

Options Index

Options Availability Guide..... 2

Replaceable Seats 3

Mating Flanges and Replaceable Seats 4

Dual Seats 4

Elastomer “D” Ring Seats for Conventional Knife Gate Valves 4

V-Port 5

Abrasion Protection, Metallic Components..... 6

Deflection Cones..... 6

Hard Seats and Gates 6

Live Loaded Packing..... 7

Back Seat 7

Chest Buttons..... 8

Centerline Buttons..... 8

Chest Liners 8

Backing Rings..... 9

Flush Ports 10

Gate Support Strip for Large Knife Gate Valves..... 10

Handwheels..... 11

E-Z Spin Handwheel 11

Extended Stems 12

Rimpull (Required Handwheel Force)..... 13

Chainwheel 14

Chainpull 14

Bevel Gear 14

Lever 14

Ratchet 15

Cylinder Actuators..... 15

Self Supporting Yokes 15

Alternate Stem Threads..... 15

Electric Actuators..... 15

Rod Boots 15

Locking Devices 16



ITT

ENGINEERED FOR LIFE

Options

Revision 5

Options Availability

Knife gate and slide gate valves are available with many options. The following chart defines availability by figure number.

OPTION	C33/ C133	C37	37L ¹	F39	C42	F44	C45	C67	C105	C132	C134	XS 150	ULV	DFV
"D" Ring Seat		X	X	X		X	X			X	X			X
Hard Faced Replaceable Seats		X		X	STD		X				X			
Hard Faced Integral SS Seats		X		X		X					X			
Poly Replaceable Seats		X		X			X		STD		X			STD
PTFE Replaceable Seats														
Rubber Replaceable Seats		X		X			X				X			
UHMW Replaceable Seats		X		X			X				X			
Dual Seats		X		X			X				X			STD
Bevel Gear	STD	X		X			X				X	X	X	X
Chainwheels	X	X	X	X		X	X	X	X		X	X	X	X
Cylinder Actuator ²	X	X	X	X		X	X	X	X		X	X	X	X
Self-Supporting Yokes	X	X	X	X	X	X	X	X	X		X	X	X	X
Electric Actuators	X	X	X	X	STD	X	X	X	X		X	X	X	X
E-Z Spin Handwheel	X	X	X	X	X	X	X	X	X		X	X	X	X
Handwheels	X	X		X		X	X	X	X		X	X	X	X
Lever Operator	X	X	X	X		X	X	X	X		X			
Ratchet		X					X		X	X	X	X	X	
Backing Ring	X	X	X	X		X	X	X	X	STD	X			
Centerline Buttons		X	X	X	STD	X					X			
Chest Buttons		X	X			X				X	X			
Chest Liners		X ³		X ³		X ⁴	X ³	X			X ⁵			
Cast Ni-Hard Deflection Cones ⁶	STD							X				X	X	
Fabricated Deflection Cones		X					X	X		X	X	X	X	
Epoxy Coating	X	X	X	X	X	X	X	X			X	X	X	X
Extended Stems	X	X	X	X		X	X	X	X	X	X	X	X	X
Extra Wedges	X	X	X	X		X	X	X	X	X	X			
Flush Ports		X	X		X	X					X			
Gate Support Strips	X ⁷	X		X	STD	X	X	X ^{4,8}		X	X			STD
Hard Faced Gate Edge	X	X	X	X		X					X			
Hard Gate Material		X		X		X	X		X		X	X	X	
Nickel-TFE Coated Gate	X	X		X	STD	X	X	X	X	X	X	X	X	
Live Loaded Packing	X	X		X		X	X	X	X	X	X			
Back Seat	X	X	X	X	STD	X	X	X	X	X	X			
Locking Devices	STD	X	X	X	X	X	X	X	X	X	X	STD	X	
Rod Boots	STD	X	X	X	X	X	X	X	X		X	X	X	
Thru Drilled Flanges		X	X	X	X	STD	X	X	X		X	X	X	
V-Port		X	X	X		X	X ⁹	X			X	X		

¹ The 37L is only available in sizes 30" and 36"

² Single and double acting

³ Not available 2" - 6"

⁴ 6" and larger only

⁵ Required on valves without wiper packing

⁶ Only available in sizes 3" through 16"

⁷ Standard on the C133

⁸ Chest only

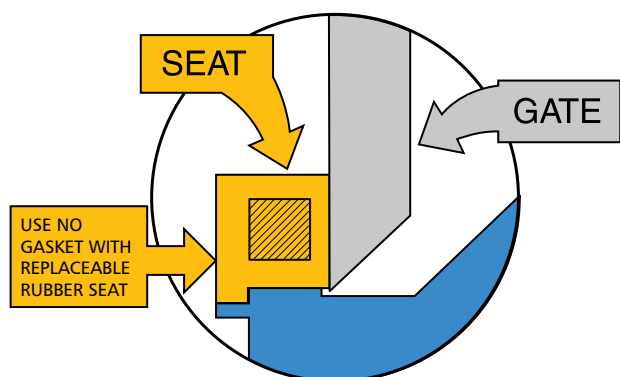
⁹ Only with replaceable Metal, PTFE or UHMW Seat

Replaceable Seats

The rugged Fabri-Valve replaceable seat is available in many different materials, and can be ordered in the following Fabri-Valve figure numbers:

C33, C37, C45D, C105, C133, C134, & F39

The Fabri-Valve Replaceable Seat is designed for tough applications. The thick section provides a wide seating area with the majority of the seating surface far removed from the abuse of the flow stream. While providing rugged service, the toughest services will eventually require replacement. **This seat design simply slips into the specially machined valve body and is held in place by the adjacent pipe flange.** End of service applications will require mating flange installation.



Polyurethane (RP) replaceable seats are designated "RP". Polyurethane is excellent in abrasive applications. A heavy steel internal reinforcing ring insures that the Polyurethane holds its shape and remains in place. The side with the Replaceable Polyurethane seat (RP) **does not** use a Flange Gasket. Maximum temperature is 170°F (77°C).

PTFE (RT) replaceable seats are designated "RT". The "RT" seat is machined from a solid piece of pure PTFE stock. No other knife gate valve offers a mechanically retained PTFE seat with a broad seating surface. The side with the Replaceable PTFE seat (RT) **does not** use a Flange Gasket. Maximum temperature is 400°F (204°C).

Ultra high molecular weight polyethylene (RW) replaceable seats are designated "RW", and are machined from a solid piece of UHMW stock. This rugged material is used for a wide variety of tough abrasive services. The side with the Replaceable UHMW seat (RW) **does not** use a Flange Gasket. Maximum temperature is 140°F (60°C).

* Figures 37, 45, 39, 105 and 134 that are ordered without the Replaceable Seat Option have valve bodies machined to standard, and WILL NOT accept Replaceable Seats in the field.

If field Replaceable Seats are desired with Figures 37, 45, 39, 105, or 134, please order the valves with a "Replaceable Seat Option" (the body will be machined to accept the Optional Replaceable Seat).

Rubber replaceable seats are also available in a wide variety of rubbers including Neoprene®, Viton®, Aflas®, Hypalon®, EPDM, Hycar® and HNBR. A heavy steel internal reinforcing ring insures that the rubber holds its shape and remains in place. The side with the Replaceable Rubber seat does not use a Flange Gasket.

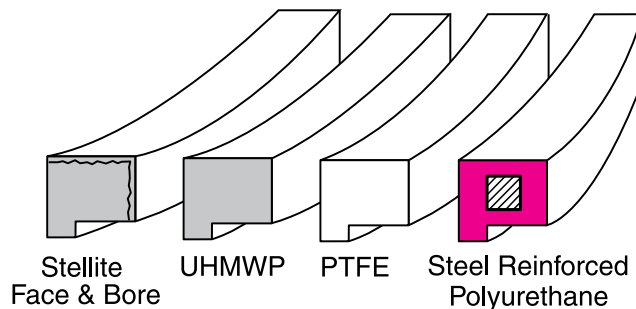
TEMPERATURE RATINGS FOR REPLACEABLE RUBBER SEATS	
Material	Maximum Temperature
EPDM (Ethylene Propylene Diene Monomer)	280°F (138°C)
Viton® (Fluorelastomer)	350°F (177°C)
Neoprene® (Chloroprene Rubber)	180°F (82°C)
Hycar® (Nitrile Rubber)	200°F (93°C)
Hypalon® (Chlorosulfonated Polyethylene)	275°F (135°C)
Aflas® (Fluorelastomer)	400°F (204°C)
HNBR (Hydrogenated Nitrile Butadiene Rubber)	280°F (138°C)

NOTE: ITT Engineered Valves reserves the right to substitute materials to achieve equivalent performance.

Hard faced (RH) replaceable seats are designated "RH", and are machined from a solid piece of steel (carbon steel for the C45D, and the same material as the body for all other valves). The seat face is overlaid with a cobalt based alloy (0.050" minimum finished thickness) with a hardness of approximately Rockwell C41. The seat I.D. can also be overlaid with a cobalt based alloy as an option. RH seats are used on difficult services, particularly when high temperatures of up to 1600°F (871°C) are involved. RH seats are supplied (with valves and as parts) with a 1/16" (1.6mm) thick gasket between the seat and the body, and also require a gasket between the body and the mating flange. Maximum temperature 750°F (399°C) with the standard gasket and 1600°F (871°C) with reinforced graphite. NOTE: Maximum temperature limit of the RH seat is dictated by the base material, see the technical section of the catalog for details.

Replaceable seats can also be supplied in F39 slide gate valves on a special order basis. Consult factory for shutoff criteria.

Caution: Replaceable seats must be retained by a mating pipe flange. System pressure must be relieved before servicing seats.



Options

Revision 5

Mating Flanges

Replaceable seats can be used with either flat or raised face mating flanges. When used in conjunction with rubber or urethane lined pipe non-metallic replaceable seats must be equipped with a 1/4" (6.4 mm) thick metal spacer. Consult factory for details. Metallic replaceable seats can be used with any type mating flange or pipe.

Dual Seats

Fabri-Valve can also supply knife gate valves with dual seats for bi-directional flow. Dual seats are available in all seat configurations. Recognize that a dual seated valve does not have the wedging action of a single seated valve, and therefore may not shutoff as well. Also, care must be taken to consider possible clogging of the space between the seats. This is a problem normally handled by flushing with air or liquid depending upon the system. For this purpose, flush ports are supplied as standard on double replaceable seated Fabri-Valve knife gate valves.

Dual seated valves are rated for full pressure in both directions.

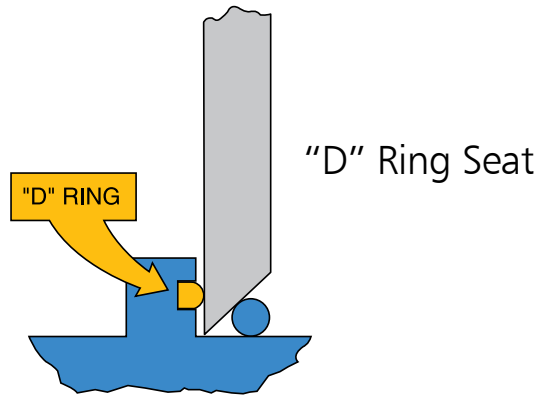
Note: Sizes 2" to 4" with dual "D" ring seals utilize a slip in second seat.

Caution: Dual seats create a trough between the seats that may collect solids. Consult the factory for use in services containing solids.

Elastomer "D" Ring Seats for

Conventional Knife Gate Valves

Resilient seats are used when tight shutoff is required. The basic resilient seat design consists of an elastomer "D" shaped ring recessed into the face of the valve seat. The "D" shape provides the maximum surface area for adhesive used to retain the ring, as well as maximum sealing surface. The temperature limit of the adhesive, 250°F (121°C), limits the temperature of this seat configuration regardless of the seat material. "D" rings furnished in valves 2"-4" in size are mounted in a removable stainless steel seat ring when dual seats are specified. In applications where adhesives are not suitable or where high temperatures are required, consider the replaceable elastomer seat or the C67.



FDA approved materials available on request.

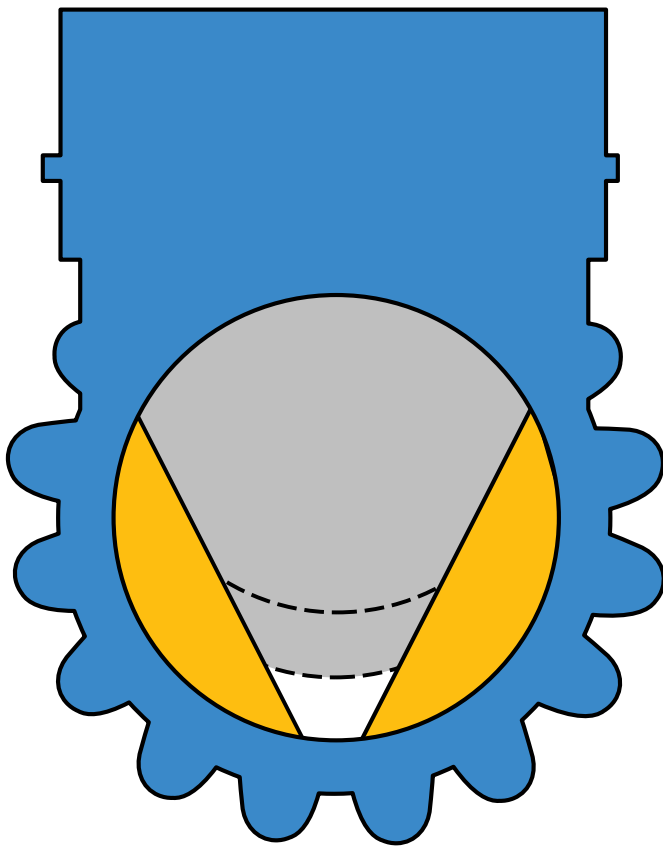
TEMPERATURE RATINGS FOR "D" RING SEATS	
Material	Maximum Temperature
EPDM (Ethylene Propylene Diene Monomer)	250°F (121°C)
Viton® (Fluorelastomer)	250°F (121°C)
Neoprene® (Chloroprene Rubber)	180°F (82°C)
Hycar® (Nitrile Rubber)	200°F (93°C)
Hypalon® (Chlorosulfonated Polyethylene)	250°F (121°C)
Aflas® (Fluorelastomer)	250°F (121°C)
HNBR (Hydrogenated Nitrile Butadiene Rubber)	250°F (121°C)

Aflas is a registered trademark of Asahi Glass Co., Ltd.
Neoprene and Hypalon are registered trademarks of DuPont
Hycar is a registered trademark of BF Goodrich

NOTE: ITT Engineered Process Solutions reserves the right to substitute comparable materials to achieve equivalent performance.

V-Port

This modified port opening allows a knife gate valve to be used for metering service, on suspended solids, with very little chance of the valve plugging. On standard knife gate valves, the port configuration in the nearly closed position, takes the shape of a crescent, which has a tendency to plug with suspended solids at the points of the crescent. The shape of the Fabri-Valve V-Seat eliminates this problem. The change in flow characteristics is not as significant as the reduction in plugging during the first stages of opening.



V- Port

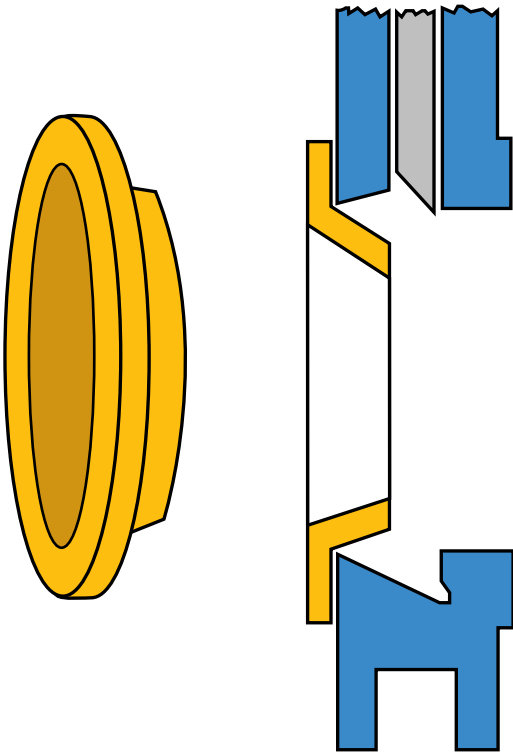
Options

Revision 5

Abrasion Protection, Metallic Components

The components of a knife gate valve that take the most abuse in abrasive services are the gate and the seat. Several options are available to help combat abrasion related problems:

1. Deflection Cones: A deflection cone is a metal cone clamped between the upstream valve flange and the adjacent pipe flange. The deflection cone, while only slightly reducing the valve port I.D., redirects flow away from the seat and protects the valves sealing surface. Deflection cones are easily replaced, at far less cost than replacing an entire valve.



The standard material for deflection cones in size 3" through 16" (DN 75-DN 400) is cast Ni-Hard. Ni-Hard is a rugged high nickel cast iron with a hardness of Rockwell C-58. Larger size deflection cones are fabricated from stainless steel and can be hardened by overlaying with Stellite 6® or tungsten carbide. When ordered with a valve, deflection cones are supplied with a gasket for use between the deflection cone and the valve body. A gasket is also required between the deflection cone and the mating flange.

2. Hardening the seats and gates: several different methods are available to harden the gate and seat surfaces. They all provide a much harder surface than the standard stainless steel, which is approximately Rockwell B80.

- A.** 17-4 PH stainless steel is a heat treated stainless steel used for gates. Gates made of 17-4 PH are hardened throughout to a hardness of approximately Rockwell C44. This material has good abrasion and impact resistance and good to excellent corrosion resistance. Maximum temperature rating is 900°F (482°C).
- B.** 400 series is a hard alloy steel, Rockwell hardness is C51. Abrasion resistance and corrosion resistance are excellent, and it has very good impact resistance. Maximum temperature rating is 900°F (482°C).
- C.** Stellite 6® is an alloy of cobalt-chromium and tungsten, which is overlaid on the surface by welding. The surface must then be machined to finish. Stellite® thickness is **0.050** inches minimum. Stellite® is usually used on the seat and/or leading edge of the gate. It is particularly effective when the gate must cut through fibers or chips by providing a durable sharp cutting edge. Stellite® provides a hardness of approximately Rockwell C41. Abrasion resistance is good, and it has excellent impact and corrosion resistance. Maximum temperature rating is 1600°F (871°C).
- D.** Tungsten carbide is a thin coating of approximately **0.010** inches in thickness that provides a hardness of approximately Rockwell C70. Abrasion resistance is excellent, corrosion resistance is good, and impact resistance is only fair. Maximum temperature rating is 1200°F (649°C).
- E.** Nitriding is a process of case (surface) hardening. The material to be hardened is heated in an atmosphere of ammonia or in contact with a nitrogenous material to produce hardness by absorption of the nitrogen. Nitriding can be used for gates and for seats by treating the entire body, reaching a hardness of approximately Rockwell C65. However, corrosion resistance is substantially reduced and the hardened layer is very thin. Impact resistance is poor.
- F.** Hard chrome is a thin layer (**0.003 inches**) of industrial hard chrome coating. Rockwell hardness is C52. Abrasion, corrosion, and impact resistance are good. Maximum temperature rating is 1000°F (538°C).

NOTE: ITT reserves the right to substitute comparable materials to achieve equivalent performance.

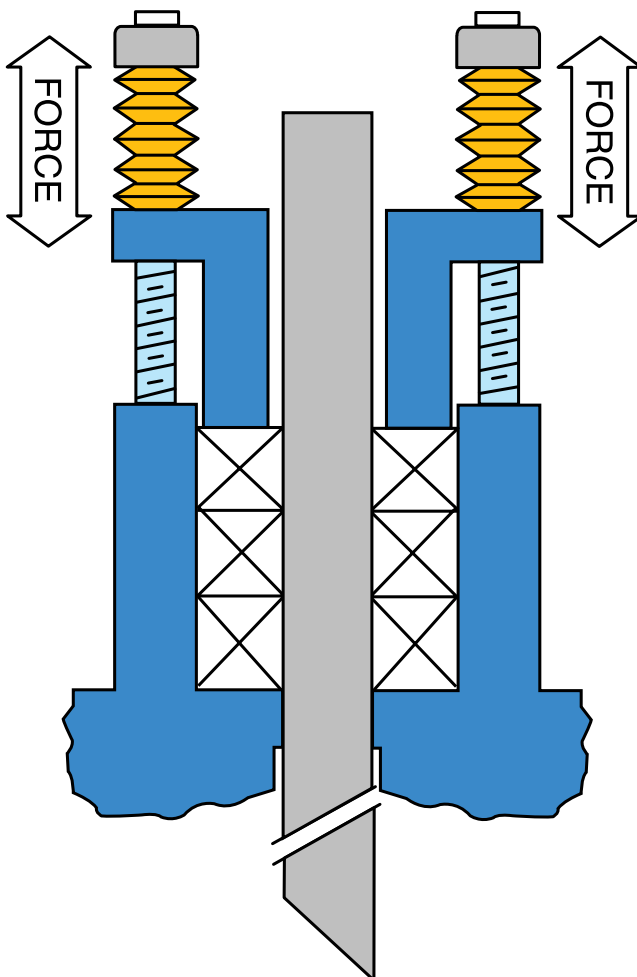
Live Loading the Packing

The term "live loading" refers to the use of springs to maintain pressure on the packing during thermal cycling or high cycle conditions. A stack of spring washers is placed on extended packing follower bolts to exert pressure on the packing follower. The springs are stacked opposing each other so each spring exerts its designed load over a given travel distance. Stacked in the opposing position, load remains constant while total travel is determined by the number of springs stacked. Adjustment is made by tightening the bolting until the springs go solid, thus the springs also serves as a built in tightening gauge.

Backseat

As an option, Figures C134, F134 & F71 can be equipped with a backseat. The bottom of the stuffing box and the top of the gate clamp are precisely machined to create a tight metal to metal seal when the valve is fully opened. The backseat option allows the valve to be repacked under line pressure. **WARNING:** Never repack a valve under pressure if the pipeline contains dangerous, lethal, harmful, active, or scorching media.

Spring Washers



Options

Revision 5

Chest Buttons

Chest buttons are set screws installed in the chest of knife gate valves. The set screw, which has a reinforced PTFE tip (brass, and Nitronic® 60 are optional), is threaded into a coupling and adjusted to contact the back side of the gate. This helps keep the gate against the seat. Chest buttons help optimize shutoff in low rP applications, or where it is necessary to install the valve in a vertical pipe with the gate underneath the seat. Chest buttons are standard on all single resilient seated knife gate valves in size 30" (DN 750) and larger (except Fig. 37L & Fig. C67).

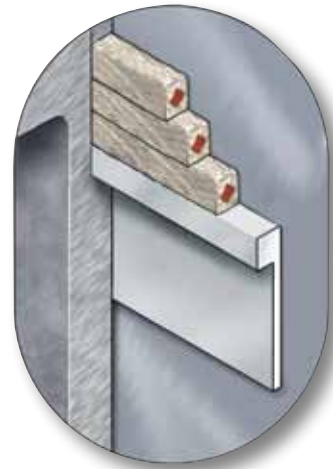
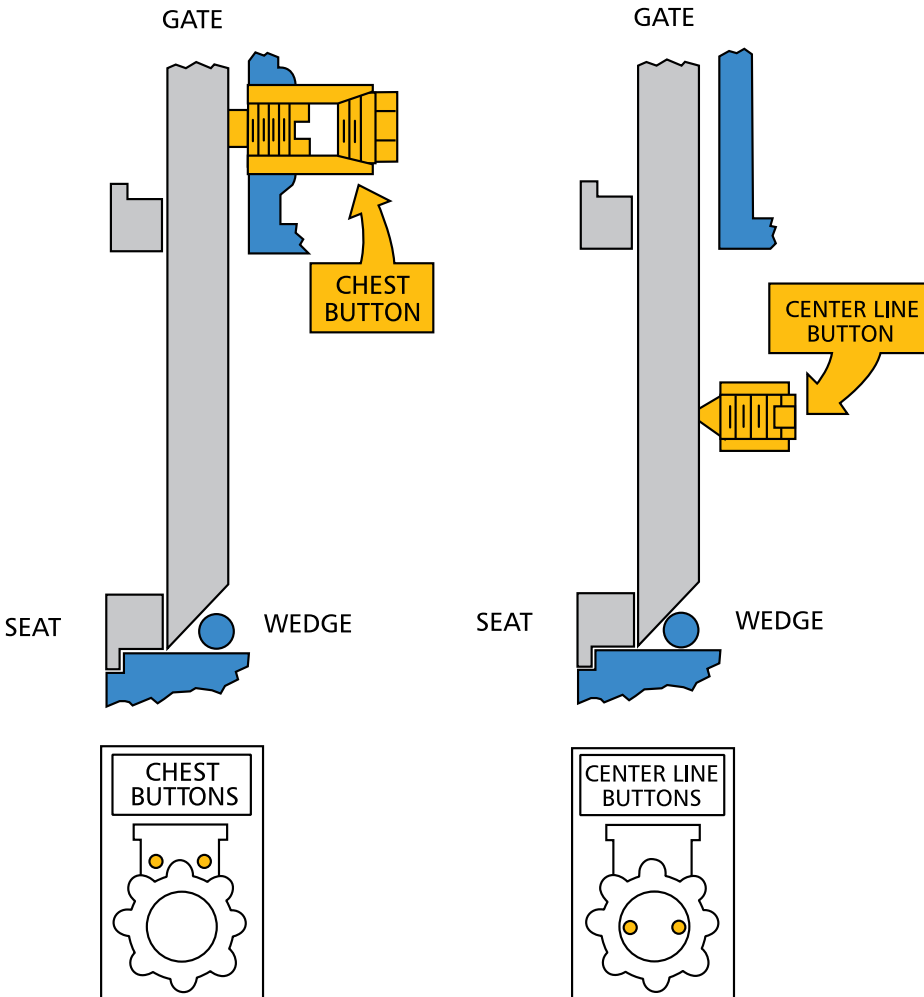
NITRONIC® is a registered trademark of ARMCO Inc

Centerline Buttons

Centerline buttons are set screws installed at the horizontal centerline of the valve (3 O'clock and 9 O'clock positions). The set screw, which has a hardened tip, is threaded into a coupling and adjusted to contact the gate. Centerline buttons help optimize shutoff in low ΔP applications. Centerline buttons are standard on all single seated knife gate valves in size 30" (DN 750) and larger (except Fig. C67).

Chest Liners

Chest liners are available on the C67 to fill the clearances between the gate and the chest of the valve body. Chest liners prevent solids entrapment in the chest area, and also provide increased gate support for high flow/high pressure applications. Standard materials are Ultra high molecular weight polyethylene (UHMW) and reinforced PTFE.



Backing Rings

Backing rings are square stock shaped to fit in the upper port opposite the seat. Backing rings support the gate in reverse flow conditions, and prevent gate damage caused by reverse flow. Care should be taken to specify the correct backing ring configuration for slurry service.

The standard backing ring option (segmented) consists of two segments. The standard backing ring option supports the gate and also allows any media in the chest to drain.

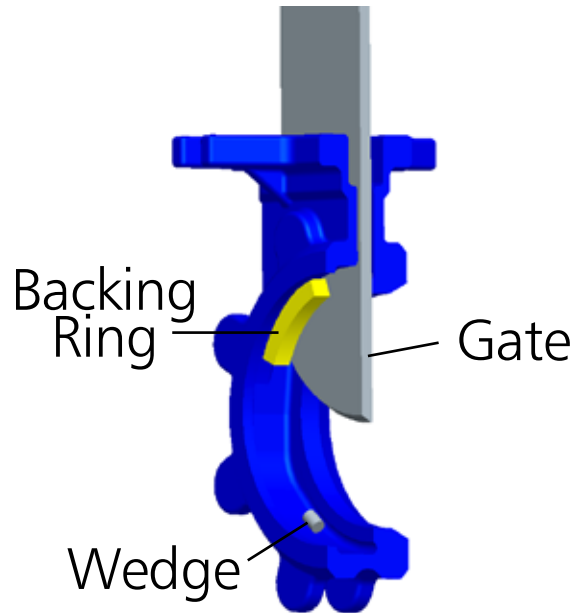
Reverse Flow Pressure Rating

(with optional backing rings)

Figure C37 & Figure C134 valves

- **Closed:**
150 CWP (reverse flow)
- **Cycling Service:**
 - 2" & 3": 150 psid maximum (reverse flow)
 - 4": 125 psid maximum (reverse flow)
 - 6" & 8": 100 psid maximum (reverse flow)
 - 10" - 16": 150 psid maximum (reverse flow)
 - 18" - 24": 100 psid* maximum (reverse flow)

* Alternate backing ring designs are available that allow the valve to be cycled against higher reverse flow pressures. Consult Factory.



Options

Revision 5

Flush Ports

Knife gate valve services often involve suspended materials that collect in the bottom of the valve or in the chest area. Collection of material in these areas is generally unimportant unless it causes a problem in the operation of the valve. Flush ports are used to keep the valve clear of material by injecting fluid to flush the debris clear.

The flushing medium can be a liquid, a gas, or even steam. Constant, heavy volume flushing is not normally required. Flushing during stroking of the valve is often sufficient. Where the material being handled tends to setup or de-water, a slight trickle is often sufficient.

Flush ports can be positioned on the sides of the chest and in the

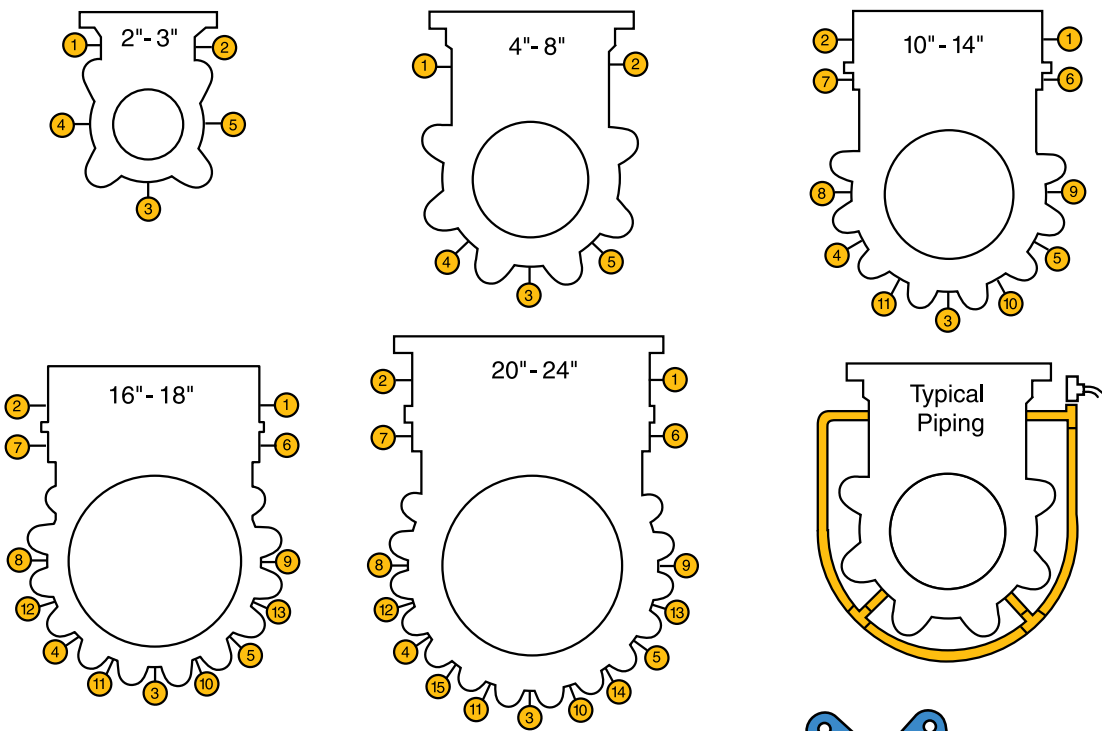
bottom of the valve. The following detail shows the availability of flush ports by size for the C37. Specify quantity and location of flush ports for each size valve being ordered. If no position is specified flush ports will be furnished in numeric order by position number. Flush ports are shipped hydro tested, with a pipe plug in place. The plug will be carbon steel for ductile iron bodied valves, and T316 SS for all other valves.

Flush ports are also available fully piped.

Note: C45D flush positions are available same as the C37 except: Positions 4 & 5 not available on the 2" and 3" C45D
Positions 3, 8, & 9 not available on the 10"-14" C45D

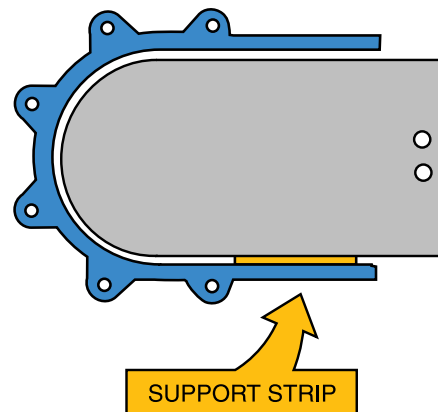
Figures C37 and C45

(View of valve side that is opposite the seat)



Gate Support Strip for Large Knife Gate Valves

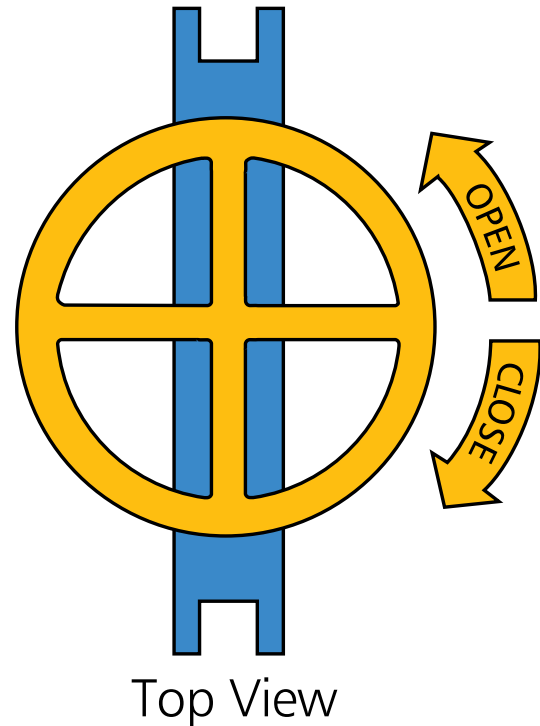
Valves larger than 24" (DN 600) mounted in positions other than with the stem vertical may require special gate support and packing material to insure optimum packing performance. When valves are mounted so the gate is in the horizontal position, on edge, a hardfaced gate support strip mounted in the chest and a hard packing such as acrylic/PTFE or Kevlar® are recommended. For other mounting positions consult factory. When ordering, specify orientation.



Handwheels

Handwheels are standard on most knife gate valves through 24" (DN 600). Rimpull is defined as the amount of force that must be applied to the handwheel rim to open or close the valve. Rimpull may exceed reasonable limits depending on the pressure drop across the valve, packing drag, and service conditions. Packing drag and ΔP across the valve are major contributors to the amount of force required. In most applications the ΔP drops as the valve is opened thus the rimpull is reduced as the valve is opened.

When rimpull exceeds acceptable levels bevel gear operators are used to reduce the rimpull. Keep in mind that when a gear operator is used to reduce the rimpull the number of turns required will increase proportional to the effort decrease. For example: given the same size handwheel, a 3:1 gear will decrease the rimpull by a factor of 2.7 and triple the number of turns required.



E-Z Spin Handwheel

For extreme duty, a low torque bearing handwheel assembly is available. The assembly features the heavy duty Fabri-Valve yoke assembly fitted with a roller bearing stemnut.

The following charts will assist in selecting a manual gear operator.

Figures C37, F37, C45, 37L, C134, F134, C105, C100, F100 – Rimpull

Media is clear fluid or gas

Valve Size (Inches)	Handwheel Dia. (Inches)	Differential Pressure		
		50 psid	100 psid	150 psid
2	8	4 lb, 10 turns	5 lb, 10 turns	7 lb, 10 turns
3	8	7 lb, 14 turns	9 lb, 14 turns	13 lb, 14 turns
4	8	10 lb, 18 turns	14 lb, 18 turns	20 lb, 18 turns
6	10	14 lb, 26.5 turns	22 lb, 26.5 turns	32 lb, 26.5 turns
8	12	23 lb, 34.5 turns	37 lb, 34.5 turns	54 lb, 34.5 turns
10	16	25 lb, 43 turns	41 lb, 43 turns	61 lb, 43 turns
12	16	34 lb, 52 turns	57 lb, 52 turns	85 lb, 52 turns 3:1 W/12"Hw, 45 lb, 156 turns
14	20	42 lb, 60 turns	72 lb, 60 turns	108 lb, 60 turns 3:1 W/12"Hw, 71 lb, 180 turns
16	20	53 lb, 68 turns	93 lb, 68 turns 4:1 W/12"Hw, 46 lb, 272 turns	139 lb, 68 turns 4:1 W/12"Hw, 68 lb, 272 turns
18	20	76 lb, 76 turns	135 lb, 76 turns 4:1 W/12"Hw, 66 lb, 304 turns	4:1 W/12"Hw, 99 lb, 304 turns
20	20	93 lb, 80 turns 4:1 W/12"Hw, 46 lb, 320 turns	4:1 W/12"Hw, 81 lb, 320 turns	4:1 W/12"Hw, 121 lb, 320 turns
24	20	130 lb, 96 turns 4:1 W/12"Hw, 64 lb, 384 turns	4:1 W/12"Hw, 115 lb, 384 turns	4:1 W/18"Hw, 114 lb, 384 turns
30	30	130 lb, 120 turns 4:1 W/12"Hw, 96 lb, 480 turns	4:1 W/18"Hw, 118 lb, 480 turns	4:1 W/24"Hw, 150 lb, 480 turns
36		4:1 W/12"Hw, 136 lb, 576 turns	4:1 W/24"Hw, 144 lb, 576 turns	16:1 W/18"Hw, 99 lb, 2304 turns
42		4:1 W/18"Hw, 140 lb, 672 turns	16:1 W/18"Hw, 82 lb, 2688 turns	16:1 W/18"Hw, 147 lb, 2688 turns
48		16:1 W/12"Hw, 85 lb, 3072 turns	16:1 W/18"Hw, 130 lb, 3072 turns	24:1 W/24"Hw, 104 lb, 4608 turns

Options

Revision 5

Extended Stems

Two types of stem extensions are offered: rising stem and non-rising stem.

The rising stem arrangement places the handwheel (gear, etc.) and the stem nut in the extended position. The stem threads are also located in the extended position, which provides a measure of valve position at the handwheel. When the handwheel is turned clockwise the stem nut engages the stem causing the valve to close. This arrangement requires substantial support of the handwheel and anchoring of the valve/pipe since the stem is alternately subjected to tension and compression to open and close the valve. Support of the handwheel is normally accomplished with a floorstand. Stem guides (wall brackets) are typically required to prevent the extended stem and reach rod from buckling during the closing cycle of the valve. Fabri-Valve recommends wall brackets be placed at distances not to exceed fifty times the reach rod diameter. For example: A 1-1/2" O.D. reach rod would require support at a maximum interval of 75" (1.50 O.D. x 50).

When extended position indication is not required, a **non-rising stem** arrangement is typically used. The non-rising arrangement consists of a **stem extension coupling** in place of the standard handwheel, a reach rod, and a handwheel. Turning the handwheel atop the reach rod then rotates the stem extension coupling. The reach rod does not rise and fall with the opening and closing of the valve. Rather, the standard valve stem rises and falls inside the hollow tube of the stem extension coupling. The only support needed for this arrangement is at the handwheel. The non-rising arrangement does not see the tension and compression of the rising stem arrangement. Therefore, it is not as sensitive to valve and handwheel support as the rising stem arrangement. However, the valve must be properly supported to avoid having the topworks serve as a pipe support. A floor stand is not essential to the operation of a non-rising arrangement. A stub shaft, which accepts the stock handwheel, may be attached directly to the reach rod. In this configuration, a wall bracket or guide should be located as close to the stub shaft as possible.

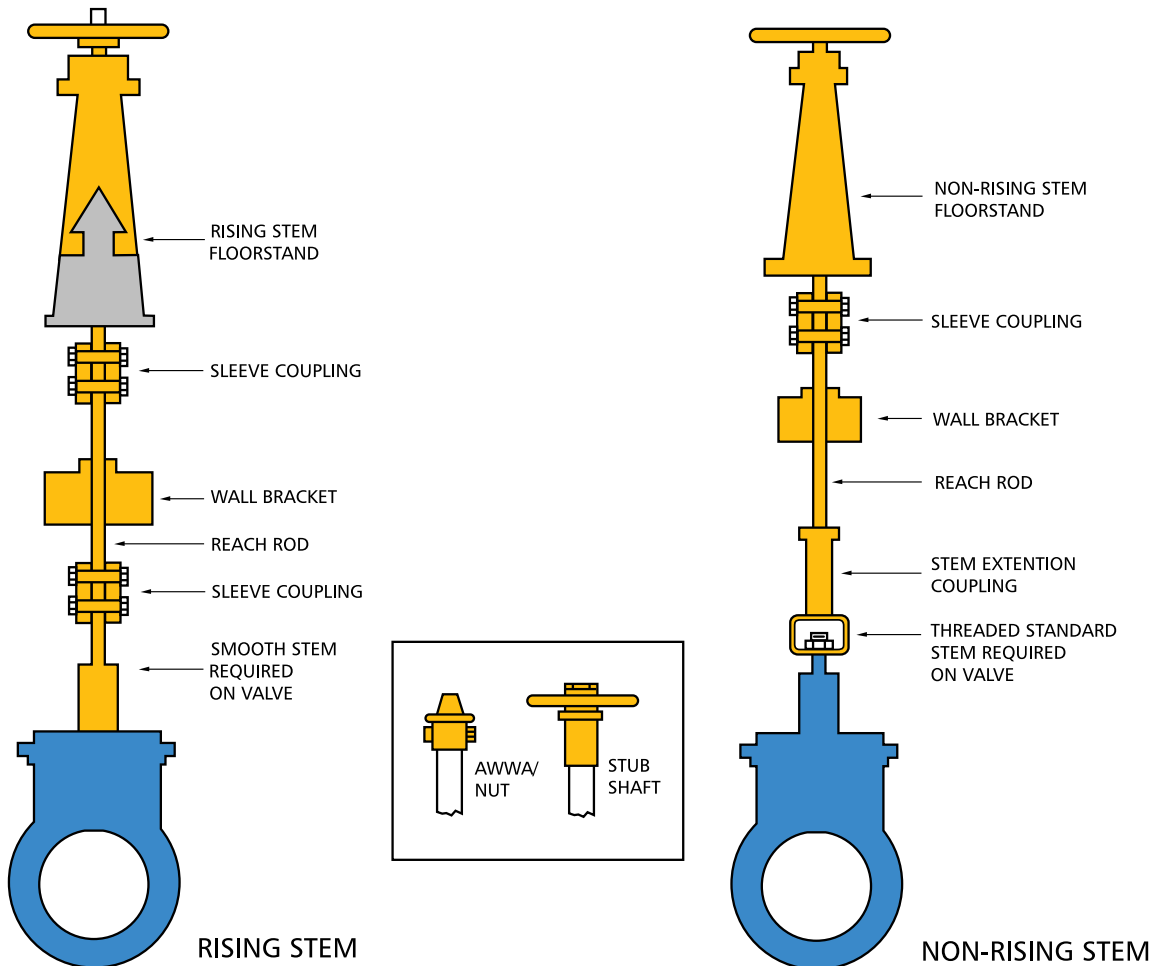


Figure F39 – Rimpull CLEAR FLUID, GAS OR SLURRY SERVICE

Valve Size (Inches)	Handwheel Dia. (Inches)	Differential Pressure		
		50 psid	100 psid	150 psid
2	8	6 lb rimpull, 9 turns	7 lb rimpull, 9 turns	11 lb rimpull, 9 turns
3	8	10 lb rimpull, 14 turns	12 lb rimpull, 14 turns	18 lb rimpull, 14 turns
4	10	14 lb rimpull, 18 turns	19 lb rimpull, 18 turns	28 lb rimpull, 18 turns
6	10	20 lb rimpull, 26.5 turns	27 lb rimpull, 26.5 turns	41 lb rimpull, 26.5 turns
8	12	31 lb rimpull, 34.5 turns	44 lb rimpull, 34.5 turns	66 lb rimpull, 34.5 turns
10	16	32 lb rimpull, 43 turns	48 lb rimpull, 43 turns	72 lb rimpull, 43 turns
12	16	42 lb rimpull, 51 turns 3:1 W/12"Hw, 22 lb rimpull, 153 turns	66 lb rimpull, 51 turns 3:1 W/12"Hw, 35 lb rimpull, 153 turns	98 lb rimpull, 51 turns 3:1 W/12"Hw, 52 lb rimpull, 153 turns
14	20	52 lb rimpull, 56.5 turns 3:1 W/12"Hw, 34 lb rimpull, 169.5 turns	82 lb rimpull, 56.5 turns 3:1 W/12"Hw, 54 lb rimpull, 169.5 turns	3:1 W/12"Hw, 80 lb rimpull, 169.5 turns
16	20	65 lb rimpull, 64 turns 4:1 W/12"Hw, 32 lb rimpull, 256 turns	104 lb rimpull, 64 turns 4:1 W/12"Hw, 51 lb rimpull, 256 turns	156 lb rimpull, 64 turns 4:1 W/12"Hw, 77 lb rimpull, 256 turns
18	20	91 lb rimpull, 74 turns 4:1 W/12"Hw, 45 lb rimpull, 296 turns	150 lb rimpull, 74 turns 4:1 W/12"Hw, 74 lb rimpull, 296 turns	223 lb rimpull, 74 turns 4:1 W/12"Hw, 110 lb rimpull, 296 turns
20	20	109 lb rimpull, 82 turns 4:1 W/12"Hw, 54 lb rimpull, 328 turns	182 lb rimpull, 82 turns 4:1 W/12"Hw, 89 lb rimpull, 328 turns	270 lb rimpull, 82 turns 4:1 W/12"Hw, 133 lb rimpull, 328 turns
24	20	150 lb rimpull, 98 turns 4:1 W/12"Hw, 74 lb rimpull, 392 turns	254 lb rimpull, 98 turns 4:1 W/12"Hw, 125 lb rimpull, 392 turns	4:1 W/18"Hw, 124 lb rimpull, 392 turns
30	30	147 lb rimpull, 123 turns 4:1 W/12"Hw, 108 lb rimpull, 492 turns	256 lb rimpull, 123 turns 4:1 W/18"Hw, 126 lb rimpull, 492 turns	16:1 W/18"Hw, 67 lb rimpull, 1968 turns

Figure C67 – Rimpull CLEAR FLUID, GAS OR SLURRY SERVICE

Valve Size (Inches)	Handwheel Dia. (Inches)	Differential Pressure		
		50 psid	100 psid	150 psid
2	8	18 lb, 9.25 turns	18 lb, 9.25 turns	18 lb, 9.25 turns
3	10	18 lb, 13.25 turns	18 lb, 13.25 turns	18 lb, 13.25 turns
4	10	22 lb, 17.25 turns	22 lb, 17.25 turns	22 lb, 17.25 turns
6	12	32 lb, 25.25 turns	32 lb, 25.25 turns	33 lb, 25.25 turns
8	12	40 lb, 33.25 turns	40 lb, 33.25 turns	54 lb, 33.25 turns
10	12	50 lb, 41.5 turns	54 lb, 41.5 turns	80 lb, 41.5 turns
12	20	36 lb, 49.5 turns	46 lb, 49.5 turns	68 lb, 49.5 turns 3:1 W/12"Hw, 45 lb, 148.5 turns
14	20	50 lb, 54.75 turns	72 lb, 54.75 turns	108 lb, 54.75 turns 3:1 W/12"Hw, 71 lb, 164.25 turns
16	20	57 lb, 62.75 turns	93 lb, 62.75 turns 4:1 W/12"Hw, 46 lb, 251 turns	139 lb, 62.75 turns 4:1 W/12"Hw, 68 lb, 251 turns
18	30	51 lb, 70.75 turns 4:1 W/12"Hw, 66 lb, 283 turns	90 lb, 70.75 turns 4:1 W/12"Hw, 99 lb, 283 turns	134 lb, 70.75 turns
20	30	62 lb, 78.75 turns 4:1 W/12"Hw, 46 lb, 315 turns	110 lb, 78.75 turns 4:1 W/12"Hw, 81 lb, 315 turns	4:1 W/12"Hw, 121 lb, 315 turns
24	30	87 lb, 94.75 turns 4:1 W/12"Hw, 64 lb, 379 turns	4:1 W/12"Hw, 115 lb, 379 turns	4:1 W/18"Hw, 114 lb, 379 turns
30		4:1 W/12"Hw, 96 lb, 480 turns	4:1 W/18"Hw, 118 lb, 480 turns	4:1 W/24"Hw, 150 lb, 480 turns
36		4:1 W/12"Hw, 136 lb, 570 turns	4:1 W/24"Hw, 144 lb, 570 turns	16:1 W/18"Hw, 99 lb, 2280 turns

Figure C33, F33, C133, F133 – Rimpull CLEAR FLUID, GAS OR SLURRY SERVICE

Valve Size (Inches)	Handwheel Dia. (Inches)	Differential Pressure (0-150 psid)
2	10	19 lb, 11 turns
3	18	13 lb, 15 turns
4	18	16 lb, 19 turns
6	18	21 lb, 28 turns
8	20	32 lb, 36 turns
10	20	42 lb, 45 turns
12	20	54 lb, 54 turns
14		3:1 W/12"Hw, 50 lb, 180 turns
16		4:1 W/12"Hw, 48 lb, 272 turns
18		4:1 W/12"Hw, 70 lb, 304 turns
20		4:1 W/18"Hw, 58 lb, 338 turns
24		4:1 W/24"Hw, 64 lb, 408 turns
30		16:1 W/12"Hw, 67 lb, 2064 turns
36		16:1 W/18"Hw, 66 lb, 2486.5 turns
42		16:1 W/24"Hw, 69 lb, 2909 turns
48		24:1 W/24"Hw, 56 lb, 4997 turns

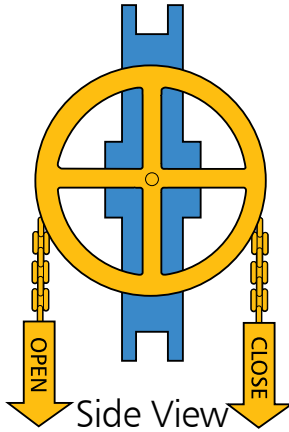
Differential Pressure has little effect on the C33/C133 rimpull

Options

Revision 5

Chainwheel

When valves are installed overhead, chainwheels can be supplied for easy operation. Chainwheels can be used in conjunction with bevel gear actuators for easy operation of large diameter valves. Galvanized (std) or brass chain is available.



The following charts show chainwheel size by valve size and the chainpull based on ΔP 's of 50,100 and 150 psi. This chart is based on non-slurry service.

Figures C37, F37, C45, C37L, C134, F134, C105, C100, F100 – Chainpull

Valve Size (inches)	Chainwheel Dia. (inches)	Differential Pressure		
		50 psid	100 psid	150 psid
2	9	3.1	4.0	6.0
3	9	5.3	7.5	11.2
4	9	8.1	11.8	17.7
6	12	11.3	17.6	26.3
8	12	22.1	36.0	53.9
10	18.5	20.9	35.0	52.3
12	18.5	28.6	48.8	73.0
14	21.5	38.6	66.9	99.9
16	21.5	49.1	86.1	128.4
18	21.5	70.5	124.9	51.8*
20	21.5	85.8	42.5*	63.3*
24	21.5	120.4	60.3*	89.8*

MEDIA IS CLEAR FLUID OR GAS

* Using 4:1 Bevel Gear

Figure C67 – Chainpull

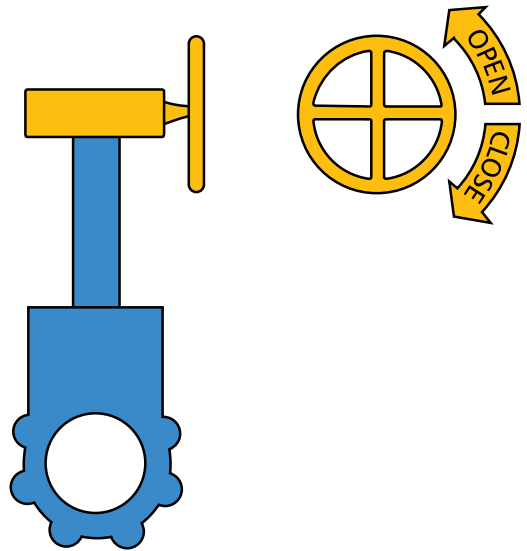
Valve Size (inches)	Chainwheel Dia. (inches)	Differential Pressure		
		50 psid	100 psid	150 psid
2	12	11.4	11.4	11.4
3	12	14.8	14.8	14.8
4	12	18.2	18.2	18.2
6	18.5	20.2	20.2	21.1
8	18.5	25.9	25.9	35.0
10	18.5	31.9	35.0	52.3
12	21.5	32.8	42.0	62.8
14	21.5	45.9	66.9	99.9
16	21.5	53.0	86.1	128.4
18	30	50.5	89.5	133.5
20	30	61.5	109.6	45.4*
24	30	86.3	43.2*	64.4*

CLEAR FLUID, GAS OR SLURRY SERVICE

* Using 4:1 Bevel Gear

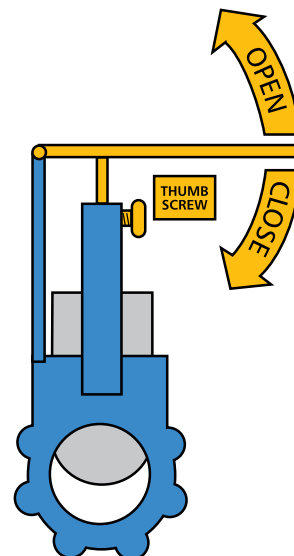
Bevel Gear

Totally enclosed weatherproof right angle drive bevel gear actuators can be furnished on all Fabri-Valve handwheel actuated valves. Bevel gear actuators offer as much as an 18:1 mechanical advantage, which makes larger diameter valves much easier to actuate. Options for bevel gears include stem protectors and 2" square AWWA drive nuts.



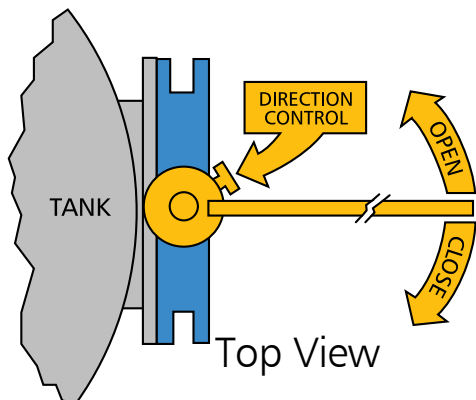
Lever

2"–14" valves can be supplied with lever operators. Levers are not available with the C67, XS150, or XS150 ULV. Fabri-valve recommends the use of PTFE packing or other packing material that imparts lubricity, to minimize the force required to actuate the lever. Levers should not be used in high line pressure or reverse flow applications. Consult factory for recommendations.



Ratchet

All valves can be furnished with ratchet operators for installations where space limitations would not permit use of handwheels or bevel gears. The C132 Transmitter Isolation Valve, which is usually installed next to a tank wall, has a ratchet operator as standard.



Cylinder Actuators

All Fabri-Valve knife gate, slide gate, and wedge gate valves can be supplied with pneumatically or hydraulically actuated cylinders

Refer to FA actuator's technical bulletin for sizing of pneumatic cylinders. For hydraulic actuators, contact factory.

Accessories

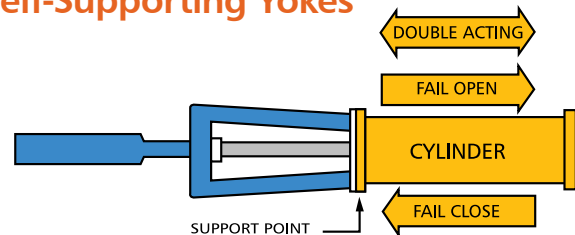
A full complement of accessories is available including:

- Limit Switches (mechanical and proximity type)
- Positioners
- Transducers
- Filter Regulators/Lubricators
- Enclosures
- Speed Controls
- Fail Safe Systems
- Gate Position Indicators
- Directional Control Valves
- Self Supporting Yokes

Cylinder options available include:

- Spring return (consult factory for sizing)
- High temperature seals
- Low temperature seals
- Manual overrides
- Special body materials
- Adjustable strokes (travel stops)
- High pressure operation
- Water operation/AWWA specification
- Stainless steel Rods
- Cushions
- Rod boots
- Lifting eye

Self-Supporting Yokes



Properly support the cylinder actuator at the yoke operator mount plate, when the valve is mounted in a position other than stem-vertical; the support can be a pedestal from the bottom or support from the top. Spring return cylinders may require additional support at the top of cylinder due to length and weight. Cylinders in harsh vibration service may require additional support or damping at the top of the cylinder.

As an option, self-supporting yokes are available for installations where the actuator's cylinder rod is not vertical and traditional support methods are unavailable. Self-supporting yokes are specifically designed to bear the full weight of the actuator.

Alternate Stem Threads

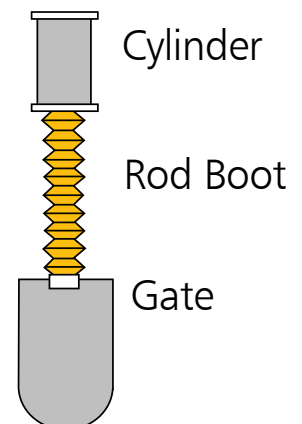
Stems with different thread lead/pitch are available as an option. (Lead is the distance a screw thread advances axially in one complete turn. On a single thread, the lead and pitch are identical.) ITT EPS, Fabri-Valve can manufacture valves that require fewer turns to operate by increasing the thread lead/pitch (may permit a smaller electric actuator to be utilized). Contact the factory for details.

Electric Actuators

Fabri-Valve products are available with a wide range of electric actuators. Options include: operating current, enclosures, limit switches, controls, starters, switches, etc... Consult the factory for details.

Rod Boots*

A rod boot is a convoluted rubber/cloth tube that is clamped over the cylinder rod. Its purpose is to protect the rod and rod seal from dirt and debris that could cause premature failure of cylinder sealing components.



*May require a longer stroke cylinder and a different yoke. Contact Factory.

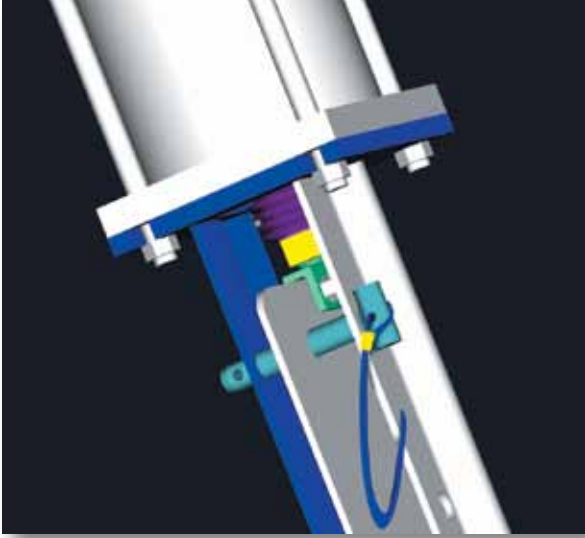
Options

Revision 5

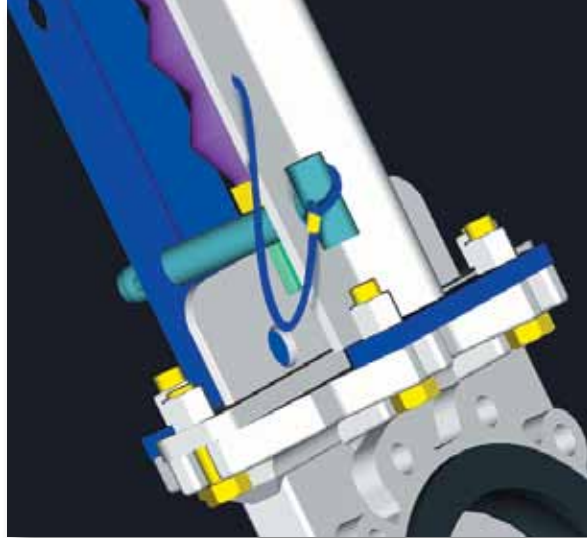
Locking Devices

All Fabri-Valve knife gate valves and slide gate valves are available with a locking device. The locking device can either be a SS cable attached to the yoke, that is then passed through the handwheel spokes and padlocked (manually actuated valves only), or a heavy duty pin that passes through the yoke legs, engages the gate, and is padlocked. Locking pins are designed to withstand the full thrust load capacity of the actuator.

Pin Locking Device



Locked Open



Locked Closed

Cable Locking Device



Unlocked



Locked