

WATER AGENCIES' STANDARDS

Design Guidelines for Water, and Sewer Facilities

SECTION 5.5 AIR VALVES

5.5.1 PURPOSE

The purpose of this section is to provide information regarding the use, sizing, location, alignment and design of air valves for use with potable and recycled water pipelines. This section focuses on the use of Combination Air and Vacuum Valves.

5.5.2 STANDARD TERMS AND DEFINITIONS

Wherever technical terms occur in these guidelines or in related documents, the intent and meaning shall be interpreted as described in Standard Terms and Definitions.

The following terms and definitions as found in this section shall have the following meaning:

ARV:	Air Release Valves
AVV:	Air and Vacuum Valves
CAV:	Combination Air and Vacuum

5.5.3 GENERAL

It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document. The Engineer of Work may not deviate from the criteria presented in this section without prior written approval of the Agency's Engineer.

5.5.4 GUIDELINE

- A. Description of use:
1. Air Release Valves (ARV) are designed and used to vent small amounts of entrained air from the pipeline when the system is normally operating under pressure. Air release valves are installed at highpoints in the system where air will accumulate. ARV's may also be installed on discharge piping of pump stations only as directed by the Agency's Engineer.
 2. Air and Vacuum Valves (AVV) are designed and used to allow large amounts of air to be exhausted from a pipeline as it is being filled and allow air to enter the pipeline when the pipeline is being drained. An AVV will not allow entrained air to be released when the pipeline is operating under pressure. ARV's shall be used at locations only as directed by the Agency's Engineer.

3. Combination Air and Vacuum Valves (CAV) are used to vent large amounts of air to the atmosphere during the filling of the pipeline, release small amounts of air while the pipeline is operating, and to allow air to enter the pipeline when subject to vacuum. CAV's perform the functions of both ARV and AVV as described above. CAV's shall be used on distribution and transmission mains.
- B. Requirements: CAV's are to be specified at locations where air valves are required unless otherwise directed by the Agency's Engineer.
1. Air valves are to be installed with an isolation valve to allow for removal or maintenance of the valve with the pipeline under pressure.
 2. Air valves are to be installed above ground within an enclosure outside the traveled way, within the road right of way or Agency Easement.
- C. Sizing: Air valves are sized as needed to release air during filling of the pipeline, to release small quantities of air during operations, and to admit air as the pipeline is being drained. Note that the valves are sized for normal operations of the pipeline and not designed for catastrophic failure. During catastrophic failure, valves can vent very large quantities of air, although damage to the valve is possible due to the resulting high airflow velocities.

Air valves shall be sized in accordance with the manufactures recommendations to admit air into pipelines at a rate equivalent to the maximum water discharge rates of blowoffs installed down-slope in accordance with Section 5.6.

The drawings or specifications must state the design pressure range for each valve. The valve pressure class shall generally match the pressure class of the pipeline to be installed with.

Each pipeline is to be evaluated individually for the need of CAV's. Minimum sizes shall be as follows:

1. Two inch (2") CAV assemblies shall be installed on pipeline six inches (6") through fourteen inches (14") in diameter.
 2. Four inch (4") CAV assemblies shall be installed on pipeline sixteen inches (16") and twenty inches (20") in diameter.
 3. CAV assemblies to be installed on pipeline twenty four inches (24") and larger and pipelines on steep slopes greater than fifteen percent (15%) shall be calculated and sized appropriately and approved by the Agency's Engineer.
- D. Appurtenances: CAV appurtenances are required in accordance with Standard Specifications Section 15108, Standard Drawings WA-02 thru WA-06 and the Approved Materials List.
- E. Locations:
1. For water mains sixteen inches (16") and smaller: The location of air valves are generally determined by the topography of the pipeline system and, accordingly, should be installed at high points and at long sloping gradients.

Fire hydrants could also be used as a manual air valve only as approved by the Agency's Engineer.
 2. For water mains larger than sixteen inches (16"): Along with being installed at high points, air valves are also installed on the down slope or low side of closed valves when closure of the valve creates a localized high point.

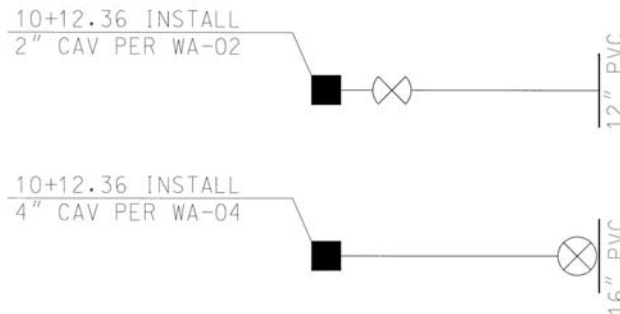
- F. Installation: Air valves shall be installed above ground within an enclosure outside the traveled way, yet within the road right of way or Agency Easement in accordance with Standard Specification 15108 and Standard Drawings WA-02 through WA-06 accordingly.

5.5.5 NOTATIONS ON PLANS

Air valves shall be shown in the plan view portion of the sheet(s) only and shall include, but not be limited to, the following minimum information:

- A. Standard symbols, stationing and plan callout notes shall be in accordance with Section 1.1.
- B. Air valves shall be shown with the following information:
- Stationing of the air valve at the connection to the pipeline.
 - Size of Air valve.
 - Refer to Figure 1 below.

Figure 1
CAV Plan Callouts



5.5.6 MATERIAL SELECTION

CAV and appurtenant components to be used with the installation of water systems shall be in accordance with Specification Section 15108 and the Approved Materials List.

5.5.7 REFERENCE

- A. Should the reader have any suggestions or questions concerning the material in this section, contact one of the member agencies listed.
- B. The publications listed below form a part of this section to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said publications unless otherwise called for. The following list of publications, as directly referenced within the body of this document, has been provided for the users convenience. It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document.
1. Water Agencies' Standards (WAS):
 - a. Design Guidelines:
 1. Section 5.6, Blowoff Assemblies.

- b. Standard Specifications:
 - 1. Section 15108, Air Release Valve, Air and Vacuum Valve, and Combination Air Valve Assemblies.
 - c. Standard Drawings:
 - 1. WA-02 through WA-06.
 - d. Approved Materials List for Water Facilities
2. American Water Works Association (AWWA):
- a. AWWA C512, Air Release, Air/Vacum, and Combination Air Valves for Waterworks Service.

END OF SECTION