

ANSI/AWWA **C520-24**
(Revision of ANSI/AWWA C520-19)

AWWA Standard

Knife Gate Valves, Sizes 2 In. (50 mm) Through 96 In. (2,400 mm)

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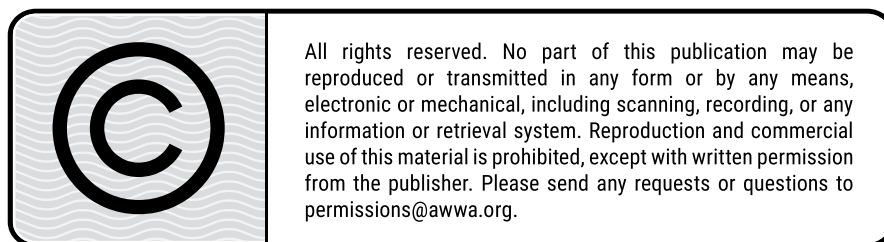
AWWA Standard

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C520.*

I. Introduction.

I.A. *Background.* Knife gate valves are generally used for isolation of pipes in water and wastewater treatment plants. Knife gate valves can be metal or resilient seated, bidirectional, or unidirectional.

I.B. *History.* The need for standardization of knife gate valves was recognized by the American Water Works Association (AWWA) in 2007, resulting in the formation of a standards committee. Subsequent revisions of C520 were approved by the AWWA Board of Directors on June 20, 2010; June 8, 2014; and Feb. 1, 2019. This edition was approved on June 8, 2024.

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. 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 372, Drinking Water System Components—Lead Content; and NSF/ANSI/CAN 600, Health Effects Evaluation and Criteria for Chemicals in Drinking Water.

* American National Standards Institute, 1180 Avenue of the Americas, 10th Floor, New York, NY 10036.

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

‡ NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

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

3. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,⁴ 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 jurisdiction. 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 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.

ANSI/AWWA C520 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.

In an alternative approach to inadvertent drinking water additives, some jurisdictions (including California, Maryland, Vermont, and Louisiana at the time of this writing) are calling for reduced lead limits for materials in contact with potable water. Various third-party certifiers have been assessing products against these lead content criteria, and a new ANSI-approved national standard, NSF/ANSI 372, Drinking Water System Components—Lead Content, was published in 2010. An updated version, NSF/ANSI/CAN 372, was published in 2022. 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 these products meet a weighted average lead content of not more than 0.25 percent.

⁴ Both publications available from The National Academies Press, 500 Fifth Street NW, Keck 360, Washington, DC 20001.

II. Special Issues.

II.A. *General.* Conditions under which a valve is to be operated must be evaluated carefully by the purchaser. The evaluations must include the determination of the hydraulic characteristics of the system in which the valve will be installed and the operation of the valve, including (1) the maximum transient and static differential pressure across the valve gate and (2) flow through the valve under the most adverse operating conditions. Torque and thrust requirements for valve operation vary considerably with differential pressure across the valve, fluid velocity, and fluid temperature. Knife gate valves are not intended for throttling service.

Shutoff direction is important in the installation and use of a knife gate valve. The valve's performance and sealing characteristics vary with direction of sealing. A manufacturer may designate a recommended high-pressure sealing side for long-term reliability.

Installation: Knife gate valves may have protrusions in the bonnet area that may come in contact with oversize mating flanges. The top works of the valve may be significant and should be considered when designing the piping system. While knife gate valves are commonly provided with port flange bolt patterns (number of bolts, bolt size, bolt circle, etc.) that dimensionally match ANSI/AWWA C207, ANSI/AWWA C606, ASME** B16.1, ASME B16.5, ASME B16.42, MSS-SP44, or ASME B16.47 flange bolt patterns to facilitate installation, they are not designed to handle the same torque requirements of a Class 150 flange. With a lower nominal pressure rating, narrow face-to-face dimension, and thinner body flanges, a knife gate body may distort if subjected to the full torque values of a Class 150 flange, causing irreparable damage. Refer to manufacturer's recommended flange torque values and recommended installation instructions.

Use of nontraditional flanging arrangements may exceed normal knife gate design criteria. Refer to manufacturer's recommended installation instructions.

Gasket selection has a bearing on potential flange torques. Refer to manufacturer's recommended installation instructions.

Manual Actuation: Due to long linear travel during gate stroking, large knife gate valves require many rotations of handwheels or chainwheels with high rimpull force. This may be impractical and may fatigue operating personnel. It may be advisable to specify 2-in. nuts on input shaft of bevel gear actuators to allow use of powered torque devices.

** ASME International, Two Park Avenue, New York, NY 10016.

However, powered devices may over-torque valves and/or actuators at the ends of the stroke if the devices are not properly sized. When powered devices are employed, torque-limiting devices or declutching mechanisms set at 300 ft-lb (406 N-m) should be considered.

Permeation: The selection of materials is critical for potable water, wastewater, and reclaimed water service and distribution piping systems in locations where there is a likelihood the piping system will be exposed to significant concentrations of pollutants composed of low-molecular-weight petroleum products or organic solvents or their vapors. Documented research has shown that piping system materials—such as polyethylene, polybutylene, polyvinyl chloride, and asbestos cement—and elastomers used in gaskets and packing glands are subject to permeation by lower-molecular-weight organic solvents or petroleum products. If a potable water, wastewater, or reclaimed water piping system must pass through such a contaminated area or an area subject to contamination, consult the manufacturer regarding permeation of pipe walls, valve components, jointing material, and other piping system components before selecting materials for use in that area.

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.

II.C. *Advisory Information on Product Application.* This standard does not describe all possible applications or manufacturing technologies. The purchaser should identify special requirements and required deviations from this standard and include appropriate language in purchase documents. Refer to Sec. III.A in this foreword. Other advisory information is as follows.

1. The maximum anticipated fluid velocity through the valve, maximum nonshock operating pressure, water temperature range, and valve classification are used by manufacturers to calculate torque and thrust requirements, which then may

determine valve operating-component design and actuator sizing. This information should be provided according to items in Sec. III.A in this foreword.

2. The direction of shutoff and whether it is uni- or bidirectional can affect valve design.

3. There is no standard for valve laying lengths for valves larger than 36 in. (900 mm). Laying lengths should be provided by the supplier on certified drawings (Sec. 4.1.1.1) for the contract.

4. Whether the valve is to be provided with or without a bonnet.

5. Some actuators may produce sufficient torque that may damage the valve if the valve is prevented from closing because of an obstruction in the pipeline. Preventive measures such as torque-limiting devices or shear pins and keys are beyond the scope of this standard.

6. Metal-seated knife gate valves are typically designed as unidirectional valves with a single seat and a preferred direction of flow for pressure-assisted downstream shutoff of the system. The metal-seated valve design makes use of the differential pressure across the valve gate to assist in obtaining a seal around the perimeter of the gate by forcing it against the metal seat. At lower differential pressures, it is difficult to achieve an adequate shutoff given the rigidity of the mating metal seat surfaces. As the pressure differential across the valve increases, the seat leakage decreases as the rigidity of the metal mating seat surfaces begins to yield until an acceptable rate of 40 cc/in. of valve diameter/min can be attained. The pressure differential where this leakage rate can consistently be achieved is typically 40 psi but can vary with different valve sizes. At pressures below 40 psi, the leakage rate of a metal-seated knife gate valve cannot be predicted with any certainty.

II.D. *Advisory Information on Scheduling Requirements.* Valves made in accordance with this standard in large sizes are not production-run products. They are custom designed and manufactured for the specific application. As a consequence of this, the valve manufacturers may require more time than usual for large valves to develop bid prices, prepare valve designs, submit shop drawing data, manufacture the valve, and shop test the valve. The purchaser should discuss schedule requirements with manufacturers in advance of placing orders or advertising for bids.

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.