ANSI/AWWA **C512-25**

(Revision of ANSI/AWWA C512-15)

AWWA Standard

Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service—Metallic Body and Cover

Effective date: Oct. 1, 2025.
First edition approved by Board of Directors Jan. 26, 1992.
This edition approved Jan. 23, 2025.
Approved by American National Standards Institute Feb. 24, 2025.

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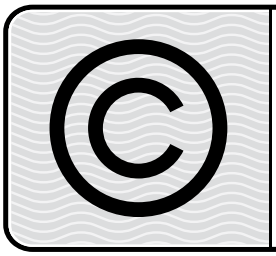
AWWA Standard

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ISBN-13, print: 978-1-64717-272-5

ISBN-13, electronic: 978-1-61300-793-8

DOI: http://dx.doi.org/10.12999/AWWA.C512.25

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C512.*

I. Introduction

I.A. *Background.* Air valves have been used in the United States for over a century on liquid piping systems that provide water and wastewater service. They perform various functions in providing a safe and efficient operation of a liquid piping system. Their functions include (1) automatically releasing small pockets of accumulated air and wastewater gases, (2) admitting or venting large quantities of air during the draining or filling operation of a liquid piping system, and (3) admitting outside air into a liquid piping system to reduce or mitigate the occurrence of vacuum pressure caused by transient surge events. Following are the three basic types of air valves:

1. Air-release valves, also called *small-orifice valves*, are designed to automatically release small pockets of accumulated air and wastewater gases from a liquid piping system while the system operates at a pressure exceeding atmospheric pressure.

2. Air/vacuum valves, also called *large-orifice valves*, are designed to vent large quantities of air automatically during a liquid piping system filling and to admit large quantities of air automatically when the pressure in the liquid piping system drops below atmospheric pressure.

3. Combination air valves are designed to perform the same function as air/vacuum valves, but in addition, they will automatically release small pockets of accumulated air and wastewater gases from a liquid piping system while the system operates at a pressure exceeding atmospheric pressure, like an air-release valve.

I.B. *History.* The AWWA Standards Committee on Waterworks Air-Release Valves was authorized on Nov. 17, 1984, in response to the water industry's request for a standard on air valves. The first edition of this standard titled Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service, designated as AWWA/ANSI C512, was approved by the AWWA Board of Directors on Jan. 26, 1992. Subsequent revisions to ANSI/AWWA C512 were approved on June 20, 1999, June 13, 2004, and June 24, 2007. In 2009, the committee name was changed to Air Valve Committee to reflect the committee's attention to both the water and wastewater industries. The fifth

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edition titled Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service was approved on June 7, 2015. This edition titled Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service—Metallic Body and Cover was approved on Jan. 23, 2025.

I.C. *Acceptance*. In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International[†] (NSF) to develop voluntary third-party consensus standards and a certification program for direct and indirect drinking water additives. Other members of the original consortium included the Water Research Foundation (formerly AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.[‡] Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including

1. Specific policies of the state or local agency.

2. Four standards developed under the direction of NSF: NSF/ANSI/CAN[§] 60, Drinking Water Treatment Chemicals—Health Effects; NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects; NSF/ANSI/CAN 372, Drinking Water System Components—Lead Content; and NSF/ANSI/CAN 600, Health Effects Evaluation and Criteria for Chemicals in Drinking Water.

3. Other references, including AWWA standards, *Food Chemicals Codex, Water Chemicals Codex*,[¶] and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI/CAN 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdictions. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

NSF/ANSI/CAN 600 (which formerly appeared in NSF/ANSI/CAN 60 and 61 as Annex A, "Toxicology Review and Evaluation Procedures") does not stipulate a

[†] NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

[‡] Persons outside the United States should contact the appropriate authority having jurisdiction.

[§] Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

[¶] Both publications available from National Academies Press, 500 Fifth Street, NW, Washington, DC 20001.

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maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of "unregulated contaminants" are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of NSF/ANSI/CAN 600 procedures may not always be identical, depending on the certifier.

AWWA/ANSI C512 does not address additives requirements. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to

1. Determine additives requirements, including applicable standards.
2. Determine the status of certifications by parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

An ANSI-approved national standard, NSF/ANSI/CAN 372, Drinking Water System Components—Lead Content, was published in 2010. On Jan. 4, 2011, legislation was signed revising the definition for "lead free" within the Safe Drinking Water Act (SDWA) as it pertains to "pipe, pipe fittings, plumbing fittings, and fixtures." The changes went into effect on Jan. 4, 2014. In brief, the new provisions to the SDWA require that wetted surfaces of these products meet a weighted average lead content of not more than 0.25 percent.

II. Special Issues

II.A. *Advisory Information on Product Application*. For additional guidance regarding selecting, sizing, locating, and installing air-release, air/vacuum, and combination air valves, see AWWA M51, *Air Valves: Air-Release, Air/Vacuum, and Combination*.

II.B. *Venting*. When selecting types of air valves, it must be noted that air/vacuum valves, once closed, will not reopen to vent air and wastewater gases while a liquid piping system operates at a pressure generally exceeding atmospheric pressure. To vent air and wastewater gases from a liquid piping system operating at a pressure exceeding atmospheric pressure, an air-release valve or combination air valve is required. Air/vacuum and combination air valve orifices should be suitably sized using the manufacturer's sizing data to admit air and to release air and wastewater gases at required flow rates specific to the system application.

II.C. *Service*. Air valves are designed for either water service or wastewater service. The type of service must be specified.

II.D. *Pressure Surge Suppression*. Large outlet orifice sizes on air/vacuum and combination air valves (air-release valves not included) may allow the rapid venting of air and wastewater gases, followed by the sudden orifice closure that may cause pipeline

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pressure surges. To suppress surges, the attachment of throttling devices on the outlet of the air/vacuum valve or combination air valve or the attachment of slow-closing devices on the outlet or inlet of the air/vacuum valve or combination air valve should be considered, along with appropriate pressure surge analysis.

II.E. *Pipeline Water Column Separation Protection*. On pipeline applications where water column separations may occur, a vacuum breaker with air-release valve or a combination air valve with restricted outflow should be considered.

II.F. *Minimum Test Pressure.* Air valves for water and wastewater service are tested at a minimum pressure of 20 psig (138 kPa [gauge]) unless specified otherwise by the purchaser (see item 28 of Sec. III.A). Air valves may need to operate and seal at pressures below 20 psig during gravity flow, low-pressure flow, and static nonflow conditions.

II.G. *Maximum Test Pressure*. Air valves for water and wastewater service are tested at 1.5 times the design pressure. If air valves need to operate at higher pressures because of transients or initial pipeline tests, the maximum operating pressure should be designated by the purchaser (see item 3 of Sec. III.A).

II.H. *Internal Protective Coating for Wastewater Air Valves*. An internal smooth protective coating should be considered to reduce clogging and prevent corrosion. Refer to item 24 of Sec. III.A to designate an internal coating.

II.I. *Releasing or Venting.* The releasing or venting of air and wastewater gases, if present, may involve additional environmental issues regarding corrosion and odors.

II.J. *Chlorine and Chloramine Degradation of Elastomers.* The selection of materials is critical for water service and distribution piping in locations where there is a possibility that elastomers will be in contact with chlorine or chloramines. Documented research has shown that elastomers such as gaskets, seals, valve seats, and encapsulations may be degraded when exposed to chlorine or chloramines. The impact of degradation is a function of the type of elastomeric material, chemical concentration, contact surface area, elastomer cross section, and environmental conditions, as well as temperature. Careful selection of and specifications for elastomeric materials and the specifics of their application for each water system component should be considered to provide long-term usefulness and minimum degradation (swelling, loss of elasticity, or softening) of the elastomer specified.

II.K. *Finite Element Analysis (FEA) Advisory Information on Valve Design.* Calculation tools like FEA software can be used as a supplement to the stress design requirements of this standard. These calculation tools are able to show detailed stress concentrations on valve components for a given load scenario, which are not

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indicative of the allowable stress determinations in this standard. Other standards, such as the ASME Boiler and Pressure Vessel Code, Section VIII, Division 2, may be used to separately evaluate the localized stress concentrations resulting from the various load case(s) being evaluated.

III. Use of This Standard. It is the responsibility of the user of an AWWA standard to determine that the products described in that standard are suitable for use in the particular application being considered.

III.A. *Purchaser Options and Alternatives*. This standard includes certain options and alternatives, summarized in the following list, that the purchaser should designate when purchasing air valves described in this standard. The purchaser should review each item and make appropriate provisions in procurement documents to stipulate additional requirements. The following information should be provided in procurement documents by the purchaser:

1. Standard used—that is, AWWA/ANSI C512, Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service—Metallic Body and Cover, of latest revision.
2. Valve size (nominal).
3. Design pressure and minimum and maximum operating pressure of each valve (Sec. II.F and Sec. II.G).
4. Quantity required.
5. Type of installation (in-plant, in-vault, or outdoor).
6. Warranty statement, if other than manufacturer's standard warranty.
7. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required.
8. Valve type—air-release valve, air/vacuum valve, or combination air valve (Section 3).
9. Catalog data, if required. The purchaser should specify if any particular types of valve performance data are required (Sec. 4.1.1).
10. Certified drawings, if required (Sec. 4.1.2).
11. Operating manual, if required (Sec. 4.1.3).
12. Details of federal, state, provincial, territorial, and local requirements (Sec. 4.2.1).
13. Records of physical and chemical tests, if required (Sec. 4.2.2).
14. Cover bolt materials of construction (Sec. 4.2.2.4 and Sec. 4.3.2.6).
15. Body inlet configuration, threaded or flanged (Sec. 4.3.2.1.1).

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16. Size of inlet port connection if different from the nominal valve size (Sec. 4.3.2.1.2).

17. Ball valves and fittings for backwash equipment, if required (Sec. 4.3.2.1.3).

18. Flange requirements (Sec. 4.3.2.2.1).

19. Intended service, whether water service or wastewater service (Section 3).

20. Cover outlet configuration—threaded, flanged, or hooded (Sec. 4.3.2.10).

21. Whether a slow-closing device is required on the valve inlet for water and on the valve outlet for water or wastewater (Sec. 4.3.3).

22. Whether a throttling device is required on the valve outlet (Sec. 4.3.4).

23. Whether weld examination is required (Sec. 4.4.6).

24. Internal protective coating, if required (Sec. 4.5.2.2).

25. If required, special external protective coatings, if other than the manufacturer's standard coating (Sec. 4.5.2.3).

26. Holiday testing, if required (Sec. 4.5.2.4).

27. Records of tests, if required (Section 5).

28. Lower test pressure, if required (Sec. 5.1.2.1, Sec. 5.1.2.2, and Sec. 5.1.3).

29. Plant inspection by purchaser (Sec. 5.2).

30. Affidavit of compliance, if required (Sec. 6.3).

III.B. *Modification to Standard*. Any modification to the provisions, definitions, or terminology in this standard must be provided by the purchaser.

IV. Major Revisions. Major changes made to the standard in this revision include the following:

1. An advisory statement on FEA was added in the foreword as a supplement to the stress determination methods (Sec. II.K).

2. Added clarifications for valve performance data as part of catalog data (Sec. III.A, item 9, and Sec. 4.1.1).

3. Revised the definitions of *raw water* and *source water*. Deleted the general definition for *water* as source. *Potable water* and *reclaimed water* are defined individually (Section 3).

4. Clarified the definitions for *operating pressure* and *valve size* (Section 3).

5. Deleted *working pressure* definition and deleted working pressure from the definition of *operating pressure* (Section 3).

6. Clarified the requirement that materials shall comply with the Safe Drinking Water Act, as this applies for water service (not wastewater service), and clarified that compliance requirements with other regulations are to be specified by purchaser as listed in foreword Sec. III.A, item 12 (Sec. 4.2.1).

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7. Removed reference to ANSI since it is an accreditation body and added AWS (American Welding Society) since its standards are now referenced within the fabrication section (Sec. 4.2.2).

8. Where a metric version of an ASTM or AWS referenced standard exists but was not included, the "M" version of the designation was added throughout (e.g., ASTM A36/A36M).

9. Combined wrought, fabricated, and cast stainless steel into a single section, which added ASTM A276/A276M and ASTM A666 for fabricated stainless steel. Added Types 304 and 304L to ASTM A666. Added the low-carbon version of the cast materials (Grades CF3 and CF3M) for ASTM A351/A351M and ASTM A743/A743M (Sec. 4.2.2.3).

10. Restructured the language for wastewater valve size as determined from air flow requirements, as this is true for all valves not just wastewater valves (Sec. 4.3.2.1.2).

11. Clarified flange requirements (Sec. III.A, item 18, and Sec. 4.3.2.2.1).

12. Added other AWWA standards of compliance for flange gaskets (Section 2 and Sec. 4.3.2.4).

13. Revised drain/test ports to be proportional to valve size (Sec. 4.3.2.8.1).

14. Removed statement about piping arrangement between air/vacuum valve and air-release valve (Sec. 4.3.2.8.2).

15. Clarified that slow-closing devices can also be used on combination air valves and modified hydrostatic testing for slow-closing devices based on installation location (Sec. 4.3.3).

16. Added AWS D1.6/D1.6M to the General Requirements section for welding (Sec. 4.4.1).

17. Clarified purchaser options in cases of noncompliance (Sec. 5.3).

18. Added requirement that the minimum after-delivery storage conditions be readily available to the purchaser (Sec. 6.2).

19. The standard title was changed to Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service—Metallic Body and Cover.

V. Comments. If you have any comments or questions about this standard, please call AWWA Engineering and Technical Services at 303.794.7711, write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098, or email standards@awwa.org.

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AWWA Standard

Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service—Metallic Body and Cover

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes ½-in. (13-mm) through 6-in. (150-mm) air-release valves and ½-in. (13-mm) through 20-in. (500-mm) air/vacuum valves and combination air valves having gray cast-iron, ductile-iron, carbon steel, or stainless-steel bodies and covers. The valves are designed for use in water or wastewater systems with maximum design pressures of 300 psig (2,070 kPa [gauge]), liquid temperatures ranging from above freezing to a maximum of 125°F (52°C), and a liquid pH greater than 6 and less than 12.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for air-release valves, air/vacuum valves, and combination air valves for water and wastewater service, including material, design, testing, inspection, marking, and packaging for shipment.

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