents

7.1 – General

Article 7.5.7.1.

(1) The size of every vent pipe shall conform to Table 7.5.7.1.

<table>
<thead>
<tr>
<th>Item</th>
<th>Column 1</th>
<th>Column 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Size of Trap Served, in.</td>
<td>Minimum Size of Vent Pipe, in.</td>
</tr>
<tr>
<td>1.</td>
<td>1 ¼</td>
<td>1 ¼</td>
</tr>
<tr>
<td>2.</td>
<td>1 ½</td>
<td>1 ¼</td>
</tr>
<tr>
<td>3.</td>
<td>2</td>
<td>1 ½</td>
</tr>
<tr>
<td>4.</td>
<td>3</td>
<td>1 ½</td>
</tr>
<tr>
<td>5.</td>
<td>4</td>
<td>1 ½</td>
</tr>
<tr>
<td>6.</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>7.</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure 7.1 MINIMUM SIZE OF VENTPIPES, TABLE 7.5.7.1. (1) – The size of the vent is based on the size of the trap or fixture outlet pipe, whichever is larger.

Figure 7.2 MINIMUM SIZE OF VENTPIPES – The vent serving a lavatory basin with an 1 ¼” trap and a kitchen sink with an 1 ½” trap both use an 1 ¼” vent.
VENTING SYSTEMS FOR PLUMBING

8 – Sizing of Vent Pipes

8.1 – Hydraulic Loads Draining to Wet Vents

To determine the minimum size of a Wet Vent, total all the hydraulic loads from all fixtures discharging into the Wet Vent above the lowest connecting fixture. The total load must also include any separately vented fixtures even if the fixture connects to a water closet trap arm. One must remember that the loads from the lowest connecting fixture or symmetrically connected fixtures are not included in the sizing of the wet vent.

Article 7.5.8.1.

(1) The hydraulic load that drains to a wet vent shall conform to Table 7.5.8.1.

(2) When determining the size of a wet vent, the hydraulic load from the most downstream fixture or symmetrically connected fixtures shall not be included.

### Table 7.5.8.1

<table>
<thead>
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<th>Row</th>
<th>Size of Wet Vent, inches</th>
<th>Maximum Hydraulic Load, Fixture Units</th>
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<tr>
<td></td>
<td></td>
<td>Not Serving Water Closets</td>
</tr>
<tr>
<td>1</td>
<td>1 ½”</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2”</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>3”</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>4”</td>
<td>36</td>
</tr>
<tr>
<td>5</td>
<td>5”</td>
<td>N/A</td>
</tr>
<tr>
<td>6</td>
<td>6”</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Figure 8.1 TABLE 7.5.8.1. – This table states the total fixture units that may discharge into a wet vent above the wet vented fixture or symmetrically connected wet vented fixtures. The lowest connecting fixture or fixtures in a wet vented group, whether a Water Closet or not, are not considered.

The table listed above uses column 2 for sizing Wet Vents serving a fixture with a p-trap. A maximum of 2 water closets may use column 3 for sizing a Wet Vent. Of special note is that the minimum size of a Wet Vent serving a p-trap is 1 1/2-inch and when serving a water closet, the minimum size of the Wet Vent is 2-inch. Also see Chapter 2 – Wet Venting (pgs. 9 – 21) for more requirements and illustrations.

8.2 – Individual Vents and Dual Vents

There are two types of individual vents used in a Venting System. The first is the former Continuous Waste and Vent, now known as a Continuous Vent. This type of vent connects a vertical fixture drain to a vertical vent pipe creating a continuous vertical line from drain to vent, hence the name, Continuous Vent. The Building Code defines it as:

**Continuous vent** means a vent pipe that is an extension of a vertical section of a branch or fixture drain.

The second type of Individual Vent is the Back Vent. This type of vent is used to connect a vent to a horizontal trap arm or the vertical leg of a water closet discharging vertically. The Building Code defines a Back Vent as:

**Back vent** means a pipe that is installed to vent a trap off the horizontal section of a fixture drain or the vertical leg of a water closet or other fixture that has an integral siphonic flushing action and “back vented” has a corresponding meaning.

Any vent serving a single fixture, whether using a Continuous vent or a Back Vent, must conform to Table 7.5.7.1. (fig. 7.1, pg. 57) to determine the minimum size. While the length is not considered for sizing, the length will still be needed when combining vents to form a Branch Vent.
9 – Air Admittance Valves

9.1 – Air Admittance Valves as a Vent Terminal

Air Admittance Valves are not a replacement for the Venting System, only an added component of an existing Sanitary system. This means the use of this type of valve is not intended to replace a stack extending to open air. Nor will the valve help to circulate air as needed for Relief Vents or Circuit Vents. The valve will only open when a negative pressure or pressure below atmospheric is present in the Drainage system. The Building Code defines an Air Admittance Valve as:

| Air Admittance Valve | means a one-way valve designed to allow air to enter the drainage system when the pressure in the plumbing system is less than the atmospheric pressure. |

Article 7.5.9.1.

(1) Individual vents may terminate with a connection to an air admittance valve as provided in Articles 7.5.9.2 and 7.5.9.3.

9.2 – Air Admittance Valves

The use of Air Admittance Valves is limited due to the fact that the valve shall only be used when the building is being renovated and after the Plumbing Inspection Authority has determine it is warranted. This determination is if and only if adding to the Venting System within a building would cause significant damage to the interior cosmetic finish or the actual structure would be extremely damaged.

Article 7.5.9.2.

(1) Air admittance valves shall only be used to vent,
   (a) fixtures in buildings undergoing renovation, and
   (b) installations where connection to a vent may not be practical.

(2) The air admittance valves shall be located,
   (a) above the flood level rim of the fixture it serves,
   (b) within the maximum developed length permitted for the vent,
   (c) not less than 150 mm above insulation materials, and
   (d) installed in a location not subject to back pressure.
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### 5.1 Venting Of Sanitary Sumps/tanks

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- Minimum Size Of Sanitary Sewage Sump Or Tank Vents
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