

# Knife Gate Valves

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American Water Works  
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AWWA Reference Standard C520-19



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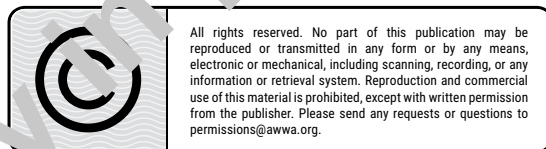
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# Preface

This manual presents the general practice for selection and installation of manual and automated knife gate valves for use in water and wastewater applications. This is a manual of recommended practice, not an AWWA standard. This document is intended to provide information and guidance on typical knife gate valves and their intended application. Questions about specific installations or applicability to specific applications not addressed in this manual should be directed to the manufacturer or supplier.

Information contained in this manual is useful for operators, technicians, and engineers to gain a basic understanding of the use and application of manual and automated knife gate valves. There are many variations of knife gate valves that may exceed the scope of this manual and require special consultations with the manufacturer to determine the associated application requirements. The valves' operational and design information is generic, and actual data from the intended valve manufacturer should be obtained before making the final selection of any type of knife gate valve and its options. This manual supplements information on the knife gate valves listed in ANSI/AWWA Standard C520 of latest edition: Knife Gate Valves, Sizes 2 in. (50 mm) Through 96 in. (2400 mm).

AWWA standards are available for purchase by calling (800) 926-7337 or online at <https://www.awwa.org/publications>.

Manufacturers graciously provided valve illustrations and other documentation. AWWA does not endorse any manufacturer's products, and the names of the manufacturers have been removed from the material provided.

Metrification Note: Valves are listed in their current US designation (in.) and the equivalent nominal metric designation (mm). To obtain the actual metric equivalent, use a conversion factor of 25.4 mm per inch.

# Committee Personnel

The AWWA Standards Committee on Knife Gate Valves, which developed this manual, had the following personnel at the time of approval.

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# Introduction

AWWA knife gate valves are a versatile design. They are manufactured in wafer, lug, and flanged body configurations from various materials. Designs are available with nonadjustable packing in bonneted-style valves and adjustable packing glands in nonbonneted-style valves. AWWA designs provide superior performance and reliability over conventional valve designs because of requirements for low- and high-pressure valves used in various applications associated with the water works industry. Knife gate valves are used in liquid and suspended solids handling. They are also used for flow isolation as well as throttling/control duties under certain operating conditions in modified configurations available from some manufacturers.

Most knife gate valve applications involve relatively low pressures, typically 150 psig (10 bar) or less; however, special designs are used up to 300 psig (20 bar) and higher (e.g., AWWA Class 300). Because of some standard constructional features, knife gate valves in double-seated configurations and selected packing material can handle major temperature fluctuations that may seriously damage or hamper the function of other valve designs or resilient-seated valves.

## HISTORY

Simple gate valves date back to ancient times in Greek and Roman water and irrigation systems. These gates were mostly operated by manual levers or screws.

The first modern knife gate valve, simply known as the gate valve, was produced in Germany in 1881. Knife gate valve mass production started around 1928, primarily for the pulp and paper industry. The name “knife” gate valve has been used in conjunction with the thinner, round, beveled leading edge of the gate to distinguish this valve from the common wedge gate valve. The first generation of knife gate valves came with a bottom-draining pocket. Soon after, standard valves from most manufacturers were made without a bottom pocket and only in rising stem configurations. The name “pulp valve” was commonly associated with today’s knife gate valve, which at the time was available in diameters of 3 in. (75 mm) up to 24 in. (600 mm).

During the initial manufacturing years of the early 1900s, the valve was available only with cast iron bodies. Leakage was common in these earlier models, which only employed metal-seated configurations. (Newer models now offer unidirectional and bidirectional resilient seating at low and high pressures with zero leakage capabilities.)

A degree of control functionality was then incorporated into the valve. Many knife gate valves are operated with lever, handwheel, chainwheel, and bevel gear manual actuators (see Figure 1-1). Powered actuators, either cylinder or electric, are also used regularly in many industrial applications for knife gate valves, including the paper, oil, gas, and power industries.

## PURPOSE

This manual will explain fundamental concepts and operation of knife gate valves, providing users with a technical background to understand, specify, and install knife gate valves in applications for which they are intended. The information in this manual should be used in conjunction with data from valve manufacturers to select valves and their associated actuation for a given application.

For isolation and control applications, actuator sizing parameters such as thrust will be explained in detail so that the sizing methodologies recommended by valve manufacturers can be applied. It is also important to understand how certain valve



Source: Elite Valve

**Figure 1-1** Typical bonnetless knife gate valve