



**American Water Works
Association**

The Authoritative Resource on Safe Water®

ANSI/AWWA C500-09
(Revision of ANSI/AWWA C500-02)

AWWA Standard

Metal-Seated Gate Valves for Water Supply Service



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AWWA Standard

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C500.

I. Introduction.

I.A. *Background.* The first AWWA standard for gate valves was adopted June 24, 1913. It was reissued without change on June 9, 1916, as part of AWWA Standard Specifications for Hydrants and Valves. At the time of the next revision in 1938, the standard for valves was published separately.

The New England Water Works Association (NEWWA) has participated with AWWA from the beginning in the development of this standard. At times, the two associations maintained separate committees that worked in close liaison with each other. At other times, NEWWA appointed representatives to the AWWA committee, as at present.

The Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) has played an important role in development of the standard. This organization was created in 1924, and in 1930 organized the MSS Water Works Committee and designated representatives for appointment to the AWWA Standards Committee on Gate Valves and Swing Check Valves. Available records do not reveal the part played by manufacturers in developing the 1913 standard. However, in subsequent revisions, the MSS committee has participated effectively, as have other manufacturers not represented by MSS.

I.B. *History.* The dates of approval and numerical designation of past editions of AWWA C500 are listed below. Dates shown in parentheses are the effective dates for use of the revised editions.

Designation	Date of Approval
None	June 24, 1913
7F.1-1939	Apr. 29, 1939 (May 1, 1939)
7F.1-39	Feb. 25, 1943 (limitations by War Production Board)
C500-52T	May 9, 1952 (January 1953 except Sec. 17 and Sec. 18, which became effective June 1, 1953)
C500-58T	Jan. 28, 1958 (Jan. 1, 1959)
C500-59T	Jan. 28, 1959
C500-61	Jan. 23, 1961
C500-71	Jan. 24, 1971
C500-80	Jan. 28, 1980

C500-86	June 22, 1986
C500-93	June 6, 1993
C500-02	June 16, 2002
C500-09	Jan. 25, 2009

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 consortium included the American Water Works Association Research Foundation (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. An advisory program formerly administered by USEPA, Office of Drinking Water, discontinued on Apr. 7, 1990.
2. Specific policies of the state or local agency.
3. Two standards developed under the direction of NSF, NSF[†]/ANSI[‡] 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.
4. 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 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

*Persons outside the United States should contact the appropriate authority having jurisdiction.

†NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48113.

‡American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

§Both publications available from National Academy of Sciences, 500 Fifth Street, N.W., Washington, DC 20001.

Annex A, “Toxicology Review and Evaluation Procedures,” to NSF/ANSI 61 does not stipulate a 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 Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA C500 does not address additives requirements. Thus, 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.

II. Special Issues.

II.A. Field Testing and Operating Gate Valves at High Pressure.

II.A.1 Field-testing limitations. ANSI/AWWA C500 provides for hydrostatic pressure and leakage testing of the valves at the manufacturer’s plant. If field testing of the pipe system in which valves are installed requires that the valves hold against higher pressures than their rated working pressures, the purchaser should recognize that the excess test pressure may cause seat leakage in excess of that specified in ANSI/AWWA C500 and should consider this when evaluating the field-test results. It should be recognized that wear or foreign materials may damage valve seating surfaces and may cause leakage in excess of that specified in ANSI/AWWA C500. In no case should the field-test pressure applied to the valves be greater than twice the lowest rated working pressure of the valves, since component parts may be excessively stressed or deformed, nor should the valves be opened or closed during the field test against differential pressures exceeding the rated working pressures of the valves.

II.A.2 Operation under full-flow discharge or emergency conditions. When valves larger than 12-in. (300-mm) NPS* are intended for continuous operation under full-flow discharge conditions of the magnitude that might occur when a water main breaks, with differential pressures approaching the rated pressures of the valves, special design and construction may be required. Before specifying such special design and construction, the purchaser should review the operating conditions and special requirements with the valve manufacturer.

* Nominal pipe size.

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.* The following items should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C500, Metal-Seated Gate Valves for Water Supply Service.
2. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required.
3. Quantity required.
4. Size and type of valve (Sec. 1.1).
5. Intended position of valve (Sec. 1.1).
6. If catalog data, net weight, and assembly drawings are to be provided by the manufacturer (Sec. 4.1).
7. Details of other federal, state, local, and provincial requirements (Sec. 4.2.1).
8. If records of tests listed in Sec. 4.2.4 and Sec. 5.1 are to be provided.
9. If the piping system in which the valve or valves are to be used carries water that promotes galvanic corrosion and requires the use of alternative materials, as described in Sec. 4.2.3.
10. Whether the valve will be subjected to water that reacts chemically with materials used in these valves. Consultation with the manufacturer is advised to determine the suitability in cases of doubt (Sec. 4.2.4.3.3).
11. Other coating requirements (Sec. 4.2.4.9).
12. Cutter diameter must be specified for tapping valves (Sec. 4.3.2).
13. Whether bolting material with physical and chemical properties other than ASTM* A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength, is required (Sec. 4.4.2). It is recommended that the purchaser verify with the supplier the appropriateness of any alternative bolting materials required.
14. Bell dimensions or outside diameter of pipe for valves 16-in. (400-mm) NPS or larger (Sec. 4.4.3.1.2), if deviating from Table 3.
15. Type of valve ends—bell (Sec. 4.4.3.1), flanged (Sec. 4.4.3.2), tapping-valve flange (Sec. 4.4.3.3), mechanical joint (Sec. 4.4.3.4), or push-on joint (Sec. 4.4.3.5).
16. Spot-facing, if required (Sec. 4.4.3.2.1).

* ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

17. Orientation of the bolt holes in mechanical-joint flanges (Sec. 4.4.3.4). The common practice is to have the bolt holes straddle the vertical centerlines of valves, fittings, and hydrants. If another orientation is known to be necessary, it should be specified.

18. Solid bronze discs (gates), if required (Sec. 4.4.4.1).

19. Method of fastening gate rings, if not in accordance with Sec. 4.4.4.2.

20. Type of stem seal—stuffing box or O-ring (Sec. 4.4.10 and 4.4.11.1).

21. What rustproofing alternative, for bolts and nuts if any, is desired (Sec. 4.4.2 and Sec. 4.4.12.3).

22. Detailed description of wrench nuts and handwheels, if the ones used are not in accordance with Sec. 4.4.13.

23. Direction in which handwheel or wrench nut shall turn to open (Sec. 4.4.13.2).

24. Gears, if required (Sec. 4.4.14).

25. Gray-iron gears, if required (Sec. 4.4.14.1).

26. Type of gear case to be provided—extended type or totally enclosed type (Sec. 4.4.15).

27. Position indicator, if required (Sec. 4.4.16).

28. Bypass, if required (Sec. 4.4.17), and its location.

29. If a special interior or exterior coating is required (Sec. 4.5.2).

30. If the hydrostatic test at twice the rated pressure is to be held for a specified period of time (Sec. 5.1.3.1).

31. Special cast markings, if required (Sec. 6.1).

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

At the time this edition of ANSI/AWWA C500 was approved, the US Environmental Protection Agency (USEPA) had enacted regulations to reduce quantities of asbestos fiber in the workplace and in the ambient air, thus lowering exposure of the general public to the health risks associated with asbestos inhalation. Language in this standard no longer references the use of asbestos packing and gasket materials. Users of ANSI/AWWA C500 should comply with USEPA, state, provincial, and local actions regarding asbestos and consider the implications of using various alternative gasket and packing materials as listed in this standard.

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

IV. Major Revisions. The major revisions in this edition of ANSI/AWWA C500 include the following:

1. Editorial changes to conform to current AWWA form and content.

2. Permitting the use of stainless-steel stems and reduced-thickness ductile-iron flanges.
3. Addition of stainless steel as a stem material.
4. Addition of a “nonintegral thrust collar” for stems in NRS valves.
5. Addition of aluminum-bronze and silicon-bronze copper alloys.
6. Provision for reduced flange thickness for end flanges of ductile-iron flanged valves.
7. Addition of 14-in. and 18-in. valve sizes.
8. Addition of metric fasteners and socket head fasteners.

V. Comments. If you have any comments or questions about this standard, please call the AWWA Volunteer and Technical Support Group at 303.794.7711, FAX at 303.795.7603, write to the group at 6666 West Quincy Avenue, Denver, CO 80235-3098, or e-mail the group at standards@awwa.org.



American Water Works
Association

ANSI/AWWA C500-09
(Revision of ANSI/AWWA C500-02)

AWWA Standard

Metal-Seated Gate Valves for Water Supply Service

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes iron-body, brass-mounted, nonrising-stem (NRS) gate valves, including tapping gate valves, 3-in. (75-mm) NPS through 48-in. (1,200-mm) NPS, and outside screw and yoke (OS&Y) rising-stem gate valves, 3-in. (75-mm) NPS through 24-in. (600-mm) NPS, with either double-disc gates having parallel or inclined seats, or solid-wedge gates. These valves are suitable for use in approximately level settings in water systems. These valves are intended for applications where fluid velocities do not exceed 16 ft/sec (4.9 m/sec) when the valve is in the fully open position.

1.1.1 *Valve pressure ratings.* The minimum design working water pressure shall be 200 psig (1,380 kPa) for valves 12-in. (300-mm) NPS and smaller, and 150 psig (1,050 kPa) for valves with diameters of 14-in. (350-mm) NPS and larger.

1.1.2 *Conditions and materials not described.* This standard is not intended to describe special conditions of gate-valve installation or operation such as built-in power drive, installation in unusually corrosive soil, conveyance of unusually corrosive water, excessive water hammer, or operation in a throttled position. Such conditions are beyond the intended scope of this standard and require special consideration in design and construction. Joint accessories for end connections, such

as bolts, gaskets, glands, follower rings, and so forth, are not described in this standard.

Sec. 1.2 Purpose

The purpose of this standard is to provide purchasers, manufacturers, and suppliers with the minimum requirements for metal-seated gate valves for water supply service, including materials, design, testing, inspection, rejection, marking, and shipping.

Sec. 1.3 Application

This standard can be referenced in specifications for purchasing and receiving metal-seated gate valves for water supply service. The stipulations of this standard apply when this document has been referenced and then only to metal-seated gate valves for water supply service.

SECTION 2: REFERENCES

This standard references the following documents. In their latest editions, these documents form a part of this standard to the extent specified within the standard. In any case of conflict, the requirements of this standard shall prevail.

ANSI/AWWA C110/A21.10—Ductile-Iron and Gray-Iron Fittings.

ANSI/AWWA C111/A21.11—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

ANSI/AWWA C509—Resilient-Seated Gate Valves for Water Supply Service.

ANSI/AWWA C515—Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.

ANSI/AWWA C550—Protective Interior Coatings for Valves and Hydrants.

ASME[†] B16.1—Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, and 250.

ASME B18.2.1—Square and Hex Bolts and Screws (Inch Series).

ASME B18.2.3.1M—Metric Hex Cap Screws.

ASME B18.3—Socket Cap, Shoulder, and Set Screws, Hex and Spline Keys (Inch Series).

ASME B18.3.1M—Socket Head Cap Screws (Metric Series).

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

† ASME International, Three Park Avenue, New York, NY 10016.

ASTM* A27—Standard Specification for Steel Castings, Carbon, for General Application.

ASTM A126—Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

ASTM A153—Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A276—Standard Specification for Stainless and Heat Resisting Steel Bars and Shapes.

ASTM A307—Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

ASTM A380—Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.

ASTM A395—Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

ASTM A473—Standard Specification for Stainless Steel Forgings.

ASTM A536—Standard Specification for Ductile Iron Castings.

ASTM A582—Standard Specification for Free Machining Stainless Steel Bars.

ASTM A743/A743M—Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.

ASTM B16—Standard Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines.

ASTM B62—Standard Specification for Composition Bronze or Ounce Metal Castings.

ASTM B98—Standard Specification for Copper Silicon Alloy Rod, Bar, and Shapes.

ASTM B124—Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes.

ASTM B138—Standard Specification for Manganese Bronze Rod, Bar, and Shapes.

ASTM B148—Standard Specification for Aluminum-Bronze Sand Castings.

ASTM B154—Standard Test Method of Mercurous Nitrate Test for Copper and Copper Alloys.

ASTM B283—Standard Specification for Copper and Copper-Alloy Die Forging (Hot Pressed).

* ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.