



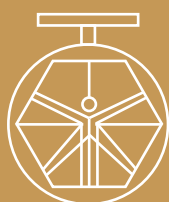
KNIFE GATE VALVES

THAT SATISFIES



GROUP

800



DAVINCI
VALVES™



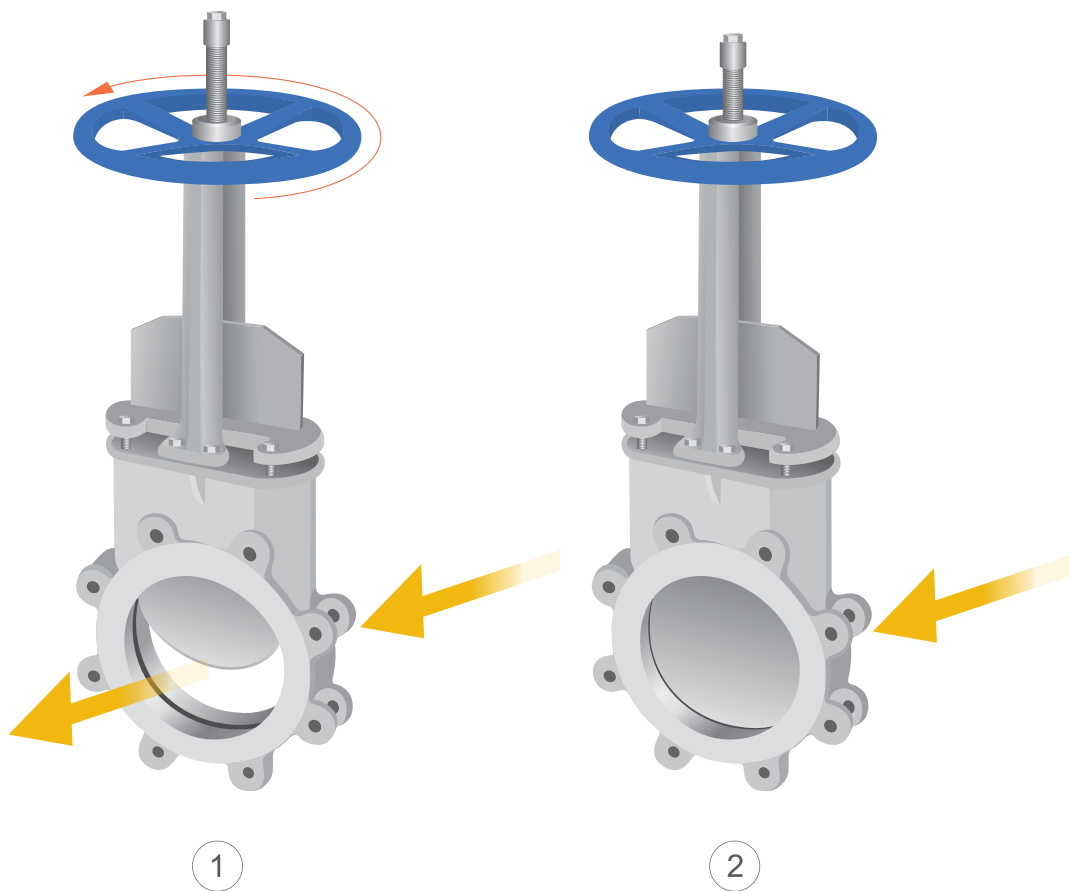
MANUFACTURE
BROCHURE



KNIFE GATE VALVES

Knife gate valves are designed mainly for on-off and isolation services in systems with high content of suspended solids. Knife gate valves are especially beneficial for handling slurry, viscous, corrosive and abrasive media.

The valves have a minimised pressure drop in fully open position, they are easy to actuate, they have a relatively low weight and are cost effective.



BASIC MOVEMENT ILLUSTRATIONS



Knife Gate Valve Classification.

A.) By Body Material:

Knife gate valves are constructed from a variety of materials.

Cast carbon steel, cast iron, ductile iron, gunmetal, nickel, alloy steels, stainless steel, and forged steels are examples of common materials used. The material used in gate valves is primarily determined by the fluid service and the design temperature.

1. Carbon Steel knife gate valve is a strong material of high hardness, tensile strength, and impact value. It is frequently used in industrial plants for high temperature/pressure operations.

Despite its high cost, **2. Stainless steel knife gate valve** has higher corrosion resistance, heat resistance, low-temperature resistance, and mechanical strength.

3. Lined valves are inherently thermally stable, chemically resistant, and have excellent mechanical properties. Because of its superior workability, it is possible to provide valve wet parts with fine lining without fear of pinholes. It is also recommended for food processing because it is colourless and does not require any additives or pigments.

B.) By Connection Type:

The end connection of the valve is primarily determined by the requirement and suitability of the valve, such as **1. Wafer type knife** gate valve and **2. Lug type knife** gate valve are used with less costly valves, **3. Flanged type end** is the most common of all kinds, and a gasket is used for sealing.

C.) By Sealing Method:

Prior to the introduction of the **1. Resilient seated knife** gate valve, **2. Metal seated knife** gate valves were commonly used. To ensure tight closure, the conical wedge construction and angular sealing devices of a metal seated wedge necessitate a dip in the valve bottom. Sand and pebbles are still trapped in the bore. Regardless of how well the pipe is flushed during installation or repair, the pipe system will never be totally free of impurities. As a result, any metal wedge would lose its ability to be drop-tight over time.

A resilient seated knife gate valve has a simple valve bottom that allows sand and pebbles to pass freely through the valve. If impurities pass through the valve as it closes, the rubber surface may close around the impurities. As the valve shuts, a high-quality rubber compound contains impurities, which are flushed away when the valve is opened again. The rubber surface would return to its original shape, ensuring a watertight seal.

D.) By stem Structure:

Knife gate valves are controlled by a threaded valve stem that connects the actuator (hand or motor) to the gate. They are categorized as **1. Rising** or **2. Non-rising stems** based on which end of the stem is threaded.

Rising stems are attached to the gate and rise and lower together as the valve is operated, providing a visual indicator of the valve's location. The nut-shaped actuator rotates around the threaded stem to lift or lower it.

The non-rising stem valves are threaded at the gate end and are attached to and rotate with the actuator. Because the motion of the gate is concealed within the valve, they often come with a pointer threaded to the upper end of the stem to demonstrate the location of the valve. Non-rising stems are used underground or in places where vertical space is limited.



Advantages and Benefits of Knife Gate Valves

1. Allows liquids to pass easily

Knife gate valves are full bore valves that allow liquids of any viscosity to pass through easily, and there are no cavities below the gate where the medium can accumulate.

2. Self-cleaned

The valves are self-cleaning since particles are forced off the gate when the valve is opened, and gate scrapers and deflector cones for impure or abrasive media can be supplied for additional packing gland protection. Furthermore, the top packing gland is normally replaceable, allowing the sealing to be replaced without disassembling the valve.

3. Easy Maintenance

Knife gate valves have a basic design that makes for easy maintenance.

4. Low Cost Installation

5. None flow direction limits

These valves can be bi-directional, allowing for installation with no limitations on flow direction.

6. Long Service life

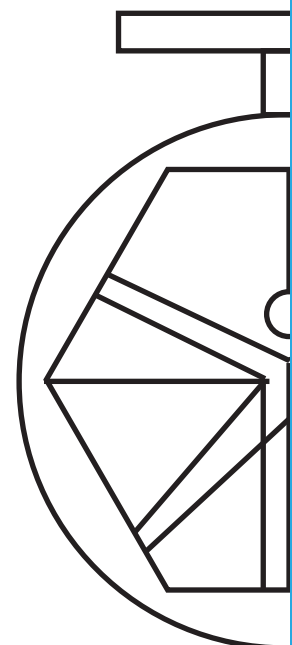
A protected seal, high-quality materials, and a complete, plain bore result in excellent performance and long service life.

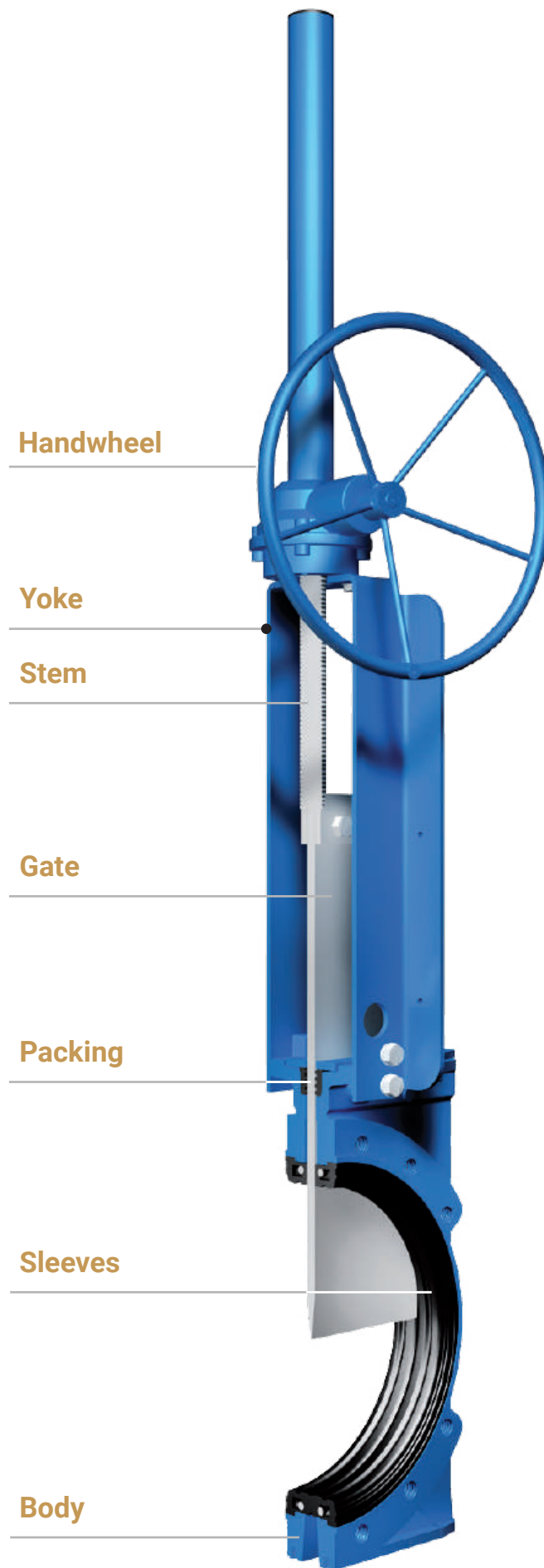
7. With DAVINCI VALVES

The best technical and quality additional service.

The advantages of knife gate valves are that **they're cheap, easy to actuate, and light**. One of the most notable disadvantages of knife gate valves is that they're known to have low-pressure limitations. This makes them less desirable for use in applications that require cleanliness or sanitary conditions.

You are kindly welcome to contact us anytime the projects of your needs are required.





COMPONENTS

Major components of a “typical” UNIDIRECTIONAL knife gate valve

The valve body

is typically made of cast iron, carbon steel, stainless steel and also exotic alloys, most common being cast iron and different grades of stainless steel.

The majority of manufacturers use cast body designs, mostly single-piece with some two-piece bolted-on as well. Stainless steel casting grades 304, 316 are most common; low carbon versions (304L, 316L, 317L etc), high temperature grades (310, 319, 320 etc), duplex grades (2205, 2507 etc), Alloy 20, Hastelloy C etc are also on offer from many manufacturers. Fabricated body designs are offered by few manufacturers in equivalent material grades, especially in special designs with low volume demands.

Body bonnets,

where offered, are made out of castings or are fabricated. Some of the designs have the valve bodies lined with rubber, Polyurethane, PTFE for better corrosion tolerance capabilities.

The valve gate is mostly made out of stainless steel (or higher alloys) plate, and finely ground and polished. Uni-directional knife gate designs feature a tapered closing edge (“knife”) on the gate and together with “jams” provided on the body, effecting the lateral movement towards the single-sided seat on the body during closure.

The valve seat

may be made from metal (integral or replaceable) or replaceable elastomer.

The clevis is used to connect the valve stem to the gate and is made of a casting or is fabricated.

The valve stem

is usually made of steel or stainless steel, produced from bar stock. Gland packing is typically PTFE or other synthetic fibre (aramid, nylon etc.), in the shape of a square braid and used in multiple layers around the gate and fitted into the packing chamber of the body.

Reinforced graphite is used in high temperature designs. For valves handling sticky media, a wiper layer (Copper braid, PTFE etc.) is sometimes used alongside the main packing.

Packing gland is usually made from cast ductile iron, steel or stainless steel with steel/stainless steel gland bolting.

Yoke or superstructure is offered both in cast and fabricated constructions.

The yoke sleeve that drives the valve stem is usually aluminum bronze or stainless steel (different grade from the stem to avoid galling).

The hand wheel is often cast, for which cast iron, ductile iron or steel are most often used. The rising stem is more common, but non-rising stem designs are also available, as are fabricated hand wheels.

The fasteners are generally made from steel or stainless steel.

BI-DIRECTIONAL slurry valves major components

They are generally similar in construction to the unidirectional but have some distinct features. Most of them have twin seats in a two-piece bolted body; few have a single piece body -some with body lining, few with a u-seal seat in the center. A wide variety of elastomers are used for seats (natural rubber, polyurethane, nitrile, chloroprene, viton, PTFE etc).

The gate usually does not have a “knife edge”, and even when present the sharp edge has a different function than in uni-directional knife gate valves.

Some have coatings/lining on the body for corrosion or erosion protection (urethane, rilsan). The gate may have a coating (hard chrome, xylan, PTFE etc) for smooth movement between elastomer seats.

Some designs do not have gland packing and in these cases fluid sealing is only achieved at the seats.

Most of these valves have large packing areas and sealing around the gate is never perfect. In view of this, standard knife gate or slurry valves are not recommended for services that demand extreme containment of media (like toxic materials). In these situations bonnetted versions of the valves are used.

Besides the handwheel, a variety of actuators (lever, gear, hand wheel, chain wheel, pneumatic, hydraulic and electric) are available for use with both types of valves.



Advantages and Benefits of DAVINCI SLEEVES

Open Position

In the open position, the gate is fully retracted outside the bore on top of the sleeves.

The sleeves are in contact and compressed against line pressure.

No metal components are in contact with the slurry.

The full bore design maximizes flow and minimizes turbulence and pressure drop.

The seal design has no cavities where solids can accumulate. Full gate closing is assured and seat damage is prevented.



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Closed Position

When closing, the gate travels through the sleeves, compressed against each other for a tight seal.

The geometry and hollow design, together with the chemical composition and the vulcanization process, make the rubber sleeves very flexible. This flexibility lowers the friction, reduces the operating torque and preserves their working life.

The double-seated design ensures a tight shut off in bidirectional flows.

The closing stroke is controlled to prevent excessive sleeves compression and stresses.



Seat / Sleeves

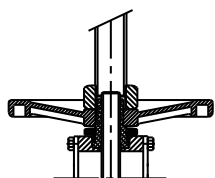
MATERIAL	MAX.TEMP. °C	APPLICATIONS
Natural Rubber	80	General
EPDM	120	Acids and non mineral Oils, Low temp.
Neoprene	90	Oils and Solvents
Nitrile	100	Hydrocarbons, oils, greases.

**All the sleeves are internally reinforced with a metallic core or other on request.

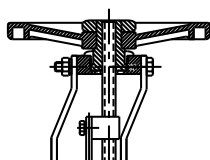
DAVINCI OPERATORS and Variety of Functionalities

We can supply our knife gate valves with the following operators

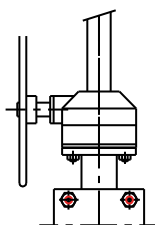
1. Manual Operators



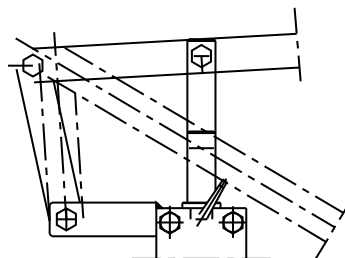
**Non - Rising Stem
Hand Wheel**



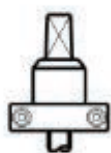
**Rising Stem
Handwheel**



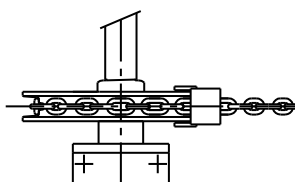
Gearbox



Quick Closing Lever

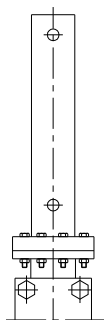


Key Cup

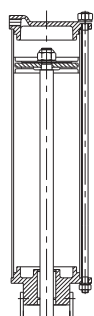


Chain Wheel

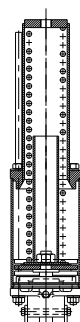
2. Automatic Operators



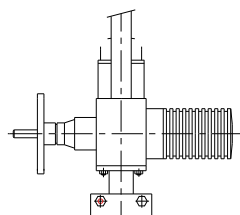
**Oil Hydraulic
Actuator**



**Double Acting
Pneumatic Actuator**



**Spring Return
Pneumatic
Actuator**



**Electric
Actuator**



In addition, end of travel limit switches, scrapers, closed bonnet (only for standard working pressures) and others, can all be supplied to the basic DAVINCI KNIFE GATE VALVES upon request.

Accessories & specials

A variety of accessories and optional constructional features are available for these valves.

Deflection cone: When uni-directional knife gate valves are used in abrasive slurry services, an accessory is generally recommended and used with the valve to protect the valve seat. This is called the deflection cone. It has a conical shape and is mounted between the valve inlet and the mating flange. These cones are made out of erosion resistant material (Ni-hard, polyurethane, stainless steel etc.) and direct the flow towards the centre of the valve and away from the seat.

Hard facing: Metal seated knife gate valves used with erosive materials (both slurries and powders) are sometimes provided with hard facing of valve parts that are subjected to erosive flow in the open condition. They include the valve seat, the gate edge and in some severe cases the flow bore as well. Welded-on hard facing such as stellite as well as plasma deposited hard layers are used.

Bore liner: Flow bore of the valves are sometimes protected from the flow by using bore liners made of polyurethane, rubber etc.

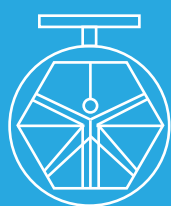
Purge ports: When valves are used in slurry or powder services, the solid components tend to settle near the stagnant areas around the seating, valve chest etc. Valves used in such services are provided with ports on the body through which a purge fluid can be injected in and used to clean the area around. Water is commonly used as purge fluid for slurries and air for pneumatically conveyed powders. The purge fluid would have to be at a slightly higher pressure than the process media.

Lockout: As many of these valves are used in remote locations, lockout devices are sometimes specified to be used to prevent unauthorized operation. Typical arrangements provide for locking the valve gate in the open, closed or either position as per application and safety requirements.

Extension: Many knife gate valves are installed in plants at locations with limited access. In such cases, extended stems with a hand wheel or chain wheel located close to the operating platforms are used. They are very common in the valves used, for example, in the water and sewage industry.

V-orifice: For the rare situations where throttling or control is needed, the unidirectional knife gate valve is offered with a v-orifice port instead of the usual round port. This provides an acceptable control valve characteristic and is popular in the pulp & paper industry, and with hard faced options, in some mining slurries as well.

Lever: For some applications where quick opening/closure is desired with small size valves, a lever mechanism is provided instead of the hand wheel.



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KNIFE GATE VALVES GENERAL PRODUCT DETAILS

The range of technology and manufacturing sophistication found in these valves vary widely, from valves designed to handle milder media to those that handle very severe service environments. In line with the same, size for size, the cost of these valves also vary in order of magnitude terms across designs.

Sizes:

Manufacturers of knife gate valves and slurry valves offer them in a wide range of sizes. The smallest size offered is usually 50mm (2 inch) and the largest valve made to date is possibly a 4300mm (168 inch) size valve - a bonneted knife gate valve made by Rovalve. While almost all manufacturers offer a minimum range of 50mm to 300mm, most of them offer a range of 50mm to 600mm.

Major manufacturers produce sizes of over 600mm, but these are few. Size ranges also depend on the design variants.

Pressure ratings:

Knife gate and slurry valves are generally low pressure valves.

The majority of these valves are designed to operate at CWP of 10 bar (150 psi) or less. Larger sizes often have very low pressure ratings of the order of 2 or 3 bar CWP.

However, some of the special designs are capable of high pressures and are available in ratings of ANSI 150lb / 300lb or higher. There are designs capable of handling 100 bar CWP as well, but these are limited in range and the need for such service requirements is rare.

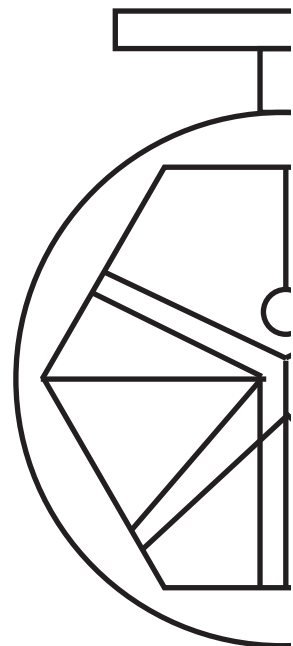
Standards:

The main standards that apply to knife gate & slurry valves are:

(1) Design – MSS SP-81, TAPPI TIS-408, NFPA-85 (2) Flange drilling – ANSI B16.5 150/300/600lb, DIN PN 10/16/40, BS-10 Table D/E/F, AS-2129 Table D/E/F, JIS 10K/20K, SABS 1123 Table D/E (3) Faceto-face – MSS SP-81, MSS SP-135, EN-558, and Proprietary.

In DAVINCI VALVES we work to offer you a wide range of quality knife gate valves which will fit perfectly for all your project requirements and needs.

Do not hesitate to contact us,
to ask for all technical details.



What is the difference between knife gate valves and gate valves?

Both the wedge type gate valves and the knife gate valves are primarily designed for on-off services where the valve is completely opened or completely closed. It is not recommended to use neither of these to regulate flow because when fluid pushes against a partially closed gate vibration occurs, and cavitation will eventually damage the seat and the body. Also, both valve types are designed to open and close slowly in order to reduce the risk of water hammer.

Both types can be used in applications involving:

- Slurries
- Heavy oils
- Non-flammable viscous fluids
- Wastewater
- Clean water

One of the differences between the gate and the knife gate valves, is that the knife gate valve often has a sharpened disc to better cut through slurry/viscous media. Also, the knife gate valve has a short face-to-face length compared to a gate valve, which is dimensionally wider. As a consequence, a knife gate valve is light weighted compared to a gate valve. **These are the main differences and probably two of the biggest advantages of the knife gate valve.**

Knife gate valves are typically found in wastewater treatment plants, chemical plants, mining, cement plants as well as in many other industrial applications while gate valves are typically found in drinking water mains, distribution networks and drinking water pump stations.



APPLICATIONS

Where are knife gate valves used?

Knife gate valves are designed to work in some of the harshest environments, typically having a sharpened blade to cut through heavy liquids.

They are especially useful in wastewater applications where corrosion is an important issue. So, in addition to the valve design optimised for slurry media, it is beneficial to have a knife made of acid-proof stainless steel as this makes it less susceptible to damages caused by corrosion and as a consequence it needs less frequent maintenance or even replacement.

Knife gate valves should only be used for applications requiring a completely open or completely closed position and should not be used to regulate flow unless they are designed for it. Whenever fluid is forced against a partially closed gate, there will be a vibration, gradually eroding the disc and seat. In addition, the knife gate valves are designed to slowly open and close to safeguard against the impacts of water hammer.



The most common applications of Knife Gate valves

1. Wastewater
2. Mining
3. Pulp and Paper Industry
4. Steel Industry
5. Power Solutions
6. Air Separation
7. Food Beverage



In Wastewater applications

there are several reasons for using stainless steel for components critical to proper function and thus ensure the long-term reliable function of a valve: Each time the valve is opened, the knife itself is cleaned by two scraper profiles integrated on both sides. These scrapers reduce unnecessary maintenance work, thus saving time and money.

An important issue in the wastewater sector is the problem of corrosion. Knife-gate valves having a knife made of stainless steel make the valve less susceptible to damage by corrosion caused by the medium and thus have to be serviced or replaced less frequently. Corrosion is not only the cause of more frequent maintenance intervals, but also involves a permanent failure risk of the valve as it prevents the valve from closing properly.

Check out more details through: www.davincivalves.com



In Mining applications

Abrasion, erosion and corrosion are the main challenges of slurry applications. Fluid handling equipment must be specifically designed and manufactured to operate under these conditions.

CONCENTRATION PLANTS

After crushing, the ore is conveyed to the concentration plant. When further reducing the particle size in the comminution area (crushers, high pressure grinding rolls, autogenous and semi-autogenous mills, ball mills, etc.), the produced slurries are usually of high solid concentration and large particle size. Special Knife Gate Valves are required.

In the cyclones, where the mineral ore is first separated based on size, the knife gate valves provides an exceptional performance due to particle size and concentration.

In the separation process based on particle type (usually flotation cells, also gravity separation or magnetic separation) where the particle size is small, knife gate valves has an excellent performance.

The concentrated mineral ore is then dewatered in the thickeners. Finally, the mineral goes through filtering (usually vacuum or press filters).



LEACHING PLANTS

After crushing and, in many cases, also milling as in the concentration plants, copper, gold, silver and many other metal ores are processed in leaching plants.

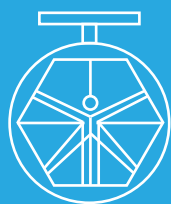
The valves are specifically designed to operate in corrosive environments to provide extended valve life and they are also a good solution for certain areas in pressure leaching or in high pressure and temperature leaching in autoclaves.

OTHER APPLICATIONS

Slurry pipelines: Knife Gate valves has been designed to operate with slurries at high pressure. Its heavy-duty construction allows to handle either tailing slurries or mineral ore concentrate slurries.

Process water: mines require large quantities of water for many different uses.





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MANUFACTURE

In DAVINCI VALVES we manufacture the best quality knife gate valves and our manufacture programm includes our technical service through all the different steps necessary to get your product just the way you need.

1

RAW MATERIAL



2 a

FOUNDRY 1.



2 b

FOUNDRY 2.



3 a

LASER CUTTING



3 b

MECANIZE



3 c

MECANIZE



4

TREATMENT



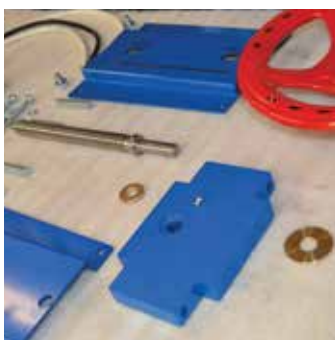
5

PAINTING



6 a

ASSEMBLY 1.



6 b

ASSEMBLY 2.



7

TESTING



8

PACKING



"Quality that satisfies"

KNIFE GATE VALVES



Ref. 800A

STANDARDS:

Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, JIS 10K, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 598
Transmission: manual, electric, pneumatic, hydraulic, electro hydraulic, gear

Ref. 801A

STANDARDS:

Type: Wafer, Lug
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, JIS 10K, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 581
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, electrohydraulic, gear

Ref. 820A

STANDARDS:

Type: Wafer
Design: MSS SP 81
Flange Standard: BS PN10/PN16
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox

Ref. 820A

STANDARDS:

Type: Wafer
Design: MSS SP 81
Flange Standard: BS PN10/PN16
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox

KNIFE GATE VALVES



Ref. 831

STANDARDS:

Type: Wafer
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, 10L, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox

Ref. 830

STANDARDS:

Type: Wafer
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, 10L, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic

Ref. 810A

STANDARDS:

Type: Wafer
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, JIS 10K, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic

Ref. 831A

STANDARDS:

Type: LUG
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, JIS 10K, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic

KNIFE GATE VALVES



Ref. 840

STANDARDS:

Type: Flange
Design: MSS SP 81
Flange Standard: Customize
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: hydraulic

Ref. 851

STANDARDS:

Type: Wafer
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, 10L, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic

Ref. 860

STANDARDS:

Type: Wafer, Flange
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, JIS 10K, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic

Ref. 861

STANDARDS:

Type: Wafer, LUG, Flange
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, JIS 10K, TABLE E/D
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic

KNIFE GATE VALVES



Ref. 870

STANDARDS:

Type: Square Flange
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, JIS 10K
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic

Ref. 880

STANDARDS:

Type: Flange
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB, 10K TE TD
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic

Ref. 860

STANDARDS:

Type: Wafer
Design: MSS SP 81
Flange Standard: DIN PN10, PN16, 150LB TE TD
Face to Face: MSS SP 81
Testing Standard: API 598
Operation: handwheel, electric, pneumatic, hydraulic, sprocket, gearbox, electrohydraulic



TESTING



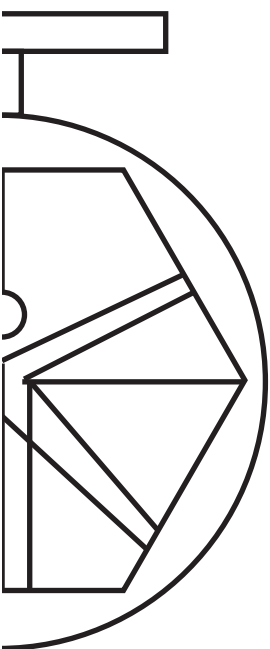
If you need specific certification for the different types of tests that verify the measurements, the quantities, the weights, in addition to the tests that check both, the components and the final product, this is the absolute guarantee service of DAVINCI VALVES LTD, through which it is ensured that the order sent to you is the one actually contracted.



The consumption of time, resources and efforts in the import process is overwhelming due to the complexity it requires and it is highly recommended to be advised by experts in this field. Avoiding possible delays and unnecessary complications you will have enough room to dedicate your time to matters of greater importance in your company. In DAVINCI VALVES LTD we offer you a personalized service adapted to your requirements.



While the import process lasts, you will know the status of your goods with all detailed information.



GROUP

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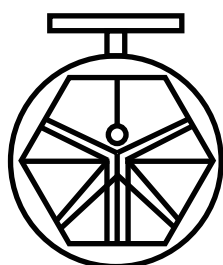
KNIFE GATE VALVES

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España: (0034) 616 553 797

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