ANSI/AWWA C500-19
(Revision of ANSI/AWWA C500-09)

American Water Works Association

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AWWA Standard

Metal-Seated Gate Valves for Water Supply Service

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AWWA Standard

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Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

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 ANSI/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 Section 17 and Section 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

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

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
C500-19	Jan. 24, 2019

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 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. 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.

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 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, P.O. Box 130140, 789 North Dixboro Road, Ann Arbor, MI 48105.

‡ Both publications available from The National Academies Press, 500 Fifth Street NW, Keck 360, 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 closed or operated 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) 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.

II.A.2.1 Special consideration should be given to packing a valve or replacing its stem seal while under pressure. Even though the valve design is required to facilitate

these work procedures, it may contravene state or local agency occupational health and safety regulations. It is recommended whenever possible that adjacent sections of the water system be depressurized before performing in situ work on a valve.

II.A.3 Bypasses. Gate valves may need high opening torques when pressure on each side of the valve is unbalanced. That is particularly true for large diameter gate valves complying with this standard, which is why integral bypasses are typically recommended with those sizes. Before specifying valves with or without bypasses, the purchaser should review operating conditions and torques with the manufacturer. An integral bypass is recommended for large sizes, unless the system design already includes a non-integral bypass.

In some applications, a power actuator may effectively address high opening torques without requiring a bypass, but this may necessitate valve design considerations beyond minimum requirements of this standard given potential stress and wear of components.

II.B *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, 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.

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 information should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C500, Metal-Seated Gate Valves for Water Supply Service, of latest revision.
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. Working pressure of valve (Sec. 1.1).

7. Whether catalog data, net weight, and assembly drawings are to be provided by the manufacturer (Sec. 4.1).

8. Details of federal, state, and local requirements (Sec. 4.2.1).

9. If records of tests listed in Sec. 4.2.4 and 5.1 are to be provided.

10. 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.

11. 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).

12. Other coating requirements (Sec. 4.2.4.9). Supplemental information regarding valve coating application and quality control testing are described in ANSI/AWWA C550.

13. Cutter diameter must be specified for tapping valves (Sec. 4.3.2).

14. Whether 54-in. (1,350-mm) and larger valves shall have a reduced or full-size waterway (Sec. 4.3.2, Table 2).

15. Whether bolting material with physical and chemical properties other than ASTM* A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 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.

16. Type of valve ends—hub (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), push-on joint (Sec. 4.4.3.5), or grooved and shouldered joint (Sec. 4.4.3.6).

17. Bell dimensions or outside diameter of pipe for valves 16 in. (400 mm) or larger (Sec. 4.4.3.1.2), if deviating from Table 3.

18. Spot facing, if required (Sec. 4.4.3.2.1).

19. 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

32. If the hydrostatic test at twice the rated pressure is to be held for a specified period of time (Sec. 5.1.2.2).

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

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

1. A note to the user on packing a valve or replacing its stem seal while under pressure has been added to the foreword (II.A.2.1).

2. A note to the user on bypasses has been added to the foreword (II.A.3).

3. A note to the user on chlorine and chloramine degradation of elastomers has been added to the foreword (II.B).

4. A purchaser option has been added regarding whether 54-in. (1,350-mm) and larger valves shall have a reduced or full-size waterway (III.A, item 14).

5. The standard has been expanded to include sizes up to 72 in. for nonrising-stem (NRS) gate valves and outside screw and yoke (OS&Y) rising-stem gate valves. Values for these sizes have been added to the relevant tables (Sec. 1.1, Tables 1, 2, 3, 6, 7, 8, 10, 12, and 13).

6. Information regarding applicability of the standard to wastewater applications has been added (Sec. 1.3.1).

7. Definitions have been added for grooved and shouldered joint, nominal valve size, potable water, reclaimed water, and wastewater. The definition of nominal pipe size has been expanded (Sec. 3).

8. A requirement for valves used in potable water service to be certified to ANSI/NSF 61 has been added (Sec. 4.2.1).

9. Table 1 has been simplified.

10. The size of waterway section has been clarified for requirements for full waterway clearance and reduced waterway clearance, and a new table with waterway clearance requirements has been added (Sec. 4.3.2 and Table 2).

11. A section clarifying laying lengths of flanged valves 12 in. (300 mm) and smaller has been added (Sec. 4.4.3.2.3).

12. A section on grooved and shouldered end joints has been added (Sec. 4.4.3.6).

13. Additional alloys have been added for stem nuts, gates, and body seat rings (Table 4).

14. Stainless steel has been added as a material for guides (Sec. 4.4.7.1) and rollers (Sec. 4.4.8.1.2).

15. Stem diameter requirements have been clarified (Sec. 4.4.9.4).

16. Proof of design leakage testing has been removed (Sec. 5.1.1).

17. The marking requirements have been updated to include marking of "C500" on valves (Sec. 6.1).

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

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AWWA Standard

Metal-Seated Gate Valves for Water Supply Service

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes iron-body, metal-to-metal seated, nonrising-stem (NRS) gate valves, including tapping gate valves, 3 in. (75 mm) through 72 in. (1,800 mm), and outside screw and yoke (OS&Y) rising-stem gate valves, 3 in. (75 mm) through 72 in. (1,650 mm), with either double-disc gates having parallel or inclined seats, or solid-wedge gates. These valves are suitable for use in approximately level settings within 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 (1,379 kPa) for valves 12 in. (300 mm) and smaller, and 150 psig (1,034 kPa) for valves with diameters of 14 in. (350 mm) 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