

TOOLBASESM TECHSPECS

Air Admittance Valves

DOLLARS & SENSE

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TECH @ A GLANCE

BENEFITS (+) / DRAWBACKS (-)

- + **AFFORDABILITY:** Reduced labor and material cost; fewer materials and penetrations needed
- + **SAFETY:** Reduces need for roof work
- + **DURABILITY:** Reduced roof penetrations and flashing requirements; repair and replacement is simple
- **CODE ACCEPTANCE:** Difficulty obtaining code approval in some areas

INITIAL COST

An AAV costs approximately \$25 to \$40; about one valve is needed for each group of plumbing fixtures. Typically, there is an initial cost savings because vent pipe length and roof penetrations are reduced. Installation can be performed in minutes using conventional plastic DWV installation methods. One study showed cost savings of \$293 for a single, 1,300-square-foot home.

OPERATIONAL COST

None. The valves require no maintenance.

CODE ACCEPTANCE

AAVs are accepted in all model plumbing codes and by the American Society of Sanitary Engineers (ASSE). Section P3114 of the 2003 International Residential Code (IRC) addresses the use of air admittance valves. However, there are U.S. localities that specifically prohibit the use of AAVs.

RESULTS FROM THE FIELD

AAVs were evaluated in several PATH Field Evaluations for cost and installation issues. AAVs were planned for in two additional projects, but denied by local code authorities.

WARRANTY

Manufacturers offer 20-year to lifetime warranties against manufacturing defects.

MAKING THE SWITCH

- AAVs are simple to install by plumbing contractors using conventional plastic welding techniques.
- A plumbing system design is needed to determine vent location and sizing.
- Obtaining code approval, if AAVs are not accepted by the local jurisdiction, can be difficult.



THE BASICS

Air admittance valves (AAVs) are pressure-activated, one-way mechanical valves that are used in a plumbing drain, waste, and vent (DWV) system in place of conventional, through-the-roof, pipe venting. Normally closed, AAVs open when wastewater discharges, allowing air to circulate for proper drainage. When closed, AAVs prevent the escape of sewer gas and maintain the trap seal.

Because AAVs can be located in any ventilated space, they eliminate the need for vent stack roof penetrations (although codes in the United States require one vent stack to the outdoors) and can greatly reduce the length of vent lines. Due to these benefits, a plumbing system using AAVs usually costs less than conventional venting systems.

AAVs are made of plastic and can be fitted into a DWV system using plastic pipe chemical welding techniques. AAVs can serve a single fixture or multiple fixtures (depending on the size and design of the valve). Because AAVs must be located in accessible areas, replacement or repair is simple.

AAVs are accepted by the 2003 International Residential Code (IRC), and recent versions of model plumbing codes. However, they are not allowed in many jurisdictions that have adopted older plumbing codes. Codes require that each home have one vent stack that discharges directly to the outdoors. Gable vents are available to provide this venting, so that roof penetrations can be avoided – adding

DOLLARS AND SENSE

Initial Cost: Each AAV **costs approximately \$25 to \$40**; one valve is needed for each group of plumbing fixtures. This is easily offset by reduced piping and flashing for vents and the labor needed to install them.

The Schenectady, New York, PATH Field Evaluation (small, affordable home with stacked baths) showed **cost savings of \$293 for a 1,344-square-foot home**, when all trades and materials were considered, as compared to conventional plumbing vents. The additional savings and costs included:

Labor Savings:	Plumbing - 4 hours Roofing - 2 hours	Added Labor Costs:	Siding Contractor - ½ hour
Material Savings:	Vent Pipe - \$50 Roofing - \$75	Added Material Costs:	AAVs - \$132

THE BASICS *continued*

to a home’s overall durability.

The American Society of Sanitary Engineers (ASSE) maintains two standards for AAV performance: ASSE 1050 is the consensus standard for stack-type AAVs; ASSE 1051 is the standard for individual and branch-type AAVs.

MAKING THE SWITCH

What is required to transition from your current building practices to using this technology?

- Consult the Local Codes – Make sure AAVs are permitted in your area
- Learn to Design the System - A plumbing system design is needed to determine vent location and sizing; this service is often performed by the manufacturer. However, system designs can be developed from manufacturer sizing charts and installation instructions.
- Review Your Home Design - AAVs must be accessible and located within a ventilated space to permit air to enter the valve during operation.
- Tools - AAVs are installed by plumbing contractors using conventional plastic welding techniques. No additional tools are needed.
- Work With Your Trade Contractors – Impacts on trades should be minimal, except for the plumber, who should become familiar with the product. Advise insulation contractors that vents in attic must be located above insulation.

RESULTS FROM THE FIELD

This technology has been used by other builders in real-world building situations – learn from their experiences. For more information on these Technologies in Practice, visit www.toolbase.org.

The use of AAVs is often met by resistance from local jurisdictions that may be unfamiliar with the technology, or that may use an older plumbing code which does not list AAVs. However, AAVs have been used successfully for many years in the United States and Europe.

Bowie, Maryland, MADE Homes (PATH Field Evaluation)

- AAVs were used in two-bath home with stacked bathrooms, and one - 2-inch vent discharged to outdoors; initially AAVs were denied code approval, but a waiver was granted for their use in this demonstration project; manufacturer produced engineered plumbing design,
- Efficient plumbing system design, combined with the use of AAVs and CPVC/PVC piping, resulted in rough-in of two baths in about seven hours; AAVs were installed at final plumbing stage, after pressure testing plumbing system,
- Design saved about 100 feet of 2- and 3-inch PVC pipe material, and roof flashing
- Contractor learned that when roughing in a sink to be fitted with an AAV, fixture drain should be offset slightly to allow room for a sanitary tee, and for AAV to be located between the drain and the wall

“This was the easiest two-bath rough-in I’ve ever done.”

Plumbing Contractor
MADE Homes Project
Bowie, Maryland

Santa Fe, New Mexico, Chapman Companies (PATH Field Evaluation)

- Technology was allowed as demonstration after initial rejection by authorities
- AAVs continue to function well after three years of service
- Plumbing installer found significant labor and material savings with AAVs, and plans to use them on future projects where building officials approve.

Schenectady, New York, Habitat for Humanity (PATH Field Evaluation)

- AAVs initially prohibited by local plumbing inspector, and rejected by plumber; NAHB Research Center staff appealed at a hearing of New York State Code Officials; final decision was to allow AAVs in this demonstration house; State Building Code was revised the next year to adopt International Code Council (ICC) codes that allow AAVs
- AAV venting system cost \$293 less than a conventional venting system, due to reduced piping length and roof penetrations
- AAVs had a minor effect on drywall, roof, and siding installation; drywall contractors had to cut around recessed boxes that housed AAVs; no flashing was required for roof vent penetrations; where AAV was vented through gable end, siding contractors had to finish around vent grill; however, this finishing is standard practice for contractors.

FOOD FOR THOUGHT

This section provides some things to think about before switching to this building technology – make sure it's the right choice for you.

- AAVs are suitable for most residential applications. They can be especially beneficial in retrofit applications where venting may be difficult. They are good for large new homes where long vent runs can be eliminated, and for kitchen island sinks.
- When roughing in a sink that will be fitted with an AAV, offset fixture drain slightly to allow room for a sanitary tee, and locate AAV between the drain and wall.
- Although building codes accept AAVs and products undergo rigorous testing according to nationally-accepted testing standards, many local jurisdictions and plumbing contractors question the reliability of mechanical valves for venting.
- Building codes require that one DWV vent per structure exhaust directly to the outside, when using AAVs in a plumbing

system. To avoid a roof penetration, screened gable wall vents are available.

- Air admittance valves must be installed according to manufacturer specifications and code requirements, which include vent sizing and location.
- Valves cannot be used with chemical or non-neutralized waste systems, and cannot be placed in air plenums.



TECH CHECK

Below is a checklist of steps to follow if you decide to implement this technology in your next building project.

- Determine if AAVs are permitted by the local jurisdiction. If not, file for a waiver.
- Obtain system design from AAV manufacturer, or use manufacturer-specified design tables. Determine location of all vents in the system, including the outdoor vent.
- Purchase AAV materials for the DWV system.
- For individual or branch AAVs, locate sanitary tee near the trap. Make room at rough-in stage for this tee and the AAV.
- After rough and finished plumbing testing, install and test AAVs. Ensure that no AAV is obstructed by construction debris or insulation.
- Inform the homeowner of the location of all AAVs in the home.



The Partnership for Advancing Technology in Housing (PATH) is dedicated to accelerating the development and use of technologies that radically improve the quality, durability, energy efficiency, and affordability of America's housing. Managed by HUD, the PATH partnership includes the homebuilding, manufacturing, insurance and financial industries, and Federal agencies concerned with housing.

PATH addresses barriers to innovation, provides information on advanced building technologies, and advances housing technology research; making affordable, quality American homes a reality.

For more information on PATH, visit www.pathnet.org.

Tech Specs are prepared for PATH by the NAHB Research Center.

DEFINITIONS

Air Admittance Valve (AAV)

A one-way valve that allows air into a plumbing system when there is water flow to allow drainage. Because the valve closes from internal air pressure, it seals under no-flow conditions. The valve will not open if there is positive internal pressure in the drainage system.

Branch-Type AAV

A DWV vent connecting two or more individual fixtures on one branch line.

Drainage, Waste, and Vent Systems (DWV)

All piping for conveying wastes from plumbing fixtures, appliances, fixture traps, and drainage piping, and including venting systems, and piping to public sewer or private septic systems.

Stack-Type AAV

A vent located above the highest horizontal drain in a plumbing stack.

RESOURCES

ToolBase Services

www.toolbase.org

Durgo, Inc.

1719 Trade Center Way, Suite #1
Naples, FL 34109
239-592-9899
www.durgo.com

Oatey

4700 West 160th Street
P.O. Box 35906
Cleveland, OH 44135
216-267-7100
www.oatey.com

RectorSeal

2601 Spenwick Drive
Houston, TX 77055
800-231-3345
www.rectorseal.com

Studor, Inc.

11256 47th St. North
Clearwater, FL 33762
800-447-4721
www.studor.net