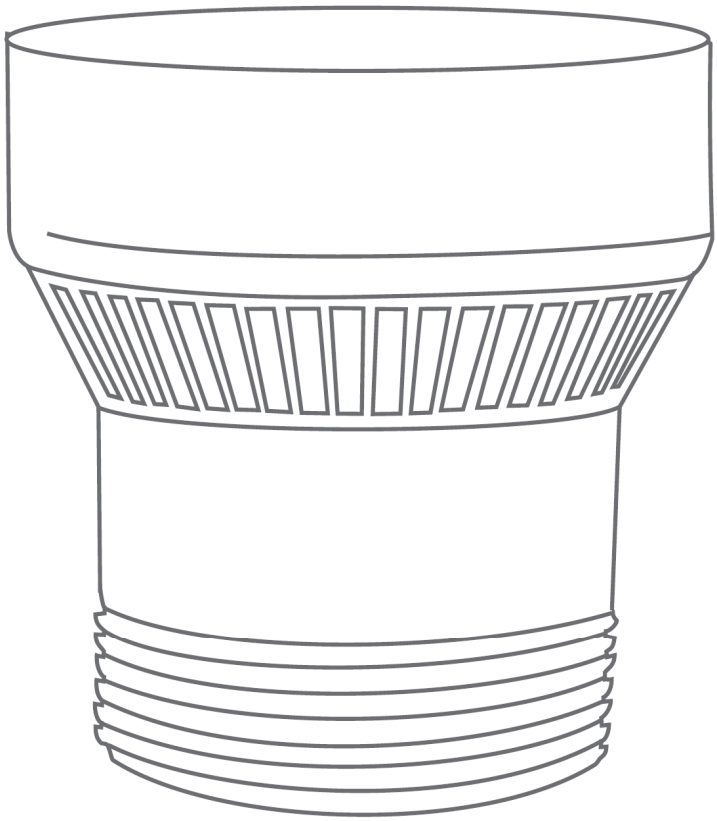
DESIGN CRITERIA AND INSTALLATION INSTRUCTIONS FOR

STUDOR®
InVENTive TECHNOLOGY®

AIR ADMITTANCE VALVES (AAVs)



DESIGN CRITERIA AND INSTALLATION INSTRUCTIONS FOR STUDOR AIR ADMITTANCE VALVES (AAVs)

Product Manufactured:
Air Admittance Valves

Product Trade Name:
Studor Mini-Vent, Maxi-Vent,
Redi-Vent, Tec-Vent and Ultra-Vent

Purpose:

The purpose of this report is to review the acceptability of Studor's air admittance valves to serve as a vent for a sanitary drainage, waste, and vent (DWV) system.

Abstract:

To prevent sewer gases from emanating into a building, every plumbing fixture connected to the sanitary drainage system is protected with a water trap seal. The fixture trap seal must be protected against pressure differentials in the drainage system that can cause the loss of the trap seal.

The common method of protecting the trap seal is the installation of a vent system that provides an open pipe connection to the outdoor air. The vent system is designed to protect the trap seal from both low pressure and high pressure conditions.

While the open piped vent system is the most widely accepted method of protecting a trap seal, other methods have also been developed. The air admittance valve is one such method that provides protection of the trap seal. When used properly, an air admittance valve installed in the system is equivalent to an open pipe vent.

Code Acceptance:

AAVs are permitted by Section 917 of the International Plumbing Code (IPC), Section P3114 of the International Residential Code (IRC) and Section 301.2, Alternate Materials and Methods of the Uniform Plumbing Code. The valves may serve as the vent for individual, branch, and stack vent applications.

The standards regulating air admittance valves are ANSI/ASSE 1050 for stack venting, ANSI/ASSE1051 for single fixture and branch venting and NSF 14 for plastic piping system components and related materials.

Product Description:

The Studor Mini-Vent, Redi-Vent, Tec-Vent and Ultra-Vent are designed for pipe sizes 1½ inch through 2 inch. The Studor Maxi-Vent is designed for pipe sizes 3 inch through 4 inch.

A full description of the Studor Air Admittance Valves is contained in the manufacturer's technical literature.

Standards:

1. ANSI/ASSE 1050 Performance Requirements for stack type air admittance valves for sanitary drainage systems.
2. ANSI/ASSE 1051 Performance Requirements for individual and branch type air admittance valves for sanitary drainage systems.
3. NSF 14 plastic piping system components and related materials.

Listings:

1. American Society of Sanitary Engineering (ASSE)
2. NSF International (NSF)
3. National Evaluation Services, Inc. (NES) - NER-592
4. Intertek Testing Services (ITS) - Warnock Hersey
5. Underwriters Laboratories, Inc. (UL) - File NO. R20814
6. International Association of Plumbing and Mechanical Officials (IAPMO) - File NO. C-3803

Technical Application:

An air admittance valve is designed to permit air to enter the drainage system when the pressure within the piping system drops below atmospheric pressure. The valve thus prevents the fixture trap seal from being siphoned.

Both field investigation and laboratory testing have shown that the primary cause of the loss of the water trap seal is siphonage or self-siphonage. The other leading cause is evaporation due to lack of use.

The venting methods with air admittance valves are based on historical data that provides protection of the trap seal. Studor Air Admittance Valves are designed to allow the exact amount of air into the drainage system that is necessary to protect the trap seal. When the vent piping is sized in accordance with the manufacturer's installation instructions, the Studor AAV will protect the trap seal from any loss due to siphonage or self-siphonage.

Certain public sewer systems may exert a positive pressure on the connected building sewer. The positive pressure may be from a forced main, the proximity to the sewage treatment plant, overtaxed public sewer mains, high pressure sewer cleaning equipment, or a mountainous terrain. The pressure can be dissipated in the drainage system by having a vent extend to the outdoors.

When a sanitary drainage system connects to a private sewage disposal system, the design of the private sewage disposal system must also be taken into consideration. This is accomplished by either an open piped vent in the sanitary drainage system or by venting the private sewage disposal system.

The Studor AAVs conforming to ANSI/ASSE 1051 can be installed as the individual or branch vent.

When a horizontal branch connects to a drainage stack more than four (4) branch intervals below the top of the stack, a relief vent is required on the horizontal branch. The relief vent must be located between the air admittance valve and the branch connection to the stack. The relief vent must connect to the vent stack and may serve as the vent for other fixtures. The relief vent is designed to relieve the pressure resulting from the flow in the drainage stack to maintain a pressure differential of plus or minus one (1) inch of a water column.

Studor AAVs that comply with ANSI/ASSE 1050 can be used as the vent terminal for a vent stack. The maximum height of the drainage stack permitted to be vented by an air admittance valve is six (6) branch intervals.

The stack type air admittance valve can also be used as the vent terminal for a waste stack vent. The maximum height permitted for a waste stack vent having an air admittance valve is also six (6) branch intervals.

Acceptable Designs:

There are many designs that can utilize the Studor AAVs. Various layouts of acceptable designs are shown in diagrams on the following pages. The layouts are intended to show some of the acceptable designs, however, many other designs not depicted are also acceptable.

The size of the Studor AAV is determined based on the pipe size required for the vent. The vent pipe size is based on being a minimum of one half the size of the required drainage pipe. For example, a 4 inch circuit vented horizontal branch would have a 2 inch circuit vent with a 2 inch Studor Mini-Vent, Redi-Vent, Tec-Vent or Ultra-Vent as the vent terminal.

SIZING TABLE

Drain, Branch or Stack Size	Vent Size	Maximum DFUs on Branch		Maximum DFUs on Stack	Studor AAV
1¼"	1¼"	1	UP TO 6 BRANCH INTERVALS	1	Mini/Redi/Tec/Ultra
1½""	1¼" - 1½"	3		8	Mini/Redi/Tec/Ultra
2"	1¼" - 2""	6		24	Mini/Redi/Tec/Ultra
3"	1½" - 3""	20		72	Mini/Redi/Tec/Ultra
4"	2" - 4"	160		500	Mini/Redi/Tec/Ultra

The Mini-Vent, Redi-Vent,Tec-Vent and Ultra-Vent are rated up to a 2" vent and the Maxi-Vent is rated up to a 4" vent.

The Redi-Vent, Tec-Vent and Ultra-Vent cannot serve as the vent terminal for a vent stack.

INDIVIDUAL VENT

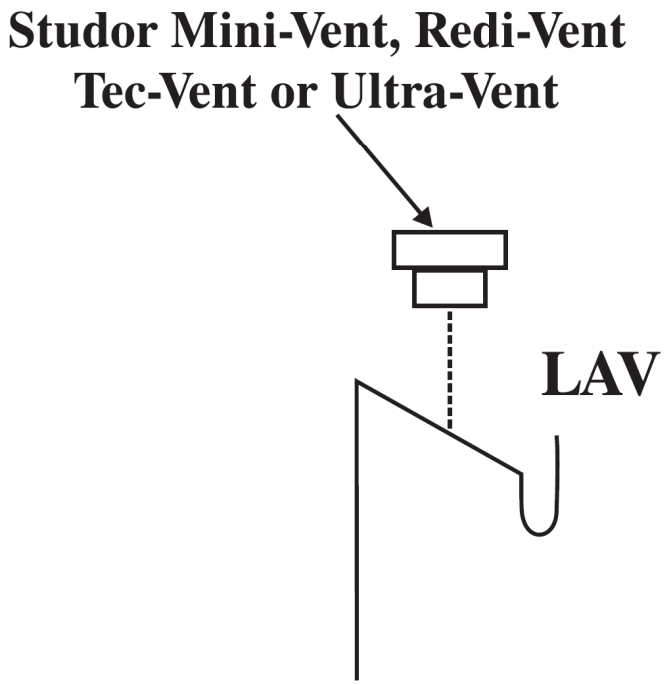


Figure 1

The simplest form of venting is an individual vent. A Studor Mini-Vent, Redi-Vent Tec-Vent or Ultra-Vent would serve as the vent protecting the fixture trap. The individual vent with a Studor AAV as the vent terminal is an effective method of venting island fixtures or fixtures located in a remote location.

The air admittance valve must be located a minimum of 4 inches above the weir of the trap. However, the valve may be located below the flood level rim of the fixture being vented.

COMMON VENT

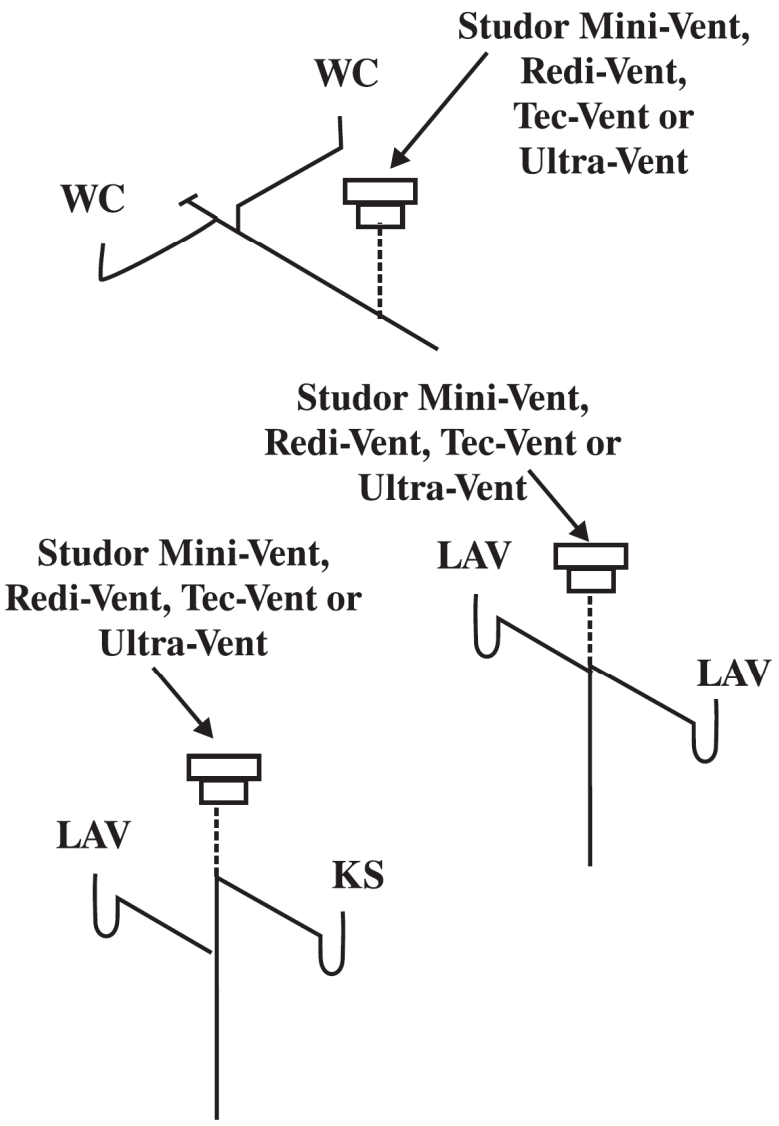


Figure 2

A common vent is similar to an individual vent. The vent serves two (2) or three (3) fixtures. The Studor Mini-Vent, Redi-Vent, Tec-Vent or Ultra-Vent can be located in the close proximity to the fixtures being vented.

WET VENT

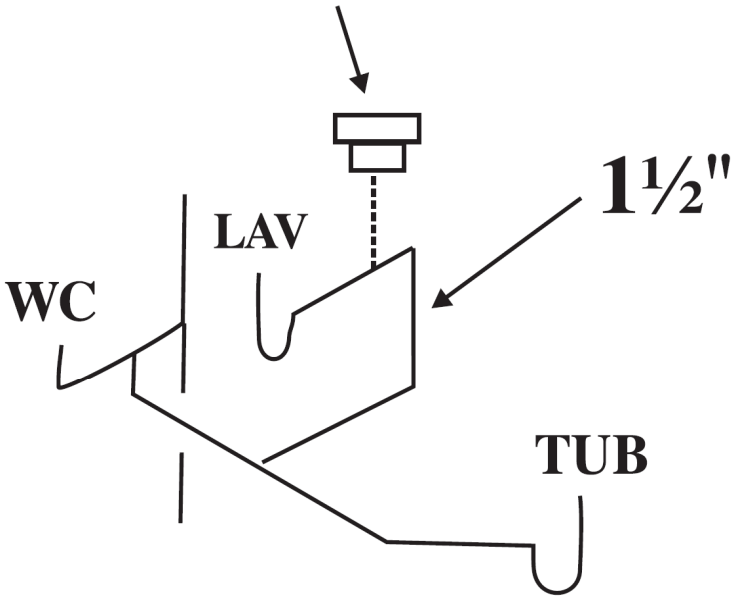


Figure 3

A wet vent is a single vent for one or two bathroom groups. There are different layouts for achieving the same venting concept.

A single bathroom group wet vent can terminate to a Studor Mini-Vent, Redi-Vent, Tec-Vent or Ultra-Vent.

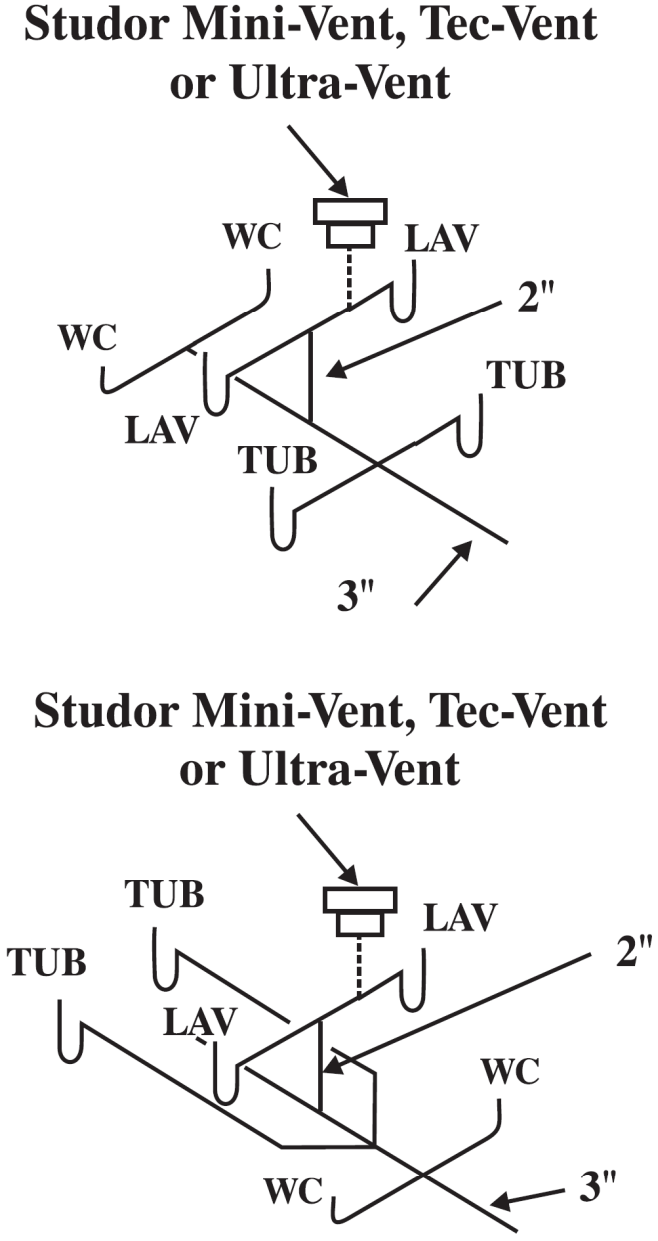


Figure 4

A double bathroom group, back-to-back, can be wet vented with a single Studor Mini-Vent, Tec-Vent or Ultra-Vent connecting as the vent.

CIRCUIT VENT

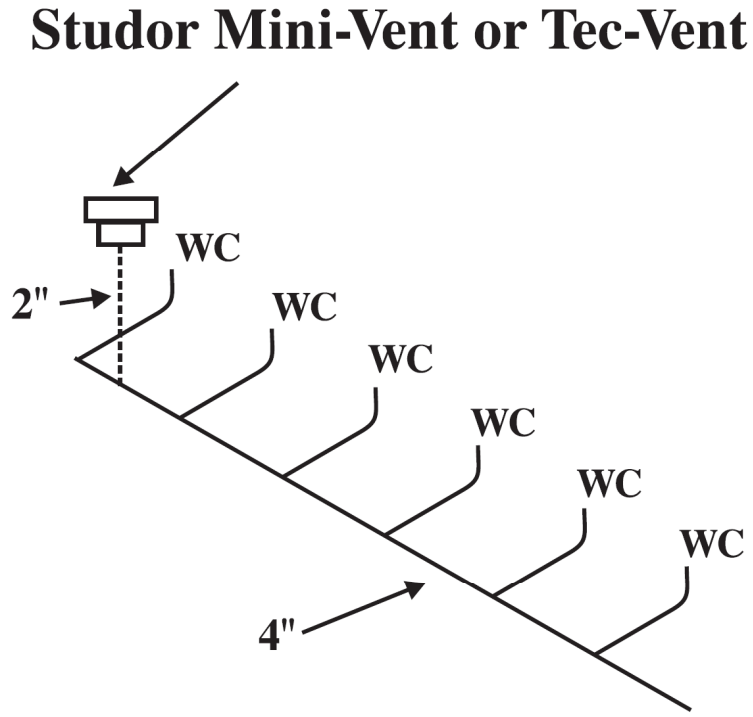


Figure 5

A single vent serves as the vent for three to eight fixtures. The Studor Mini-Vent or Tec-Vent serves as the circuit vent.

CIRCUIT VENT

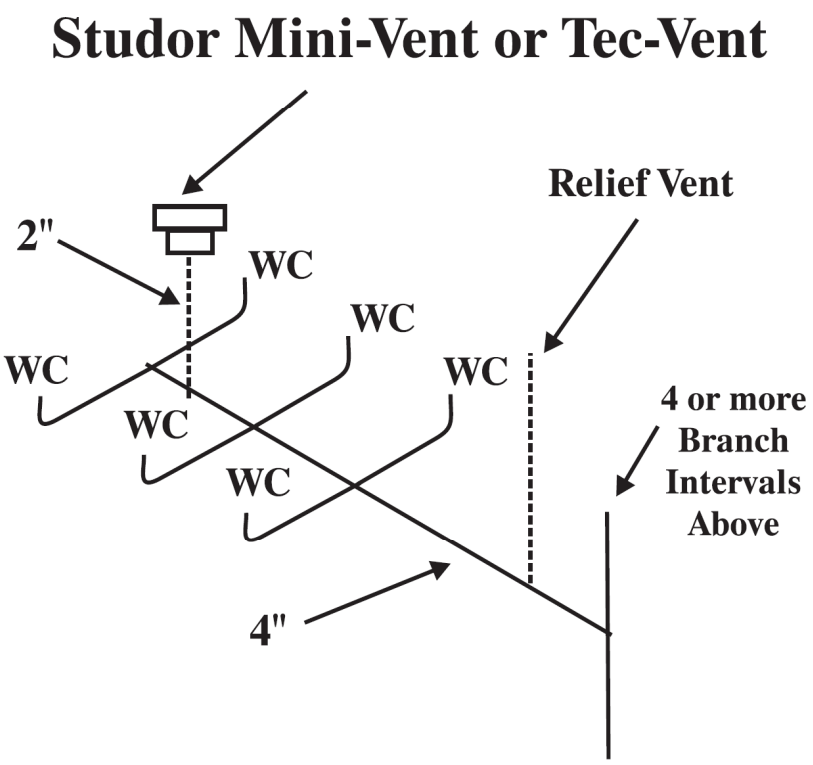


Figure 6

When the horizontal drainage branch connects to a stack having more than four branch intervals located above the branch, a relief vent is required. The relief vent must connect to the vent stack, stack vent, or extend to the outdoor air.

BRANCH VENT

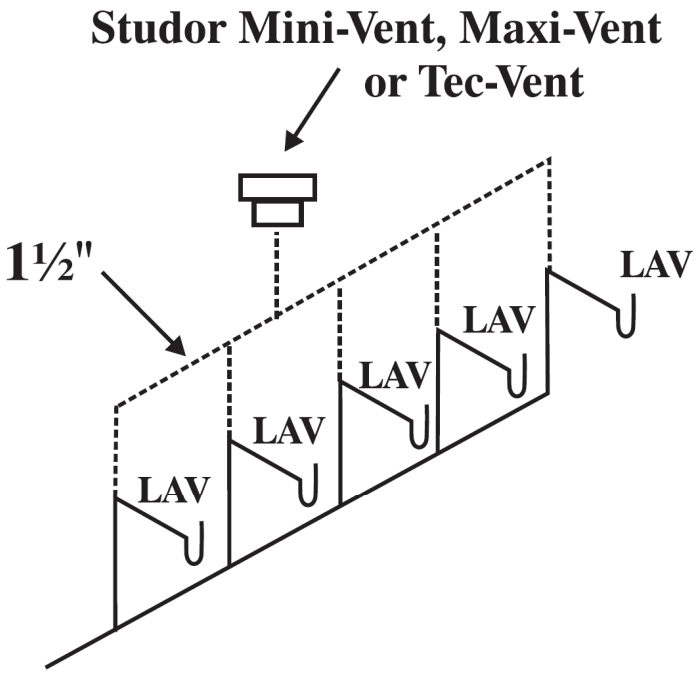


Figure 7

When various vents connect to a branch vent, a single Studor Mini-Vent, Maxi-Vent or Tec-Vent can serve as the vent for the branch.

BRANCH VENT

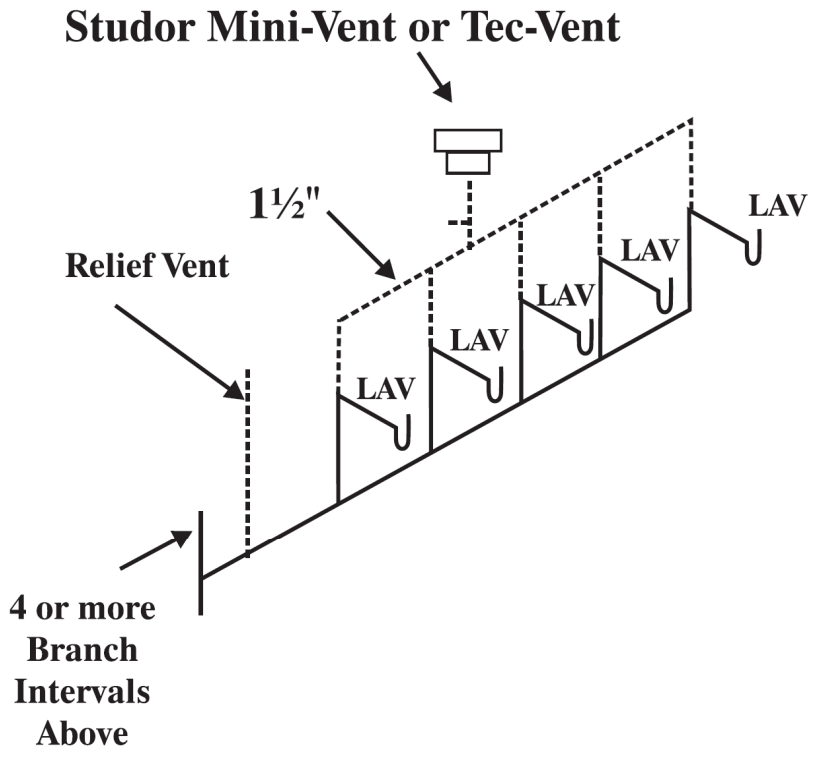


Figure 8

More than one Studor Mini-Vent or Tec-Vent can be installed within a horizontal branch to vent various fixtures. A relief vent is required when more than four (4) branch intervals are located above the branch connection.

VENT STACK - STACK VENT

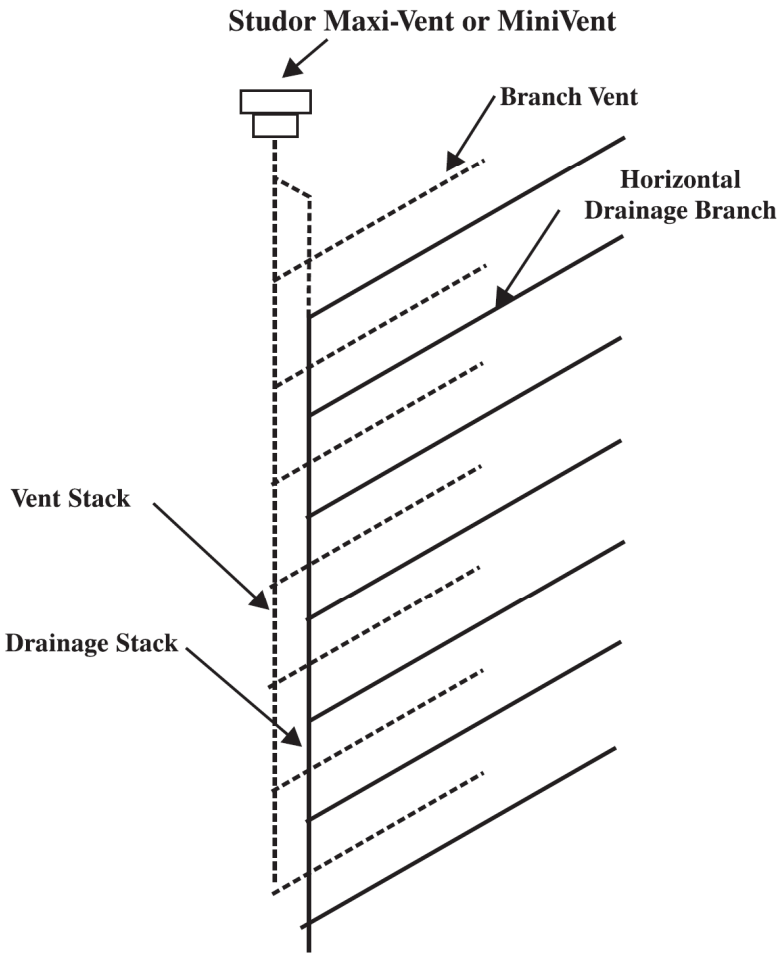


Figure 9

The stack type air admittance valve, Studor Maxi-Vent or Studor Mini-Vent, can serve as the vent for a vent stack or stack vent. The maximum height of the drainage stack that is vented with an air admittance valve is six branch intervals.

WASTE STACK VENT

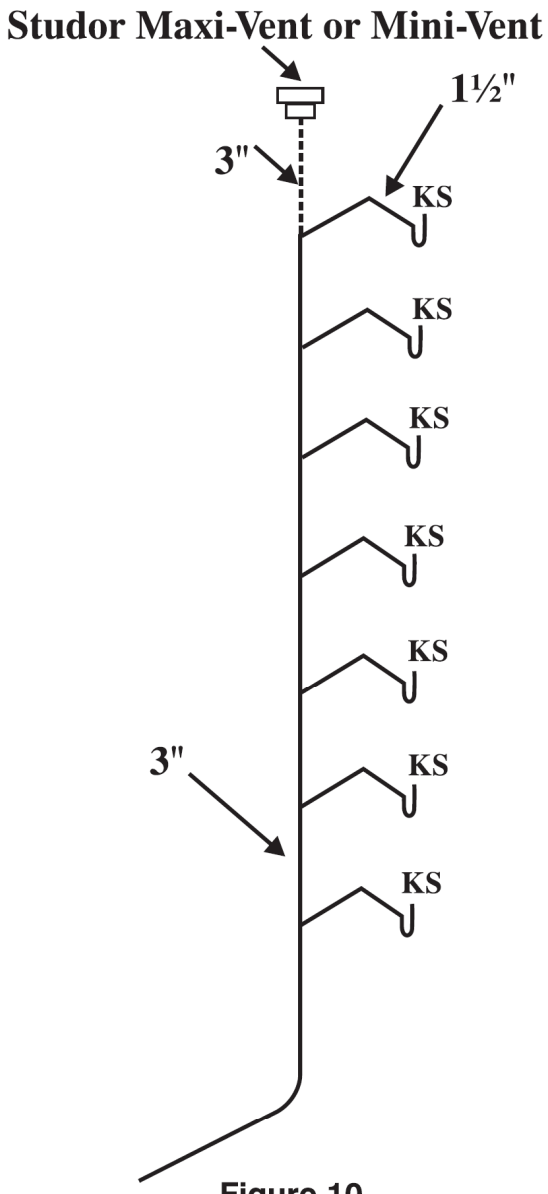


Figure 10

The Studor Maxi-Vent or Studor Mini-Vent can serve as the vent for a waste stack vent. The maximum height of the waste stack vent with an air admittance valve is six branch intervals.

WASHING MACHINE

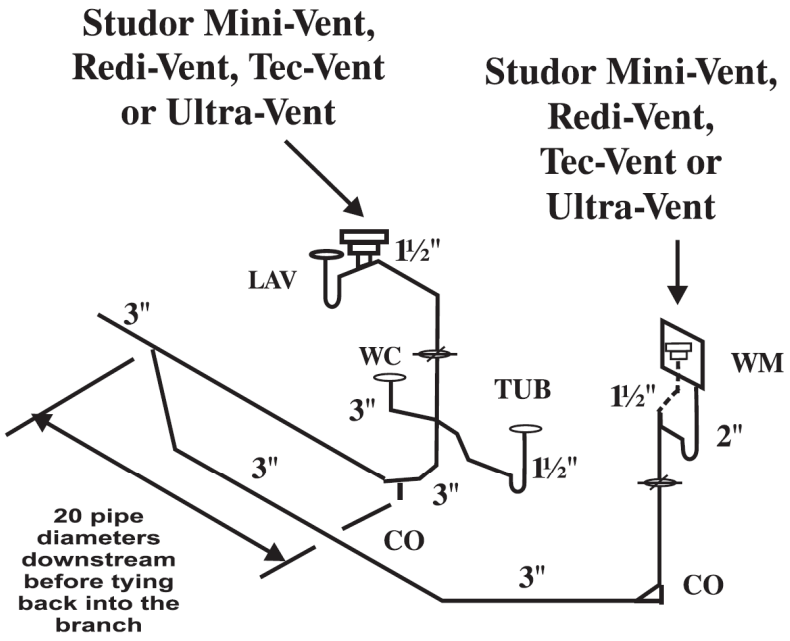
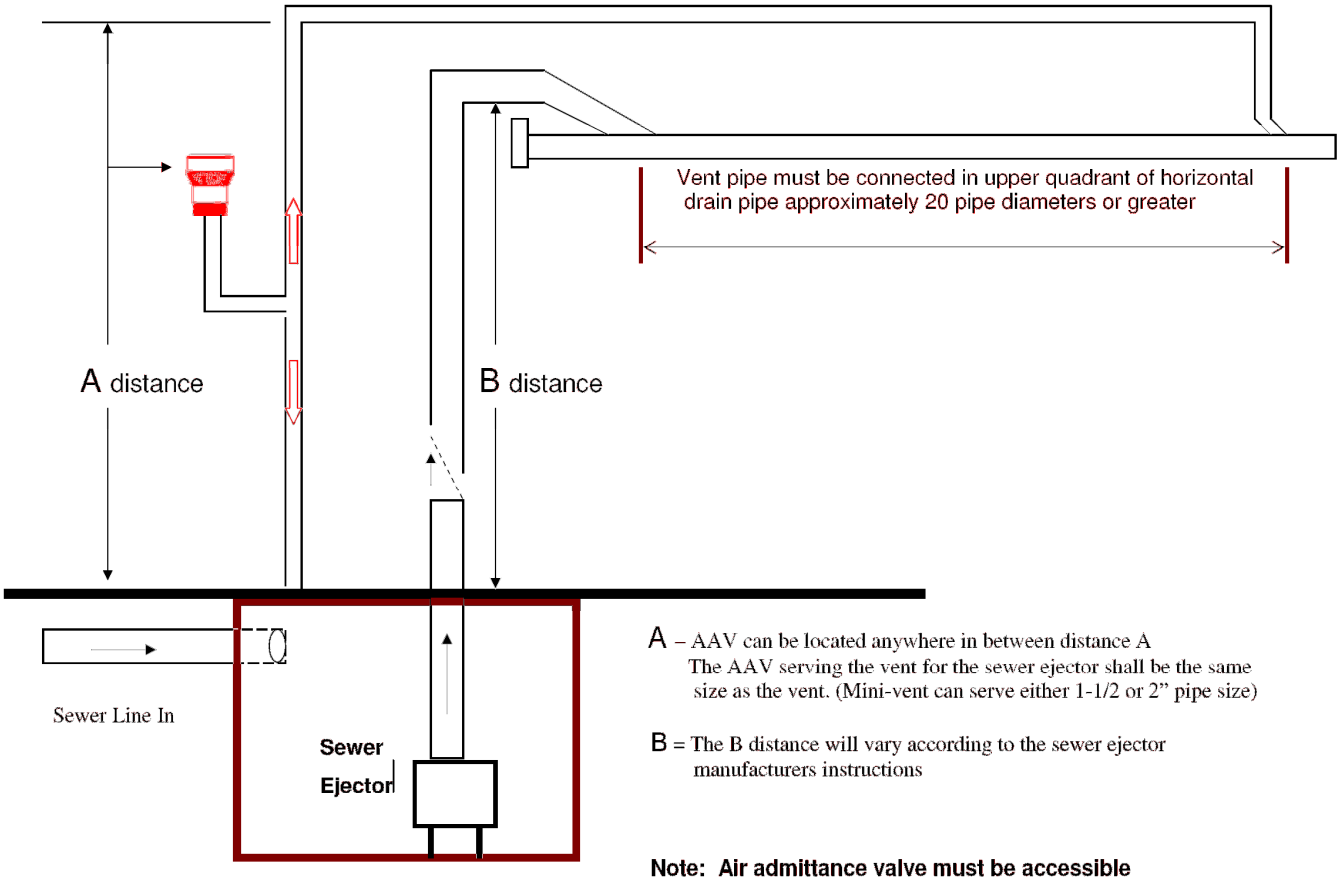


Figure 11



A – AAV can be located anywhere in between distance A
The AAV serving the vent for the sewer ejector shall be the same size as the vent. (Mini-vent can serve either 1-1/2 or 2" pipe size)

B = The B distance will vary according to the sewer ejector manufacturers instructions

Note: Air admittance valve must be accessible

Installation Requirements:

The Studor AAVs must be installed in accordance with the manufacturer's installation instructions. Failure to follow the instructions may result in the improper operation of the valve. In addition to the manufacturer's installation instructions, the following requirements shall apply.

1. In single fixture and branch applications the Studor AAV shall be located a minimum of four (4) inches above the weir of the fixture trap.

2. Each Studor AAV shall be accessible for replacement, if necessary.

3. Studor AAVs shall be located in a space that permits air to enter the valve. When located in a wall space the AAV shall be installed in the Studor Recess Box with louvered grill. Location of the Studor AAV in a vanity cabinet or sink cabinet is acceptable.

4. Studor AAVs shall be installed in the vertical upright position. The maximum offset from the vertical position shall not exceed fifteen (15) degrees.

5. The vent shall connect to the drain with a vertical connection to maintain an unblocked opening in the piping to the Studor AAV.

6. A minimum of one open pipe vent shall extend outdoors to the open air for every building plumbing drainage system. For drainage systems connecting to private sewage disposal systems, the vent should be located as close as possible to the connection between the building drain and building sewer.

7. The stack type Studor AAVs shall be installed six (6) inches above the highest flood level rim of the fixtures being vented in stack applications.

8. Studor AAVs installed in an attic area shall be located a minimum of six (6) inches above any ceiling insulation.

10. When a horizontal branch connects to a stack more than four (4) branch intervals from the top of the stack, a relief vent shall be provided. The relief vent shall be located between the connection of the branch to the stack and the first fixture connecting to the branch. The relief vent may also serve as a vent for a fixture. The relief vent shall connect to the vent stack, stack vent, or extend outdoors to the open air.

11. Studor AAVs shall be installed after the drainage system rough-in test at finish when fixtures are installed.

12. Apply pipe thread tape to valve thread before joining. Do not use pipe dope or tools to tighten.

Limitations of Use:

The following limitations of use shall apply to the Studor Mini-Vent, Redi-Vent, Ultra-Vent and Studor Maxi-Vent:

1. Where located in areas subject to extreme temperatures in excess of +150°F or -40°F the Studor Mini-Vent and Studor Maxi-Vent shall have the packaging container installed over the top of the valve as added protection.

2. The Studor AAVs shall not be installed as a vent for any sump sewer ejector unless approved by the administrative authority.

3. The Studor AAVs shall not be used to vent a special waste or chemical waste system unless approved by the administrative authority.

4. The Studor AAVs shall not be located in a supply or return plenum unless approved by the administrative authority.

5. The maximum height of drainage stack being vented by a stack type air admittance valve shall be 6 branch intervals.

Summary:

Studor AAVs can be used as a single fixture, branch or stack vent. The code official may use this report as supporting documentation to approve the acceptance of the Studor AAVs.