



## CLARKSON SLURRY KNIFE GATE VALVES - KGA AND KGA+ INSTALLATION AND MAINTENANCE INSTRUCTIONS

Before installation these instructions must be fully read and understood



CLARKSON KGA+  
VALVE ASSEMBLIES

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This instruction manual provides installation, operation and maintenance recommendations for both the Clarkson KGA and Clarkson KGA Plus (KGA+) slurry knife gate valves. The KGA was first introduced in the 1970's and the KGA+ design was introduced in 2010. While both products are very similar, the KGA+ offers additional features with resulting differences in maintenance procedures and parts lists. The first section covers the KGA+, the second the KGA. Please refer to the KGA+ or KGA section for complete instructions.

#### KGA+ and KGA identified

The KGA+ is easily identified from the KGA by several prominent features:

**Mating flanges:** the KGA has slotted mating flanges to mate with ASME B16.5/150 pipe flanges in sizes above NPS 8 (DN 200). The KGA+ features full flange design in all size and can be adapted to many different flange drillings.

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

**Secondary seal:** the KGA utilizes a multipart gate wiper assembly to wipe the gate and reduce potential for discharge from the top of the valve where the gate enters the housing assembly. The KGA+ features a secondary seal assembly capable of being lubricated without disassembly. Similar to what is currently offered on the KGD; this new seal design incorporates an external lubrication fitting to directly inject lubrication into the seal's interior (patent pending).

**Simplified housing assembly:** housing spacers found on the KGA have been eliminated from the KGA+ allowing for an easier disassembly / assembly process.

With these changes, spare parts and interchangeability with the prior design have been impacted. These changes are detailed in Sections 'Spare parts' (KGA+ and KGA).

### 1 GENERAL INFORMATION

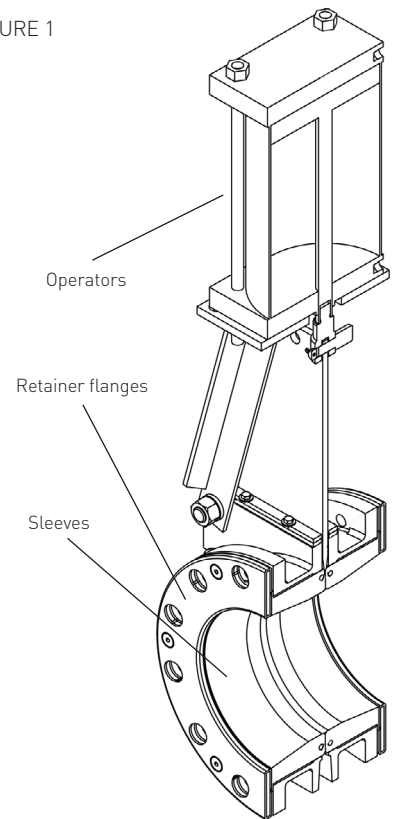
1. The KGA+ is a packingless, slurry knife gate valve. All the sealing is accomplished by the elastomeric sleeves in the valve housing. The sleeves also form the wear section for the valve. The gate is removable for inspection or replacement while the valve is in service.
2. The KGA+ is BIDIRECTIONAL (two-way shut-off) product and can be installed without concern over direction of flow. Since they will shut-off equally with in either direction, you will find no arrows or other indicators of a direction of flow or seat side.
3. Clarkson slurry knife gate valves are suitable for on-off service only. They are not to be used in a throttling application.
4. The style, size, pressure rating and material selection are the responsibility of the piping system designer.

5. All valves should be operated within the design pressure and temperature ranges. Under no circumstances should the valves be operated at conditions outside these parameters. Do not exceed 100% of the maximum pressure rating of the valve at any time during its operation. Pressure spikes beyond the valve's pressure rating are solely the responsibility of the user.

### 2 INITIAL INSPECTION

1. Examine entire valve and report any damage or discrepancies immediately.
2. Sleeves: visually examine the sleeves interior, looking for chunking, irregularities or other damage. It is not recommended you remove the retainer flanges (if equipped).
3. Retainer flanges: sizes NPS 8 (DN 200) and below may or may not have the optional retainer flanges, retainer flanges are standard on sizes NPS 10 (DN 250) and larger. Visually examine the retainer flanges surfaces, looking for tears, irregularities or other damage. Check tightness of retainer flange bolting.
4. Operators: standard manual handwheels may be shipped loose for field installation, be sure to fully tighten.
5. Valves are normally shipped with gate in open position, the recommended position for installation. Valves supplied with spring to extend (fail close) cylinder actuators are shipped with the gate in the closed position. The KGA+ should be installed with the gate in the open position, exercise caution when applying air to open this valve and then ensure that it is locked in the open position when installing in the line.
6. Accessories: if provided, including solenoids, limit switches, positioners, etc., are tested for functionality prior to shipment. Examine carefully for damage which may occur during shipment.

FIGURE 1



# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 3 INSTALLATION INSTRUCTIONS

Please take note of the specific installation tags provided with each valve.

1. The KGA+ is installed with the gate in the fully open position with the sleeves inserted into the housing halves.

#### CAUTION

*Valves are normally shipped with gate in open position, the recommended position for installation. Valves supplied with spring to extend (fail close) cylinder actuators are shipped with the gate in the closed position. Gate should be actuated to the open position prior to installation, exercise extreme caution when applying air to open this valve and then ensure that it gate locked in the open position for installation.*

2. The mating line flanges must be properly aligned prior to attempting installation. Slip on or weld flanges can be used. Never try to make up for misaligned pipe flanges by the line bolting. Pipe supports and/or expansion joints should be used to minimize pipe loads on valves. The pipeline companion flanges should be raised or flat face type to insure full sleeve support and a continuous unvarying I.D. If slip-on flanges are used, the pipe should be cut square and welded in position with the pipe end matched evenly with the flange face. Studded flanges are not compatible with these valves. Tables 1 and 2 state the maximum flange bolt tightening torques. Listed in Table 3 are the fasteners required for installation.
3. Sizes NPS 8 (DN 200) and below may or may not have the optional retainer flanges. Retainer flanges are standard on sizes

NPS 10 (DN 250) and larger. If no retainer flanges are used, the flanged end of the sleeves form the gasket when installed into the pipeline. When equipped with retainer flanges, the elastomer coated retainer flange functions as the gasket for installation into the pipeline.

4. Valve is suitable for use in either vertical or horizontal lines. The valve can be installed in any position in vertical or horizontal pipelines. However, valves installed in an orientation with the actuator below horizontal may require flushing to prevent the buildup of solids in the housing and may require additional actuator support.
5. Standard mating flanges NPS 3 - 24 (DN 80 - 600) match ASME B16.5/150, sizes NPS 26 (DN 650) and larger are per MSS-SP44 (see Table 1).

#### Installation notes

- A. All slurry knife gate valves are designed and manufactured to be installed in applications where no more than 1 g of force in excess of gravity is applied to the valve in any direction. This 1 g force can be an effect of traffic, wind, or earthquake, etc. Valves should not be used in applications that exceed 1 g.
- B. If valve stem or topworks protrude into walkways or work areas, valve should be flagged per company safety policy.
- C. All piping systems should contain independent support mechanisms and should not utilize the valve as a sole means of support.
- D. Do not install valve over walkways, electrical or other critical equipment without the use of splash guards or similar considerations.

**TABLE 1 - MAXIMUM TIGHTENING TORQUE STANDARD FLANGES**

Valve size		ft-lb	N-m
NPS	DN		
3	80	37	50
4	100	37	50
6	150	69	93
8	200	69	93
10	250	113	153
12	300	113	153
14	350	169	229
16	400	169	229
18	450	238	322
20	500	238	322
24	600	345	467
26	650	345	467
30	750	345	467
36	900	610	827
42	1050	610	827
48	1200	610	877
54	1350	1000	1355
60	1500	1000	1355

**TABLE 2 - MAXIMUM TIGHTENING TORQUE FRP FLANGES**

Valve size		ft-lb	N-m
NPS	DN		
3	80	25	34
4	100	25	34
6	150	40	54
8	200	40	54
10	250	65	88
12	300	65	88
14	350	100	135
16	400	100	135
18	450	140	190
20	500	140	190
24	600	200	271
26	650	200	271
30	750	200	271
36	900	320	434
42	1050	320	434
48	1200	320	434
54	1350	600	443
60	1500	600	813

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

**TABLE 3 - BOLTING DIMENSIONS**

Valve size		Flange diameter		Bolt circle diameter		Bolt holes no.	Bolt size/thread UNC	Bolt lengths (see note)			
		inch	mm	inch	mm			Without retainer flg.		With retainer flg.	
NPS	DN							inch	mm	inch	mm
3	80	7½	190.50	6	152.40	4	⅝ - 11	2	50.80	2½	63.50
4	100	9	228.60	7½	190.50	8	⅝ - 11	2	50.80	2½	63.50
6	150	11	279.40	9½	241.30	8	¾ - 10	2	50.80	2½	63.50
8	200	13½	342.90	11¾	298.45	8	¾ - 10	2¼	57.15	2¾	69.85
10	250	16	406.40	14¼	361.95	12	7⁄8 - 9	-	-	3	76.20
12	300	19	482.60	17	431.80	12	7⁄8 - 9	-	-	4	101.60
14	350	21	533.40	18¾	476.25	12	1 - 8	-	-	4½	107.95
16	400	23½	596.90	21¼	539.75	16	1 - 8	-	-	4¾	120.65
18	450	25	635.00	22¾	577.85	16	1½ - 7	-	-	5½	139.70
20	500	27½	698.50	25	635.00	20	1½ - 7	-	-	5½	139.70
24	600	32	812.80	29½	749.30	20	1½ - 7	-	-	6	152.40
26	650	34¼	869.95	31¾	806.45	24	1½ - 7	-	-	6	152.40
30	750	38¾	984.25	36	914.40	28	1½ - 7	-	-	7	177.80
36	900	46	1168.40	42¾	1085.85	32	1½ - 6	-	-	8½	177.80
42	1050	53	1346.20	49½	1257.30	36	1½ - 6	-	-	9	203.20
48	1200	59½	1511.30	56	1442.40	44	1½ - 6	-	-	9½	241.30
54	1350	66¼	1682.80	62¾	1593.90	44	1¾ - 5	-	-	10½	241.30
60	1500	73	1854.20	69¼	1759.00	52	1¾ - 5	-	-	11	266.70

### NOTES

- Flange dimensions per ASME B16.5/150 for NPS 2 - 24 (DN 50 - 600) and MSS SP44 for NPS 26 - 60 (DN 650 - 1500).
- Type B standard washers are not included in bolt / stud sizing.
- Mating flange thickness assumed to match ASME B16.5/150 for NPS 2 - 24 (DN 50 - 600) and MSS SP44 for NPS 26 - 60 (DN 650 - 1500).

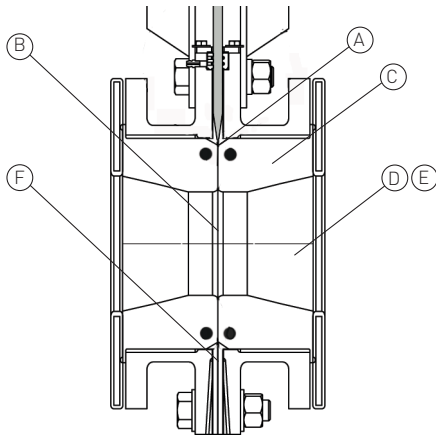
### 4 OPERATION

- Clarkson slurry knife gate valves are suitable for on-off service only. They are not to be used in a throttling application.
- To close the valve and provide isolation, the actuator (handwheel, bevel gear, air/hydraulic cylinder or electric motor actuator) moves the metal gate in a linear motion between the elastomeric sleeves to shut off the flow. To open, reverse the operation and the gate moves up and out from between the sleeves, opening the valve port.
- Matching elastomer sleeves seal against each under a high compression load when the valve is open, creating the valve pressure vessel. When the valve is closed, the sleeves seal against the gate face, isolating upstream from downstream. See Figures 2 and 3.  
**Note:** it is normal for the KGA+ to discharge media during opening and closing cycles. This helps prevent any solids from building up between the sleeves that would prevent a tight seal when the valve is fully open or closed. Discharge can be controlled with the use of an optional splash guard. Do not install valve over walkways, electrical or other critical equipment without the use of splash guards or similar considerations.
- As the gate strokes, a gap is created between the facing sleeves, allowing any media that could potentially clog or jam the valve to be purged out from between the sleeves, and potentially expelled outside the valve housing to atmosphere.
- The KGA+ valve incorporates a built-in clean-out area at the base of the housing assembly. The clean-out area may be enclosed by an optional, removable splash guard assembly. This splash guard will allow controlled drainage of any accumulated solids that may prevent full gate closure. Flush water can be used to improve the drainage efficiency. With the splash guard in place, any solids, slurry, or flush water ejected from the valve can be handled in a controlled manner. See Section 'Installation instructions for splash guard'.
- All valves should be operated within the design pressure and temperature ranges. Under no circumstances should the valves be operated at conditions outside these parameters.  
**Note:** actuated Clarkson valves have a maximum recommend stroke speed of 1" (25 mm) per second. Exceeding this speed can shorten sleeve life and may void warranty. Speed controls provided by factory will require adjustment in the field to obtain proper stroke speed against actual operating conditions.

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

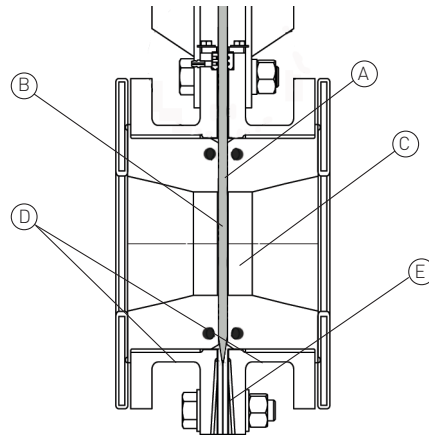
FIGURE 2 - OPEN POSITION



### Open position

- A. Gate positioned above seals, out of flow.
- B. Matching elastomer sleeves seal against each other under a high compression load.
- C. Sleeves act as pressure vessel.
- D. No metal parts in contact with slurry.
- E. Unobstructed port area eliminates turbulence, minimizes pressure drop across valve.
- F. No seat cavity where solids can collect and prevent full gate closure.

FIGURE 3 - CLOSED POSITION



### Closed position

- A. Gate travels through sleeves to provide blind flange shut-off, allowing opportunity for media to expel to atmosphere.
- B. 100% Isolation-bubble tight shut-off results in absolutely zero downstream leakage.
- C. When properly installed and maintained, the KGA+ is designed to provide man-safe isolation.
- D. Double-seated design provides bidirectional flow and shut-off.
- E. Controlled stroke prevents gate from penetrating too far, minimizing stress on sleeve.

7. The operator of any valve should have an understanding of the effects of opening/closing the valve with regards to its role in the overall piping system. Operators of valves under pressure should take caution to ensure that the valve is in good operating condition prior to operating it under pressure.
8. Certain processes contain hazardous and/or otherwise unstable media. Care should be taken in these circumstances to ensure the operator is aware of the specific health and safety risks associated with that medium.
9. When operating the valve stand clear of any moving parts such as the stem and/or gate assembly, use of gloves is suggested when operating manual valves to minimize the risk of injury.
10. All manually operated valves are designed for hand input. Do not apply excessive input torque via pipe wrenches, 'cheater bars', or other devices. If a manual handwheel actuated valve is difficult to operate due to torque requirements, it is recommended that the valve be supplied with or converted to a bevel gear, air/hydraulic cylinder or electric motor actuator.
11. Electric motor actuated valves should be left in their factory set condition, unless the system operating parameters dictate a change. If changes are necessary, they should be performed in small increments using the lightest/lowest setting possible to achieve the desired performance and then the valve/actuator function inspected. Excess torque and/or thrust in the motor settings may damage or lockup the valve.
12. Clarkson KGA+ valves are position seated and should never be torque seated. Do not use the motor torque settings to seat the valve.
13. Care should be taken to ensure that electrical motors are wired correctly to the power source. Incorrect phasing of 3-phase wiring may cause valve/motor damage.

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 5 LOCKOUTS

Lockouts are optional on the KGA+. If provided, the open-closed lockout brackets are designed to resist the normal valve operating thrust. In order to assure complete lockout compliance, any AC, HC or EM actuated valve must be placed in a ZERO ENERGY STATE by isolating all potential energy sources including electricity, operator supply air or hydraulic fluids. Please contact factory for complete details.

#### CAUTION

*Valves supplied with spring to extend (fail close) or retract (fail open) cylinders contain a mechanical spring which is compressed. In this case, the mechanical energy of the compressed spring cannot be placed in a ZERO ENERGY STATE. Take extreme care when inserting and removing the lockout pin. If the valve is actuated or the opposing pneumatic force is removed during the insertion process, the cylinder rod, gate and accompanying hardware will move and injury could occur.*

### 6 GENERAL MAINTENANCE

We recommend that all Clarkson products be inspected at least every 60 days. The following points should be examined and corrected as required:

1. Exterior overview: piping system components are subject to certain levels of erosion and corrosion. Periodic inspections should be made as valves/components may wear over time. Regular inspection of the housing assembly and gate should be performed, check for general signs of corrosion, component wear and/or damage caused by process media. Severe applications may require additional inspection types and/or frequency.
2. Valve stems, extension stems, and stem nut: look for excessive corrosion, galling or lack of lubrication. If valve stem requires lubrication, utilize the grease fitting provided and pump standard bearing grease through the yoke hub to lubricate the stem and stem nut assembly. Additional lubrication may be applied directly onto stem or stem threads. (Use material which meets ASTM 4950 GBLB.)

3. If possible stroke the valve through the full open and closed position to make sure it is functioning properly.

**Note:** it is normal for the KGA+ valve to discharge media during opening and closing cycles.

4. Housing assembly and sleeve lubrication
  - A. A secondary seal is standard on the KGA+ which provides the ability to lubricate the gate and sleeve without valve disassembly. Lubrication fittings located in the upper chest of the valve provide a direct path to the secondary seal and serve as the primary means of gate and sleeve lubrication.
  - B. As a minimum, the Clarkson KGA+ valves should be lubricated every 100 strokes for NPS 3 - 10 (DN 80 - 250) sizes and every 50 strokes for NPS 12 - 60 (DN 300 - 1500) sizes. An individual application may require more or less frequent lubrication depending on the process and chemistry. If a valve cycles very infrequently, less than once per month, lubrication prior to each stroke is recommended. (See below for approved lubrication).
  - C. The gate may also be lubricated by applying lubricant directly onto the exposed gate surface.
  - D. Sleeve wear can be minimized if the valve gate is scraped or wiped clean occasionally.
  - E. For dry material handling service, the secondary seal will not be provided and liquid or grease type lubricants should not be used.

#### NOTE

Failure to use the recommended type of lubricant will considerably reduce the life of both the sleeves and secondary seal. Under no circumstances should a hydrocarbon-based lubricant be used. The use of improper lubrication will void any remaining warranty.

FIGURE 4

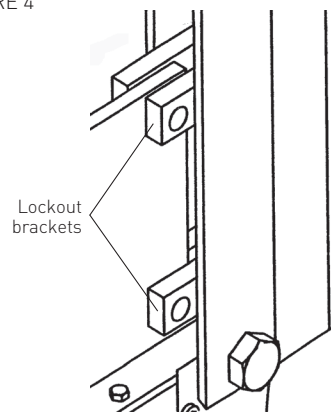
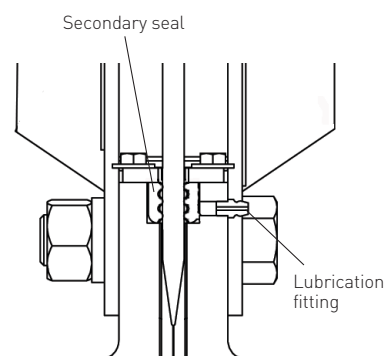


FIGURE 5



### APPROVED SILICON BASED LUBRICANTS

Dow III - Dow corning	Complex 821 - NFO
Dow 44 - Dow corning	Dow 7 - Dow corning
Rhodorsil 111 - Rhone-poulenc	Compound G661 - G E
Sil glyde - AGS Company	
For compatibility of other lubricants, consult Emerson Engineering.	

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 7 SPARE PARTS

With the update to the KGA+, it is important to understand the impact on spare parts and interchangeability with the prior design. When ordering spare parts, keep in mind the new KGA+ uses the 'plus' sign as part of the model code. This will allow quick identification to assure proper spares are provided.

If tag is missing or unreadable, there are several exterior clues to tell the difference (refer to Figure 6):

**KGA+:** At the top of the valve housing, the secondary seal retainer is a single piece and goes all-around the gate.

**KGA:** At the top of the valve housing, in place of the secondary seal retainer, the KGA has a wiper retainer. This is a two piece assembly and the wiper (black plastic) is visible.

- Encapsulated sleeves:** no changes, 100% interchangeability with all sizes.
- Gates:** to accommodate the new secondary seal, gates have been redesigned for sizes NPS 3 - 16 (DN 80 - 400). New gates for the KGA+ sizes NPS 3 - 16 (DN 80 - 400) are not interchangeable with the prior design KGA and older gates will not fit the KGA+. As a result, peripheral parts including gate clevises, stem assemblies are also impacted and not interchangeable in these sizes.
- Retainer flanges:** no changes, 100% interchangeability with all sizes.
- Housings:** all sizes have been redesigned to accommodate the secondary seal, full face flanges and spacer bar elimination. They are not interchangeable with older housings. Materials of construction remain the same.
- Frames (yokes):** no changes, 100% interchangeability with all sizes excluding special heavy duty designs.
- Stem nut assembly:** no changes, 100% interchangeability with all sizes.
- Handwheel:** no changes, 100% interchangeability with all sizes.
- Stem nut base:** no changes, 100% interchangeability with all sizes.

- Stem assembly:** as noted above, due to the gate redesign on sizes NPS 3 - 16 (DN 80 - 400), stems are not interchangeable. Sizes above NPS 16 (DN 400) are 100% interchangeable.
- Secondary seal:** a wiper assembly is standard on the KGA, the KGA+ uses a secondary seal assembly, the two assemblies are not interchangeable between the two valve types.
- Actuation:** no changes have been made to the AC or HC actuators, 100% interchangeability. The clevis assembly (gate to cylinder rod connection) has been changed for sizes NPS 3 - 16 (DN 80 - 400) and is not interchangeable. The BG actuator remains the same; however, the stem has been revised in sizes NPS 3 - 16 (DN 80 - 400) so it is not interchangeable with prior designs.

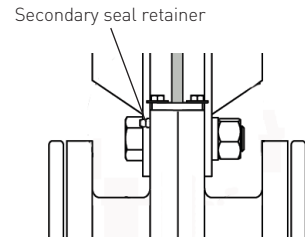
#### Recommended spare parts (see Figure 7)

Valves:

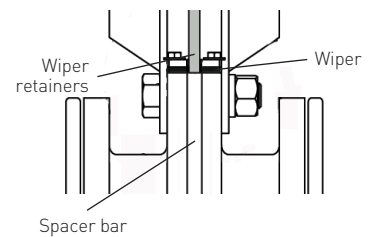
- 2-replacement sleeves
  - 1-replacement secondary seal
- Cylinder operator (if applicable):
- 1-repair kit

- When ordering replacement parts for a Clarkson product or cylinder operator, please include valve or cylinder size and complete description including serial number with your request.
- Additional replacement parts such as handwheels, stem nut assemblies, retainers, frames (yoke), stems and gates are available from factory. Again, please provide complete description with serial number when ordering.
- Spare sleeve storage: molded elastomer sleeves have a practical recommended shelf-life. Genuine Clarkson sleeves are laser etched on the outside surface with date of manufacture to use in calculating estimated shelf-life.
  - Natural rubber - 2 years
  - EPDM - 4 years
  - NBR/HNBR - 4 years
 Contact factory for additional elastomers.

FIGURE 6

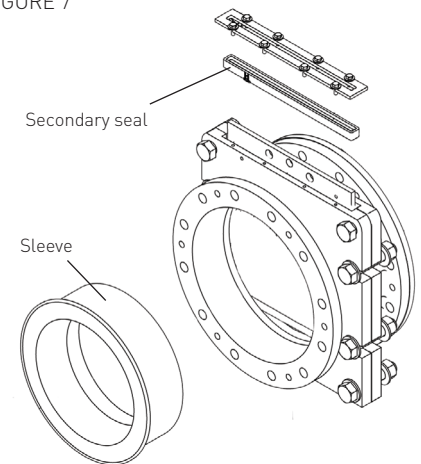


KGA+, secondary seal retainer is a single piece, goes all-around the gate, no spacer bar.



KGA, wiper retainer is two piece, wiper (black plastic) is visible. Spacer bar is also visible.

FIGURE 7





# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

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The shelf life listed is guideline data and is not a substitute for examination of cured material at the time of intended use.

To maintain shelf-life, spare sleeves should be stored in accordance with the following.

1. Store at ambient temperature up to 80°F (27°C), with 60 - 90% relative humidity away from direct sunlight and at a minimum distance of 15 feet (5 meters) away from electric motors is mandatory.
2. Care must be taken to avoid storage in a stressed condition such as piled too high or on a plain pallet overhanging a sharp edge.
3. First in - first out inventory control should be practiced.
4. The above elastomer shelf life guidelines are for components that are not already installed in a valve.

### NOTE

Emerson recommends customers always use genuine Clarkson OEM sleeves, secondary seals and other replacement parts to maintain the expected, superior, performance of their KGA+. Genuine Clarkson sleeves and secondary seals from Emerson are easily recognized by the laser etched identifying marks found on the outside surface. These marks include the size, part number, applicable patent number, elastomer batch compound and date of manufacture; all of which allow complete traceability of the part. Clarkson replacement sleeves, secondary seals and other parts from Emerson are the only ones authorized for use and offer the best fit and continued performance that non-OEM parts simply cannot give. The use of copycat parts may invalidate any remaining warranty. If valve requires further repair, please contact our office for an estimate of feasibility and cost of repair.

### 8 STORAGE

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The following are the factory's recommendations for storage procedures to retain maximum product integrity during long term storage of 1 to 5 years.

1. Valves are normally shipped with gate in open position, the recommended position for storage. During storage, the gate should always be in the open position. Storage should be in an area out of direct sunlight, away from heat, ozone and extreme weather conditions. Freezing is not considered detrimental as long as the valve is kept dry. High voltage rectifiers and other ozone generating equipment and sources should not be near the storage area.

### CAUTION

*Valves supplied with spring to extend (fail close) cylinder actuators are shipped with the gate in the closed position. DO NOT store a KGA+ with a spring to extend (fail close) in the open position.*

*This would put the spring in a compressed, fully energized position. For storage, it is recommended the valve sleeves be removed from the valve housing and stored separately from the valve. Reinsert sleeves prior to installation.*

2. The preferred storage location is a clean, dry protected warehouse. If valves are to be stored outside, precautions should be taken to keep valves clean and dry. Standard packaging materials provided in valve shipment cannot be considered sufficient for outdoor storage.
3. If outdoor storage is required, the equipment should be totally covered with a heavy, light colored, plastic covering. It is essential that the plastic be opaque to eliminate sunlight, and light colored to minimize heat buildup. The covering should be spread in a manner that allows underside ventilation. To insure proper ventilation the equipment should be elevated 2" - 4" (50 - 100 mm) above the ground.
4. Manual actuated valves may be stored in the vertical or horizontal position. For air or hydraulic actuated valves, the preferred orientation for optimum protection is with the valve fully opened and the cylinder in the vertical position. This position gives the best support to the cylinder rod and helps reduces the chance of a 'flat spot' developing on the cylinder seals. An acceptable alternate position for valves with cylinder diameters of less than 6" (150 mm) is with the cylinder in the horizontal position. Motor actuated valves should be oriented in the direction as preferred by the actuator manufacturer.
5. Valves with cylinder and motor actuators should be stored in accordance with actuator manufacturer's recommendations. Access ports or panels should be secured to prevent unauthorized entry and prevent contamination.
6. Where auxiliary equipment is included, such as limit switches, solenoid valves, etc., care must be taken to avoid moisture and condensation conditions on the equipment.
7. Storage inspection: visual inspection shall be performed on a semiannual basis and results recorded. Inspection as a minimum shall include reviewing the following:
  - Packaging
  - Flange covers
  - Dryness
  - Cleanliness
8. Maintenance shall consist of correcting deficiencies noted during inspection. All maintenance shall be recorded. Contact factory prior to performing any maintenance if valve is still covered under warranty.



# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 9 SLEEVE REPLACEMENT

#### NOTE

Sizes NPS 8 (DN 200) and below may or may not have the optional retainer flanges. Retainer flanges are standard on sizes NPS 10 (DN 250) and larger. Larger diameter valves are supplied with segmented (multipart) retainer flanges. If your valve has segmented retainer flanges, take note of the special sections.

#### Inspection of components

1. Verify that for each valve there are two (2) sleeves, two (2) retainer flanges (if required), retainer flange bolts and nuts (if required). KGA+ NPS 30 - 60 (DN 750 - 1500), use segmented retainer flanges. Refer to the Clarkson certified parts list for the appropriate valve size to determine the quantity of retainer flange nuts and bolts required.
2. Visually inspect each sleeve and retainer flange for damage to surfaces resulting from shipping or post-shipping handling. The sealing surfaces (nose) must be free of depressions, slits or gouges.

#### Disassembly

1. Before working on the KGA+ valve, verify that the valve is in the open position. If it is not, move it to the open position.

#### CAUTION

*Assure line is not pressurized before removing valve. Valve assembly and parts may be heavy, use proper lifting and support techniques. See Section 15, Lifting.*

2. Remove the valve from the piping.
3. Visually inspect and verify that the sleeve bore is clear of all debris, scale and elastomer residue.
4. Remove the retainer flange bolts taking caution to prevent retainer flanges from falling free if in vertical position. Remove the retainer flanges from the valve.
5. For valves with segmented retainer flanges (see Figure 9), loosen retainer bolts and pull each individual segment straight up away from the valve, do not remove more than one section at a time.
6. Remove the two elastomer sleeves by simply pulling each sleeve out of the housing assembly. (Sometimes a putty knife, large screwdriver or pry bar is necessary to pry the retainer flange away from the sleeve and the sleeve from the valve flange.)

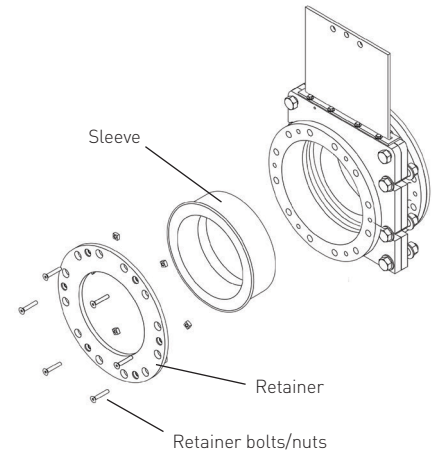
#### Installation

1. Lay valve down in a horizontal position, on a flat surface. (While it is possible to install valve sleeves with assembly in vertical position, this may make it more difficult to properly align the retainer flanges and sleeves, especially on larger valves.)
2. Check the bore diameter for unusual or excessive wear. If found, valve housing may require replacement.
3. Table 4 shows the maximum / minimum bore dimensions of a new KGA+ valve, along with the maximum allowable diameter figures of a housing affected by wear and usage. If housing is not within the maximum allowable range, it is recommended that the housing be replaced before installing new sleeves. In some cases, it may be possible to make minor repairs to the housing in order to continue using it. Please contact the factory for information.
4. Lubricate the O.D. of the seal end of the sleeve.
5. Install the sleeve, being careful to center the flange end in the bore of the housing.
6. Place a retainer flange on the top of the sleeve. Align the retainer flange bolt holes with the matching holes in the round flange. Align the I.D. of the sleeve and retainer flange.
7. For valves with segmented retainer flanges, position one retainer flange segment on the sleeve lip. Align with proper mounting holes in the round flange. Install the required bolts and nuts; hand tight. Position the next segment on the sleeve lip opposite the one previously installed. Install fasteners as before. Continue to install segments in this manner until complete flange is in position.
8. Install the retainer bolts. Only tighten sufficiently to allow installation of the next bolt. Continue this until all bolts are installed.
9. Once all bolts are in place, tighten the retainer flange bolts using a cross pattern until there is a 0" - 1/8" (0 - 3 mm) gap between the retainer flange and the housing. Do not cycle valve with only one sleeve in place.

#### NOTE

Certified Clarkson elastomer parts from Emerson are laser-etched with part number, date of manufacture, the Clarkson brand name and other appropriate information to assure you have a genuine Clarkson part. The use of non-OEM parts will void any remaining warranty.

FIGURE 8



# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

10. Turn the valve over so the installed sleeve is on the flat surface.
11. Apply a silicone base lubricant to the sealing-nose radius of the installed sleeve. Also apply it to the second sleeve sealing nose and O.D. of seal end.
12. Install the second sleeve, following steps 1 through 11. It may be necessary to use two or more C-clamps to pull down the second retainer flange. Do not fully tighten retainer flange bolts until after checking the sleeve bores for concentricity; using a straight edge, check the sleeve position in four (4) places, 90 degrees apart in relation to the installed sleeve bore I.D. Adjust as required to make the sleeve concentric with the other sleeve.
13. Fully tighten retainer flange bolts per Paragraph 9.
14. Remove C-clamps, if used.
15. The valve is now ready for installation. Keep gate in the open position until valve is installed.

### 10 SECONDARY SEAL REPLACEMENT

#### CAUTION

*Since this procedure may be performed with the valve in an active pipeline, plant standard safety procedures must be followed. Use of personal protective equipment, tag out or other plant standard safety procedures must be followed. Procedure SHOULD NOT be done with valve in closed position. If valve is removed for this service, assure line is not pressurized before removing valve. Valve assembly and parts may be heavy, use proper lifting and support techniques, refer to Lifting, Section 15.*

#### Disassembly

1. Replacement of the secondary seal can be accomplished without having to remove the valve from service, however, this procedure SHOULD NOT be done with valve in closed position. If it is suspected that either one or both of the elastomer sleeves have failed, the valve should be removed from service before secondary seal removal. If valve is to be removed, refer to Lifting section.
2. Open the valve, so the gate is in the fully raised position.

3. For ease of reassembly, using a permanent marker, draw a line on the gate face along the top of the secondary retainer plate. If marking gate is not an option, make note of the dimension from top of valve housing to top of gate in full open position (refer to Table 5, Figure 13, dimension A).
4. Remove the cotter pin from the clevis pin and remove the clevis pin from the gate. It may be necessary to actuate the valve down slightly in order to relieve pressure on the clevis pin to facilitate removal.
5. Actuator assembly removal:  
**Smaller valves:** remove the frame to housing bolts of one side except for the lowest bolt on the opposite side of the frame (see Figure 10). This bolt will act as a pivot point for the frame / actuator assembly. While supporting the actuator assembly, pivot the frame / actuator assembly away from the valve. Continue to provide support while actuator is in this position.  
**Larger valves:** remove the frame to housing bolts. Lift the frame and actuator assembly off the housing assembly to allow secondary seal and gate removal.
6. Loosen the secondary seal retainer plate bolts.
7. Remove the gate by lifting it out of the secondary seal.
8. Remove all fasteners and lockwashers that retain the secondary seal retainer plate in position.
9. Remove the secondary seal retainer plate by lifting it up.
10. Remove the secondary seal by inserting a flat blade screwdriver midway along the outside of the seal, between the seal and the valve housing. Pry the seal up and remove.
11. Inspect the gate for sharp edges or excessive damage. Refer to 'Gate replacement' section if gate requires replacement.

FIGURE 9

Example of a segmented retainer

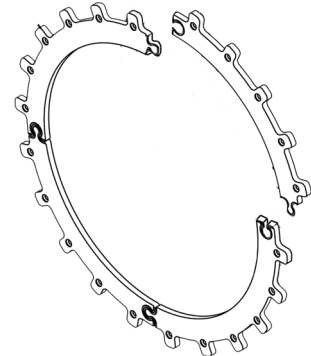
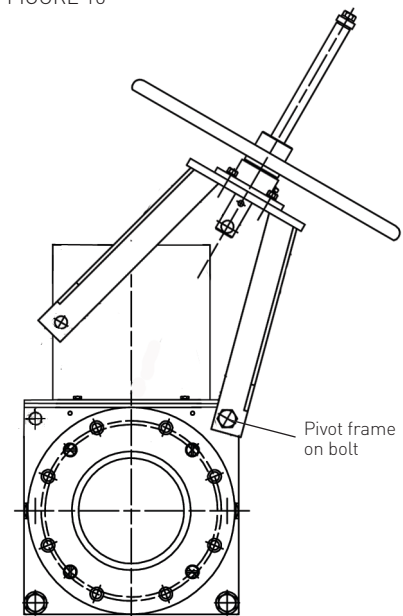


FIGURE 10



For gate and or secondary seal replacement, smaller valves may have the actuator frame swung out of the way as illustrated here. Remove frame bolts on one side only and loosen the opposite side just enough to allow movement. Be sure and properly support weight of actuator assembly, taking care to avoid injury.

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### Reassembly

1. If valve has been removed from pipe, lift valve to vertical position, refer to Lifting, Section 15.
2. Using DOW III or approved alternate, completely fill all internal cavities of the new secondary seal.
3. Insert the new lubricated secondary seal into the valve housing assembly. Make sure that the lube path openings on the seal line up with corresponding external housing lubrication fittings.
4. Place the secondary seal retainer plate into position.
5. Replace and hand tighten all the retainer plate fasteners and lockwashers.
6. Apply a small amount of recommended lubricant to the two tapered faces of the 'sharp end' of the gate.
7. Press the gate firmly through the secondary seal into the valve housing assembly until the mark drawn on the gate reaches the top of the retainer plate or gate reaches dimension A, Table 5, Figure 13.
8. Fully tighten all the retainer plate fasteners.
9. Reinstall the actuator / frame assembly with the housing / frame fasteners loosely.
10. Reconnect the gate to the actuator. (In order to facilitate installation and future removal, a coating or anti-seize compound should be applied to the outside of the clevis pin over the yoke contact area).
11. 'Stretch' the frame / actuator assembly with respect to the housing by pulling (not lifting) the frame / actuator assembly to its maximum movement away from the housing assembly (holding housing in place if valve is removed from pipeline). Tighten the frame / housing bolts and verify the tightness of the actuator to frame bolts.
12. Cycle valve to full open position and check the gate position using the data in the Table 5, Figure 13. Adjust as required.
13. Rattle the gate. It should be mostly disengaged from the sleeves. The outboard edges of the gate should be free and the center still partially engaged in between the sleeves.
14. Cycle gate full closed and full open.
15. Inspect gate for pieces of rubber. If significant amount of rubber is present, a sharp edge(s) on the gate may be causing seal damage or the gate is extending too far on the up stroke. The ends of the gate should be free and the center still engaged. If the sleeve / gate is misaligned, loosen the frame actuator bolts and / or adjust the yoke until the proper position, open and closed, is obtained.
16. If out of pipeline, reinstall the valve, refer to Lifting, Section 15.

FIGURE 11

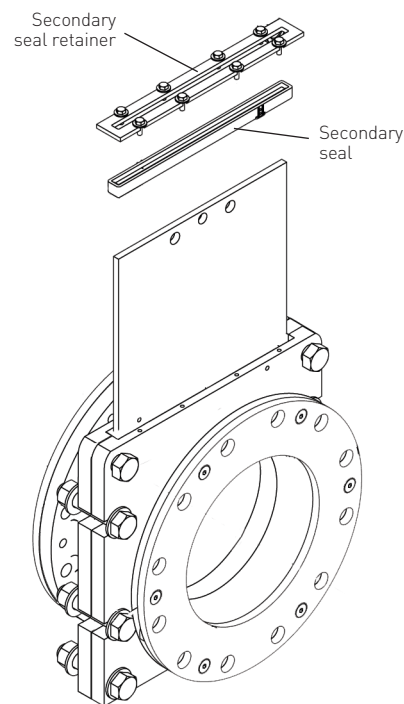


TABLE 4 - HOUSING I.D.

Valve size		I.D. minimum		I.D. maximum		Maximum allowable housing I.D.	
NPS	DN	inch	mm	inch	mm	inch	mm
3	80	4.45	113.03	4.49	114.05	4.55	115.57
4	100	5.39	136.91	5.43	137.92	5.49	139.45
6	150	7.79	197.87	7.83	198.88	7.89	200.41
8	200	9.42	239.27	9.46	240.28	9.52	241.81
10	250	11.92	302.77	11.96	303.78	12.02	305.31
12	300	13.94	354.08	13.97	354.84	14.00	355.60
14	350	15.80	401.32	15.83	402.08	15.86	402.84
16	400	17.44	442.98	17.47	443.74	17.50	444.50
18	450	19.06	484.12	19.10	485.14	19.19	487.43
20	500	21.06	534.92	21.10	535.94	21.19	538.23
24	600	26.06	661.92	26.10	662.94	26.19	665.23
26	650	28.28	718.31	28.36	720.34	28.45	722.63
30	750	32.06	814.32	32.12	815.85	32.21	818.13
36	900	38.20	970.28	38.30	972.82	38.39	975.11
42	1050	45.06	1144.52	45.19	1147.83	45.31	1150.87
48	1200	50.74	1288.80	50.77	1289.56	50.89	1292.61
54	1350	55.74	1415.80	55.77	1416.56	55.89	1419.61
60	1500	63.95	1624.33	63.99	1625.35	64.11	1628.39

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

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### 11 DISASSEMBLY AND ASSEMBLY INSTRUCTIONS

#### NOTE

Sizes NPS 8 (DN 200) and below may or may not have the optional retainer flanges. Retainer flanges are standard on sizes NPS 10 (DN 250) and larger. Larger diameter valves are supplied with segmented (multipart) retainer flanges. If your valve has segmented retainer flanges, take note of the special sections.

#### CAUTION

*Valve assembly and parts may be heavy, use proper lifting and support techniques, refer to Lifting, Section 15.*

#### Disassembly

1. Before working on the KGA+ valve, verify that the valve is in the open position. If it is not, move it to the open position.
2. Remove the valve from the piping.
3. For ease of reassembly, using a permanent marker, draw a line on the gate face along the top of the secondary retainer plate. If marking gate is not an option, make note of the dimension from top of valve housing to top of gate in full open position (refer to Table 5, Figure 13, dimension A).
4. Visually inspect and verify that the sleeve bore is clear of all debris, scale and elastomer residue.
5. Remove the retainer flange bolts taking caution to prevent retainer flanges from falling free if in vertical position. Remove the retainer flanges from the valve.
6. For valves with segmented retainer flanges (see Figure 9), loosen retainer bolts and pull each individual segment straight up away from the valve, do not remove more than one section at a time.
7. Remove the two elastomer sleeves by simply pulling each sleeve out of the housing assembly. (Sometimes a putty knife, large screwdriver or pry bar is necessary to pry the retainer flange away from the sleeve and the sleeve from the valve flange).
8. Remove the cotter pin from the clevis pin and remove the clevis pin from the gate. It may be necessary to actuate the valve down slightly in order to relieve pressure on the clevis pin to facilitate removal.
9. Remove the actuator/frame subassembly at one time by removing the frame bolts that fasten the frames to the housing and pulling it away from the housing assembly.
10. Loosen the secondary seal retainer plate bolts.
11. Remove the gate by lifting it out of the secondary seal.
12. Remove all fasteners and lockwashers that retain the secondary seal retainer plate in position.
13. Remove the secondary seal retainer plate by lifting it up.
14. Remove the secondary seal by inserting a flat blade screwdriver midway along the outside of the seal, between the seal and the valve housing. Pry the seal up and remove.
15. Remove housing bolts, and pull halves apart.  
**Note:** the KGA+ does not have spacer plates.
16. Remove old housing gaskets (two).

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### Visual inspection of parts prior to reassembly

1. Check and ensure all housing interior surfaces and drain ports are free and clear of hardened slurry or other obstructions. Clean as required.
2. Inspect the valve housing ensuring that the bores at the center of the valve are aligned with each other. Check the bore diameter for wear per Table 4. Replace if there are signs of excessive or unusual wear.
3. Examine exterior housing surfaces for buildup of hardened slurry or other contamination, clean as required.
4. Examine sleeves for signs of wear, cracking, chunking, deep cuts, severe abrasion or chemical attack (softening or gumming). Replace if in doubt; sleeves must be replaced as a set.
5. Examine secondary seal for signs of wear or cracking, severe abrasion or chemical attack (softening or gumming). Replace if in doubt.
6. Inspect the gate for sharp edges or excessive damage. Some scoring will occur in normal use. If the gate has been bent beyond  $\frac{1}{16}$ " (1.5 mm) permanent deflection at the center, straighten or replace. If straightening is performed, use considerable care to minimize marks on gate surface. Scores or other distress marks may be cleaned up with a belt sander. Machining the gate surface is not recommended. Light scale buildup may be removed with a putty knife or gasket scraper. Inspect the gate for wear and roughness.

Use a disc grinder or belt sander to remove rough surfaces. Take particular care on the leading and beveled edge to remove burrs and other sharp edges.

7. Examine frame for signs of corrosion, damage or other potential problems.
8. Check all bolting hardware for thread integrity, signs of corrosion, straightness, etc. Replace as required.
9. Examine actuator assembly.
  - A. **Manual valves:** check stem for corrosion, straightness, etc. Look for signs of wear on brass stem nut.
  - B. **Air or hydraulic:** check for seal leaks around cylinder rod seal, heads and caps. Examine cylinder rod for signs of corrosion, straightness, etc. Service per manufacturer's instructions.
  - C. **Electric motor:** service per manufacturer's instructions.

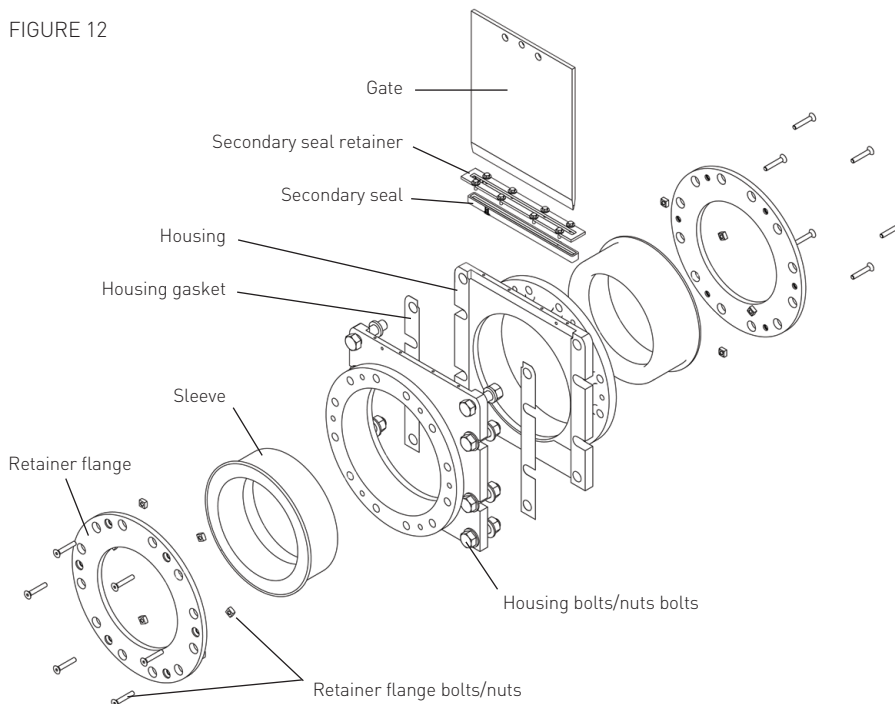
Tap the edges of the housings to align the internal sleeve bores to within  $\frac{1}{16}$ " (1.5 mm), at the same time maintaining bolt hole alignment in the square flanges.

5. Install new sleeves and retainer flanges (if used) per instruction in Section 'Sleeve replacement'.
6. Lift the valve assembly to vertical position. Refer to Lifting, Section 15.
7. Using DOW III or approved alternate, completely fill all internal cavities of the new secondary seal.
8. Insert the new lubricated secondary seal into the valve housing assembly. Make sure that the lube path openings on the seal line up with corresponding external housing lubrication fittings.
9. Place the secondary seal retainer plate into position.
10. Replace and hand tighten all the retainer plate fasteners and lockwashers.

### Reassembly

1. Lay the first housing half face down on a suitable flat surface.
2. Carefully lay two new housing gaskets on face of housings. Gaskets may be held in place with a small amount of silicone lubricant placed between gasket and housing.
3. Take second housing and place into position on the first housing, and properly align bolt holes making sure spacer plates remain in place.
4. Insert most of the housing bolts, leaving out the top bolts that are used to hold the actuator assembly to the housing and loosely tighten.

FIGURE 12

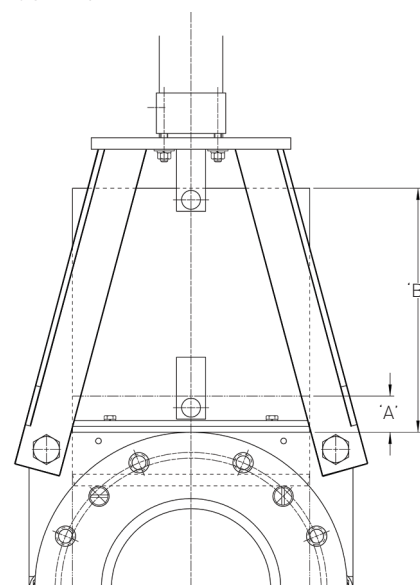


# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

11. Apply a small amount of recommended lubricant to the two tapered faces of the 'sharp end' of the gate.
12. Press the gate firmly through the secondary seal into the valve housing assembly until the mark drawn on the gate reaches the top of the retainer plate or gate reaches approximately dimension A, Table 5, Figure 13.
13. Fully tighten all the retainer fasteners.
14. Reinstall the actuator / frame assembly with the housing / frame fasteners loosely.
15. Reconnect the gate to the actuator. (In order to facilitate installation and future removal, a coating or anti-seize compound should be applied to the outside of the clevis pin over the yoke contact area.)
16. 'Stretch' the frame / actuator assembly with respect to the housing by pulling (not lifting) the frame / actuator assembly to its maximum movement away from the housing assembly (holding housing in place if valve is removed from pipeline). Tighten the frame / housing bolts and verify the tightness of the actuator to frame bolts.
17. Cycle valve to full open position and check the gate position using the data in the Table 5, Figure 13. Adjust as required.
18. Rattle the gate. It should be mostly disengaged from the sleeves. The outboard edges of the gate should be free and the center still partially engaged in between the sleeves.
19. Cycle gate full closed and full open.
20. Inspect gate for pieces of rubber. If significant amount of rubber is present, a sharp edge(s) on the gate may be causing seal damage or the gate is extending too far on the up stroke. The ends of the gate should be free and the center still engaged. If the sleeve / gate is misaligned, loosen the frame actuator bolts and / or adjust the yoke until the proper position, open and closed, is obtained.
21. Reinstall the valve, refer to Lifting section.

FIGURE 13



Dimensional tolerance:		
NPS 3 - 10 (DN 80 - 250)		+/- 1/16" (1.5 mm)
NPS 12 - 16 (DN 300 - 400)		+/- 3/32" (2.4 mm)
NPS 18 - 26 (DN 450 - 650)		+/- 1/8" (3 mm)
NPS 30 - 60 (DN 750 - 1500)		+/- 1/4" (6 mm)

Dimension A = Distance from top of valve housing (not wiper plate) to top of gate in the closed position.

Dimension B = Distance from top of valve housing (not wiper plate) to top of gate in the opened position.

TABLE 5

Valve size		'A'		'B'	
NPS	DN	inch	mm	inch	mm
3	80	1.59	40.39	5.22	132.59
4	100	1.53	38.86	6.28	159.51
6	150	1.52	38.61	8.77	222.76
8	200	1.59	40.39	10.59	268.99
10	250	1.46	37.08	12.59	319.79
12	300	2.12	53.85	15.30	388.62
14	350	2.18	55.37	17.18	436.37
16	400	2.44	61.98	19.82	503.43
18	450	5.06	128.52	24.31	617.47
20	500	4.26	108.20	26.01	660.65
24	600	5.34	135.64	32.34	821.44
26	650	4.00	101.60	33.00	838.20
30	750	4.75	120.65	37.75	958.85
36	900	4.75	120.65	43.75	1111.25
42	1050	6.62	168.15	52.62	1336.55
48	1200	6.49	164.85	58.00	1473.20
54	1350	5.73	145.54	63.23	1606.04
60	1500	8.00	203.20	70.50	1790.70

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 12 FIELD REPLACEMENT OF GATES

#### Disassembly

1. Replacement of the gate can be accomplished without having to remove the valve from service. However, if it is suspected that either one or both of the elastomer sleeves have failed, the valve should be removed from service before gate replacement. If valve is to be removed, refer to Lifting, Section 15.

#### CAUTION

*Since this procedure may be performed with the valve in an active pipeline, plant standard safety procedures must be followed. Use of personal protective equipment, tag out or other plant standard safety procedures must be followed. Procedure CANNOT be done with valve in closed position. If valve is removed for this service, assure line is not pressurized before removing valve. Valve assembly and parts may be heavy, use proper lifting and support techniques, refer to Lifting, Section 15.*

2. Open the valve, so the gate is in the fully raised position.
3. Remove the cotter pin and clevis pin from the gate. It may be necessary to actuate the valve down slightly in order to relieve pressure on the clevis pin to facilitate removal.
4. Actuator assembly removal:  
**Smaller valves:** remove the frame to housing bolts of one side except for the lowest bolt on the opposite side of the frame. This bolt will act as a pivot point for the frame / actuator assembly. Pivot the frame / actuator assembly away from the valve and temporarily support.  
**Larger valves:** remove the frame to housing bolts. Lift the frame and actuator assembly off the housing assembly to allow gate removal.
5. Loosen the secondary seal retainer plate bolts.
6. Remove the gate by lifting it out of the secondary seal.

#### Visual inspection of parts prior to reassembly

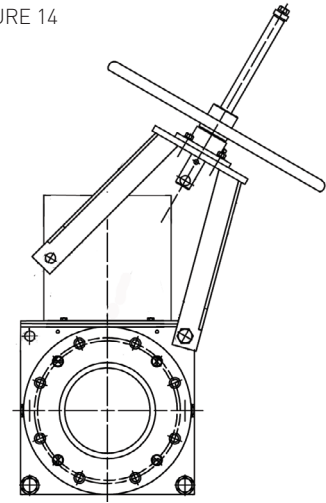
1. Examine secondary seal for signs of wear or cracking, severe abrasion or chemical attack (softening or gummying). Replace if in doubt.

2. Inspect the gate for sharp edges or excessive damage. Some scoring will occur in normal use. If the gate has been bent beyond  $\frac{1}{16}$ " (1.5 mm) permanent deflection at the center, straighten or replace. If straightening is performed, use considerable care to minimize marks on gate surface. Scores or other distress marks may be cleaned up with a belt sander. Machining the gate surface is not recommended. Light scale buildup may be removed with a putty knife or gasket scraper. Inspect the gate for wear and roughness. Use a disc grinder or belt sander to remove rough surfaces. Take particular care on the leading and beveled edge to remove burrs and other sharp edges.

#### Reassembly

1. Apply a small amount of recommended lubricant to the two tapered faces of the 'sharp end' of the gate.
2. Press the gate firmly through the secondary seal into the valve housing assembly until the gate beveled edge reaches the sleeve bore I.D.
3. Fully tighten all the retainer fasteners.
4. Reinstall the actuator / frame assembly with the housing / frame fasteners loosely.
5. Reconnect the gate to the actuator. (In order to facilitate installation and future removal, a coating or anti-seize compound should be applied to the outside of the clevis pin over the yoke contact area.)
6. 'Stretch' the frame / actuator assembly with respect to the housing by pulling (not lifting) the frame / actuator assembly to its maximum movement away from the housing assembly (holding housing in place if valve is removed from pipeline). Tighten the frame / housing bolts and verify the tightness of the actuator to frame bolts.
7. Cycle valve to full open position and check the gate position using the data in the Table 5, Figure 13. Adjust as required.
8. Rattle the gate. It should be mostly disengaged from the sleeves. The outboard edges of the gate should be free and the center still partially engaged in between the sleeves.
9. Cycle gate full closed and full open.

FIGURE 14



For gate and or secondary seal replacement, smaller valves may have the actuator frame swung out of the way as illustrated here. Remove frame bolts on one side only and loosen the opposite side just enough to allow movement. Be sure and properly support weight of actuator assembly, taking care to avoid injury.



# CLARKSON SLURRY KNIFE GATE VALVES - KGA+

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

10. Inspect gate for pieces of rubber.  
If significant amount of rubber is present, a sharp edge(s) on the gate may be causing seal damage or the gate is extending too far on the up stroke. The ends of the gate should be free and the center still engaged.  
If the sleeve / gate is misaligned, loosen the frame actuator bolts and / or adjust the yoke until the proper position, open and closed, is obtained.
11. If out of pipeline, reinstall the valve, refer to Lifting, Section 15.

### 13 INSTALLATION INSTRUCTIONS FOR SPLASH GUARD (B7 OPTION)

1. Remove the splash guard, mounting hardware, and gasket from the valve crate. Verify that the proper number of mounting U-bolts, washers, nuts, along with the guard, end cap, and gasket material are present.
2. Cut the gasket material into four pieces that will form the rectangular dimensions of the bottom of the valve if adhesive back strip is used. If the gasket is cut from sheet elastomer stock, 1/4" (6.4 mm) thick material is recommended. Material should be compatible with the slurry chemistry. The material used for the retainer flanges or sleeves will be suitable for the B7 gasket. Other choices may be possible. Consult the factory for recommendations.
3. Clean the flat machined surface of the splash guard so that there is no dirt, grit, grease, or other debris present. Remove the adhesive backing from the gasket material and apply to the splash guard on the machined flat mating surface (adhesive back strip). If a cut sheet gasket is used, it should be attached to the splash guard with an RTV type adhesive compound to hold it during installation. Attach gasket material to the flat surface along the edge of the machined slot.

4. Install the pipe cap on one end of the splash guard.
5. Position the guard below the valve and fit a U-bolt on each end with the fasteners loosely attached.
6. Verify the position of the gasket material and the bottom of the housing and tighten the installed U-bolts.
7. Tighten all U-bolt fasteners until the gasket is visually compressed.

#### WARNING

*Do not cap or close-off both ends of the splash guard. This can result in valve failure.*

#### NOTE

It is normal for the KGA+ to discharge media during opening and closing cycles. This helps prevent any solids from building up between the sleeves that would prevent a tight seal when the valve is fully open or closed. Discharge can be controlled with the use of an optional splash guard or drain plate. Do not install valve over walkways, electrical or other critical equipment without the use of splash guards, drain plates or similar considerations.

### 14 INSTALLATION INSTRUCTIONS FOR DRAIN PLATE (B9 OPTION)

1. Using a wire brush / scraper, clean the bottom of the housing.
2. Check the tapped mounting holes on the bottom of the valve. Remove any debris or obstructions from the holes.
3. Position gasket on drain plate and mount to the valve using provided bolts and lockwashers.
4. Connect drain piping (if used) to NPT port(s) as required.

#### WARNING

*Do not plug or close-off all ports on the drain plate. This can result in valve failure.*

FIGURE 15

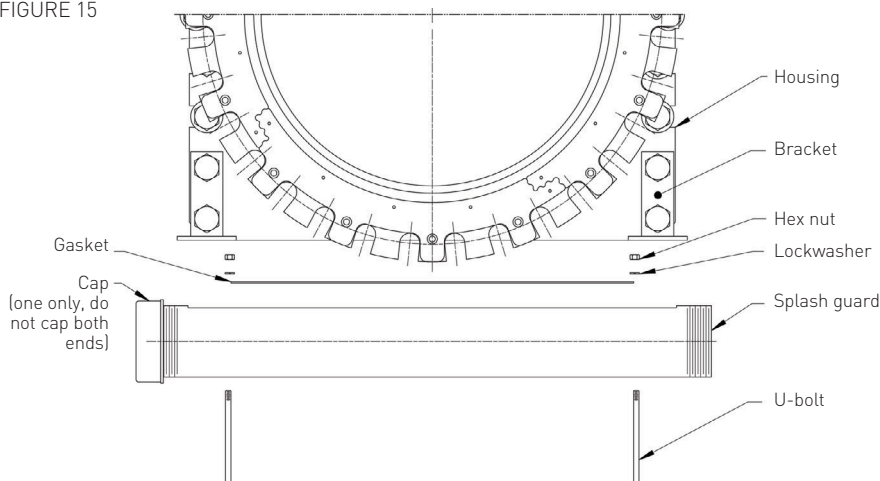
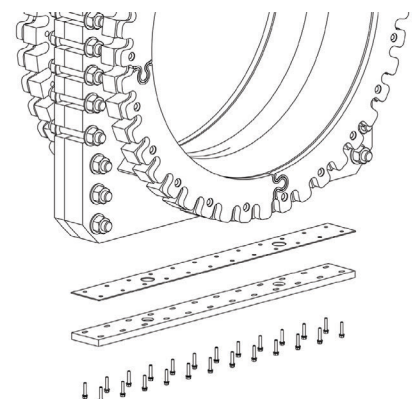


FIGURE 16



# CLARKSON SLURRY KNIFE GATE VALVES - KGA+ INSTALLATION AND MAINTENANCE INSTRUCTIONS

## 15 LIFTING

### CAUTION

Valve assembly and parts may be heavy, use proper lifting and support techniques. DO NOT attempt to lift valve together with any adjoining pipe or other equipment. DO NOT attempt to lift valve if full of media. Lifting techniques may vary depending on valve size/weight. Small Clarkson KGA air and or hydraulic actuated valves may be equipped with eyebolts. These may only be used as lifting points on valve sizes NPS 10 (DN 250) and smaller for lifting valve and actuator ONLY. DO NOT use these eyebolts on any larger valve.

For shipment, large KGA valves are normally palletized in the flat or horizontal position with the bore oriented vertically, flange faces down on pallet. The palletized valves are loaded on to trucks with a forklift. It is recommended unloading should also be done with a forklift. A crane can be used; however the weight must be supported by the pallet and not the valve. For KGA valves with slotted flanges, DO NOT lift or attempt to move valve with straps placed around the lugs of the mounting flanges, this is very dangerous.

Small Clarkson KGA air and or hydraulic actuated valves may be equipped with eyebolts.

These should only be used on valve sizes NPS 10 (DN 250) and smaller to lift valve and actuator assembly ONLY. Insert a properly rated strap and or lifting hook through eye of eyebolt and lift, taking care as center of gravity shifts. Do not drag the base of the valve during lifting as this can peel the rubber from the retaining flanges.

All valves can be lifted using the frame (yoke) assembly as the lift point. DO NOT USE LOCKOUT BRACKETS TO LIFT VALVE. Insert properly rated straps under the frame top plate, one for each leg, and lift, taking care as center of gravity shifts. Do not drag the base of the valve during lifting as this can peel the rubber from the retaining flanges.

Some larger KGA valves can be lifted using the lifting holes located near the top of each frame leg, on the side. DO NOT USE LOCKOUT BRACKETS TO LIFT VALVE. Appropriately sized and rated hoist rings can be placed in the lifting holes. Alternatively, two appropriately sized and rated steel bars can be slid through the holes and hoist rings threaded into the ends (see photo for a typical arrangement). For larger valves, all lifting should be done with chains. Shackles and straps, regardless of their weight ratings should never be used. Take care to not drag the base of the valve during lifting as this can peel the rubber from the sleeve retaining flanges.

FIGURE 17  
DO NOT use flange lugs to lift valve

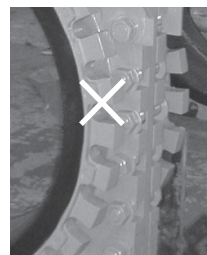


FIGURE 18

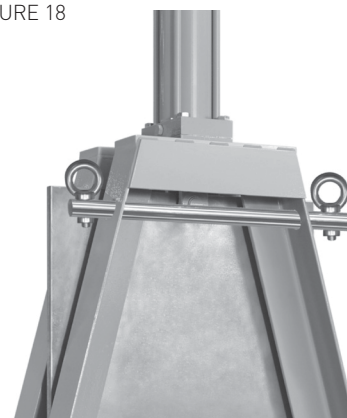


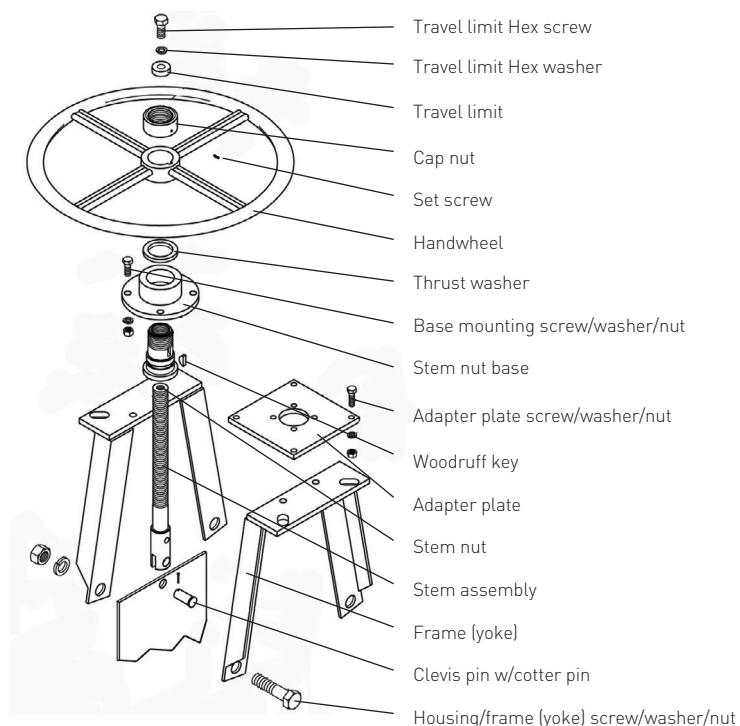
Illustration is for reference and not intended to show a recommended lifting apparatus. Be sure and follow proper lifting and support techniques.

TABLE 6 - STANDARD VALVE ASSEMBLY WEIGHTS

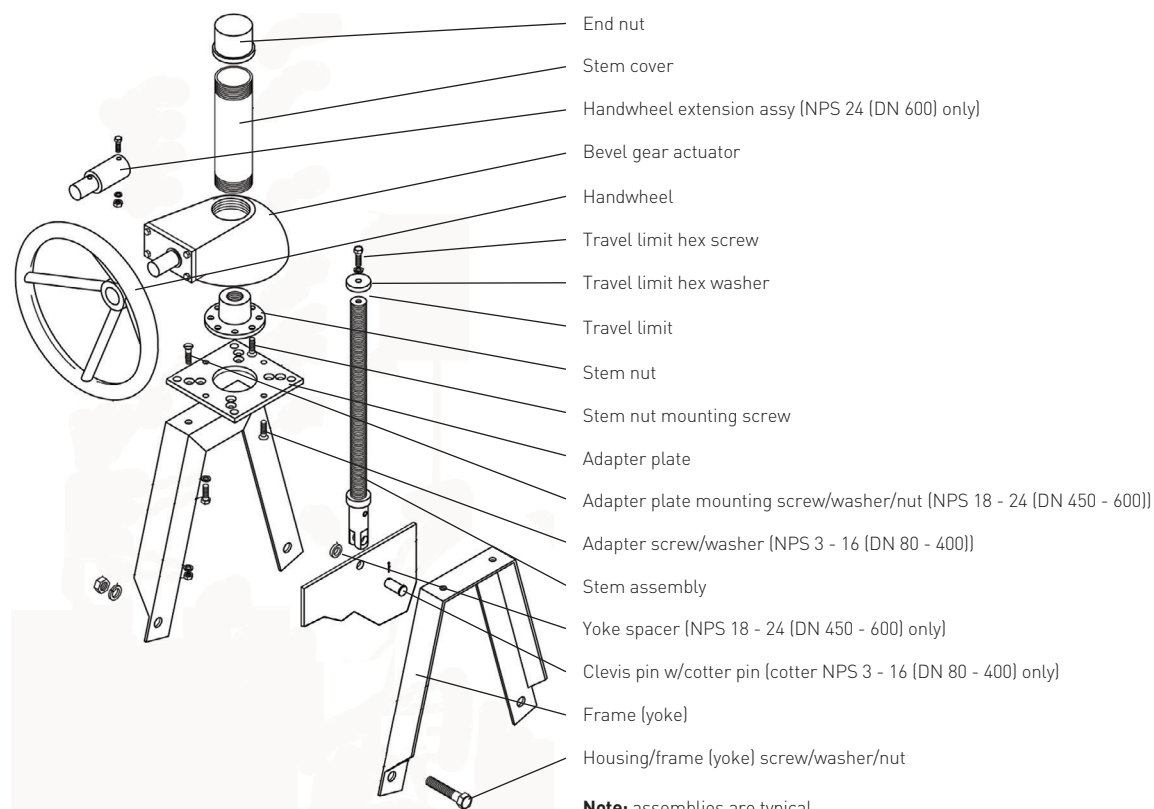
Valve size		MH		BG		AC		HC	
NPS	DN	lbs	kg	lbs	kg	lbs	kg	lbs	kg
3	80	50	22.7	127	57.6	85	38.6	50	22.7
4	100	64	29.0	141	64.0	130	59.0	70	31.8
6	150	98	44.5	175	79.4	180	81.6	98	44.5
8	200	135	61.2	212	96.2	210	95.3	135	61.2
10	250	198	89.8	275	124.7	310	140.6	175	79.4
12	300	-	-	427	193.7	669	303.5	360	163.3
14	350	-	-	448	203.2	720	326.6	414	187.8
16	400	-	-	573	259.9	1125	510.3	550	249.5
18	450	-	-	875	396.9	1330	603.3	950	430.9
20	500	-	-	1054	478.1	1680	762.0	1200	544.3
24	600	-	-	-	-	2200	997.9	1400	635.0
26	650	-	-	-	-	-	-	1700	771.1
30	750	-	-	-	-	-	-	2150	975.2
36	900	-	-	-	-	-	-	3500	1587.6
42	1050	-	-	-	-	-	-	5200	2358.7
48	1200	-	-	-	-	-	-	6970	3161.5
54	1350	-	-	-	-	-	-	8275	3753.5
60	1500	-	-	-	-	-	-	9500	4309.1

# CLARKSON SLURRY KNIFE GATE VALVES - KGA+ INSTALLATION AND MAINTENANCE INSTRUCTIONS

## 16 MANUAL HANDWHEEL ACTUATOR ASSEMBLY - MH



## 17 BEVEL GEAR ACTUATOR ASSEMBLY - BG



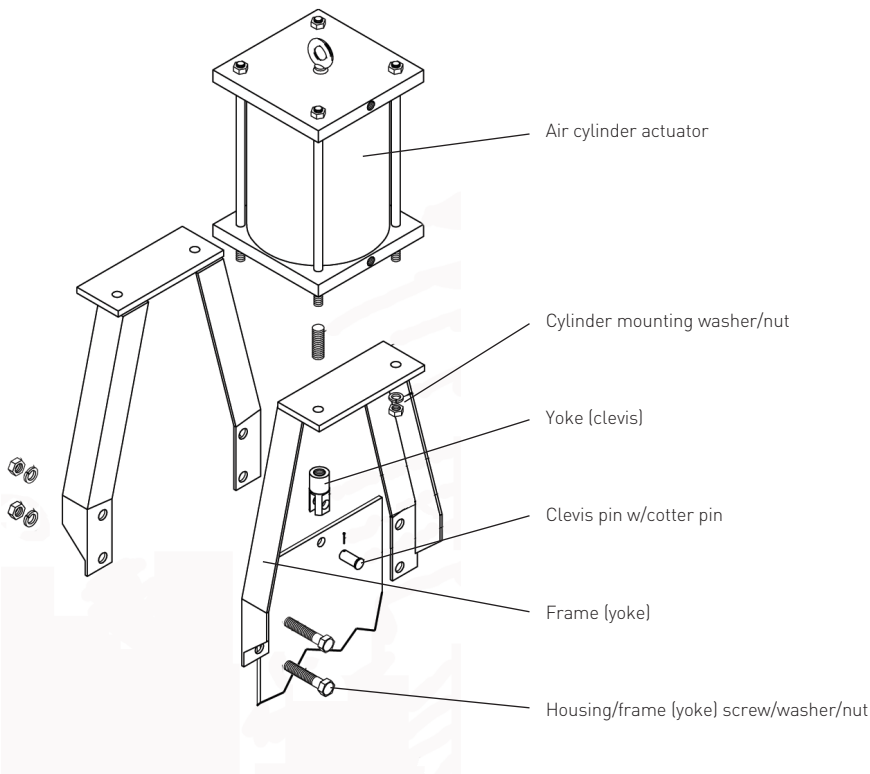
**Note:** assemblies are typical.

**CLARKSON SLURRY KNIFE GATE VALVES - KGA+**  
INSTALLATION AND MAINTENANCE INSTRUCTIONS

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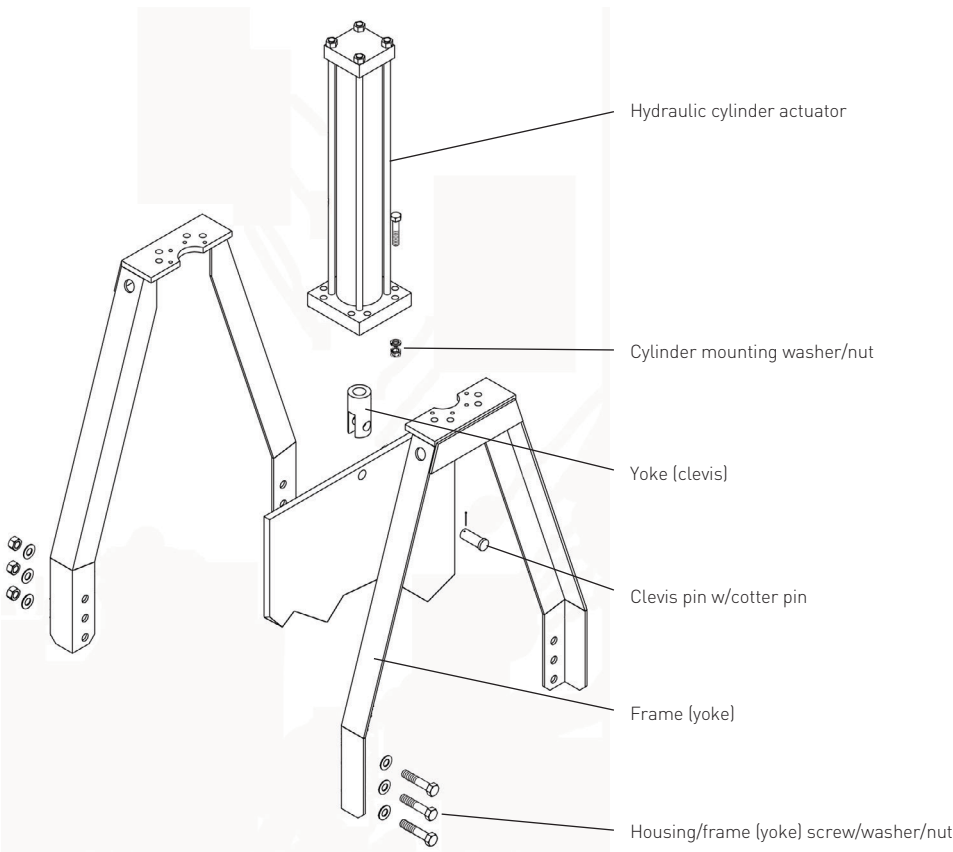
**18 AIR CYLINDER ACTUATOR ASSEMBLY - AC**

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**19 HYDRAULIC CYLINDER ACTUATOR ASSEMBLY - HC**

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# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

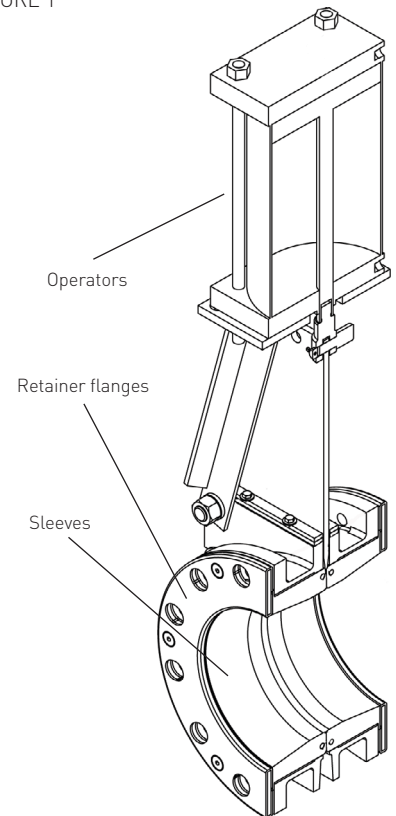
### 20 GENERAL INFORMATION

1. The KGA is a packingless, slurry knife gate valve. All the sealing is accomplished by the elastomeric sleeves in the valve housing. The sleeves also form the wear section for the valve. The gate is removable for inspection or replacement while the valve is in service.
2. The KGA is BIDIRECTIONAL (two-way shut-off) product and can be installed without concern over direction of flow. Since they will shut-off equally with in either direction, you will find no arrows or other indicators of a direction of flow or seat side.
3. Clarkson slurry knife gate valves are suitable for on-off service only. They are not to be used in a throttling application.
4. The style, size, pressure rating and material selection are the responsibility of the piping system designer.
5. All valves should be operated within the design pressure and temperature ranges. Under no circumstances should the valves be operated at conditions outside these parameters. Do not exceed 100% of the maximum pressure rating of the valve at any time during its operation. Pressure spikes beyond the valve's pressure rating are solely the responsibility of the user.

### 21 INITIAL INSPECTION

1. Examine entire valve and report any damage or discrepancies immediately.
2. Sleeves: visually examine the sleeves interior, looking for chunking, irregularities or other damage. It is not recommended you remove the retainer flanges (if equipped).
3. Retainer flanges: sizes NPS 8 (DN 200) and below may or may not have the optional retainer flanges, retainer flanges are standard on sizes NPS 10 (DN 250) and larger. Visually examine the retainer flanges surfaces, looking for tears, irregularities or other damage. Check tightness of retainer flange bolting.
4. Operators: standard manual handwheels may be shipped loose for field installation, be sure to fully tighten.
5. Valves are normally shipped with gate in open position, the recommended position for installation. Valves supplied with spring to extend (fail close) cylinder actuators are shipped with the gate in the closed position. As the KGA should be installed with the gate in the open position. Exercise caution when applying air to open this valve and then ensure that it is locked in the open position when installing in the line.
6. Accessories: if provided, including solenoids, limit switches, positioners, etc., are tested for functionality prior to shipment. Examine carefully for damage which may occur during shipment.

FIGURE 1



# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 22 INSTALLATION INSTRUCTIONS

Please take note of the specific installation tags provided with each valve.

1. The KGA is installed with the gate in the fully open position with the sleeves inserted into the housing halves.

#### CAUTION

*Valves are normally shipped with gate in open position, the recommended position for installation. Valves supplied with spring to extend (fail close) cylinder actuators are shipped with the gate in the closed position. Gate should be actuated to the open position prior to installation, exercise extreme caution when applying air to open this valve and then ensure that it gate locked in the open position for installation.*

2. The mating line flanges must be properly aligned prior to attempting installation. Slip on or weld flanges can be used. Never try to make up for misaligned pipe flanges by the line bolting. Pipe supports and/or expansion joints should be used to minimize pipe loads on valves. The pipeline companion flanges should be raised or flat face type to insure full sleeve support and a continuous unvarying I.D. If slip-on flanges are used, the pipe should be cut square and welded in position with the pipe end matched evenly with the flange face. Studded flanges are not compatible with these valves. Tables 1 and 2 state the maximum flange bolt tightening torques. Listed in Table 3 are the fasteners required for installation.
3. Sizes NPS 8 (DN 200) and below may or may not have the optional retainer flanges.

Retainer flanges are standard on sizes NPS 10 (DN 250) and larger. If no retainer flanges are used, the flanged end of the sleeves form the gasket when installed into the pipeline. When equipped with retainer flanges, the elastomer coated retainer flange functions as the gasket for installation into the pipeline.

4. Valve is suitable for use in either vertical or horizontal lines. The valve can be installed in any position in vertical or horizontal pipelines. However, valves installed in an orientation with the actuator below horizontal may require flushing to prevent the buildup of solids in the housing and may require additional actuator support.
5. Standard mating flanges NPS 3 - 24 (DN 80 - 600) match ASME B16.5/150, sizes NPS 26 (DN 650) and larger are per MSS-SP44 (see Table 1).

#### Installation notes

- A. All slurry knife gate valves are designed and manufactured to be installed in applications where no more than 1 g of force in excess of gravity is applied to the valve in any direction. This 1 g force can be an effect of traffic, wind, or earthquake, etc. Valves should not be used in applications that exceed 1 g.
- B. If valve stem or topworks protrude into walkways or work areas, valve should be flagged per company safety policy.
- C. All piping systems should contain independent support mechanisms and should not utilize the valve as a sole means of support.
- D. Do not install valve over walkways, electrical or other critical equipment without the use of splash guards or similar considerations.

**TABLE 1 - MAXIMUM TIGHTENING TORQUE STANDARD FLANGES**

Valve size		ft·lb	N·m
NPS	DN		
3	80	37	50
4	100	37	50
6	150	69	93
8	200	69	93
10	250	113	153
12	300	113	153
14	350	169	229
16	400	169	229
18	450	238	322
20	500	238	322
24	600	345	467
26	650	345	467
30	750	345	467
36	900	610	827
42	1050	610	827
48	1200	610	877
54	1350	1000	1355
60	1500	1000	1355

**TABLE 2 - MAXIMUM TIGHTENING TORQUE FRP FLANGES**

Valve size		ft·lb	N·m
NPS	DN		
3	80	25	34
4	100	25	34
6	150	40	54
8	200	40	54
10	250	65	88
12	300	65	88
14	350	100	135
16	400	100	135
18	450	140	190
20	500	140	190
24	600	200	271
26	650	200	271
30	750	200	271
36	900	320	434
42	1050	320	434
48	1200	320	434
54	1350	600	443
60	1500	600	813

# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

**TABLE 3 - BOLTING DIMENSIONS**

Valve size		Flange diameter		Bolt circle diameter		Bolt holes no.	Bolt size/thread UNC	Bolt lengths (see note)			
								Without retainer flg.		With retainer flg.	
NPS	DN	inch	mm	inch	mm			inch	mm	inch	mm
3	80	7½	190.50	6	152.40	4	⅝ - 11	2	50.80	2½	63.50
4	100	9	228.60	7½	190.50	8	⅝ - 11	2	50.80	2½	63.50
6	150	11	279.40	9½	241.30	8	¾ - 10	2	50.80	2½	63.50
8	200	13½	342.90	11¾	298.45	8	¾ - 10	2¼	57.15	2¾	69.85
10	250	16	406.40	14¼	361.95	12	7⁄8 - 9	-	-	3	76.20
12	300	19	482.60	17	431.80	12	7⁄8 - 9	-	-	4	101.60
14	350	21	533.40	18¾	476.25	12	1 - 8	-	-	4½	107.95
16	400	23½	596.90	21¼	539.75	16	1 - 8	-	-	4¾	120.65
18	450	25	635.00	22¾	577.85	16	1½ - 7	-	-	5½	139.70
20	500	27½	698.50	25	635.00	20	1½ - 7	-	-	5½	139.70
24	600	32	812.80	29½	749.30	20	1¼ - 7	-	-	6	152.40
26	650	34¼	869.95	31¾	806.45	24	1¼ - 7	-	-	6	152.40
30	750	38¾	984.25	36	914.40	28	1¼ - 7	-	-	7	177.80
36	900	46	1168.40	42¾	1085.85	32	1½ - 6	-	-	8½	177.80
42	1050	53	1346.20	49½	1257.30	36	1½ - 6	-	-	9	203.20
48	1200	59½	1511.30	56	1442.40	44	1½ - 6	-	-	9½	241.30
54	1350	66¼	1682.80	62¾	1593.90	44	1¾ - 5	-	-	10½	241.30
60	1500	73	1854.20	69¼	1759.00	52	1¾ - 5	-	-	11	266.70

### NOTES

- Flange dimensions per ASME B16.5/150 for NPS 2 - 24 (DN 50 - 600) and MSS SP44 for NPS 26 - 60 (DN 650 - 1500).
- Type B standard washers are not included in bolt / stud sizing.
- Flange thickness from ASME B16.5/150 for NPS 2 - 24 (DN 50 - 600) and MSS SP44 for NPS 26 - 60 (DN 650 - 1500).

### 23 OPERATION

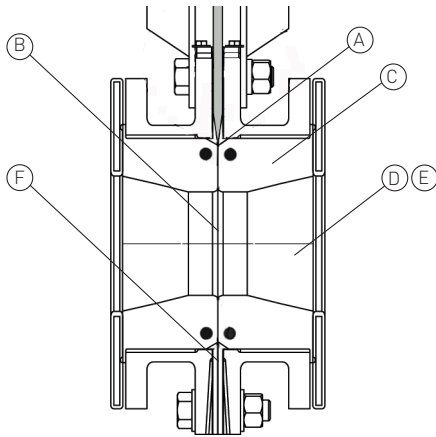
- Clarkson slurry knife gate valves are suitable for on-off service only. They are not to be used in a throttling application.
- To close the valve and provide isolation, the actuator (handwheel, bevel gear, air/hydraulic cylinder or electric motor actuator) moves the metal gate in a linear motion between the elastomeric sleeves to shut off the flow. To open, reverse the operation and the gate moves up and out from between the sleeves, opening the valve port.
- Matching elastomer sleeves seal against each under a high compression load when the valve is open, creating the valve pressure vessel. When the valve is closed, the sleeves seal against the gate face, isolating upstream from downstream. See Figures 2 and 3.  
**Note:** it is normal for the KGA to discharge media during opening and closing cycles. This helps prevent any solids from building up between the sleeves that would prevent a tight seal when the valve is fully open or closed. Discharge can be controlled with the use of an optional splash guard. Do not install valve over walkways, electrical or other critical equipment without the use of splash guards or similar considerations.
- As the gate strokes, a gap is created between the facing sleeves, allowing any media that could potentially clog or jam the valve to be purged out from between the sleeves, and potentially expelled outside the valve housing to atmosphere.
- The KGA valve incorporates a built-in clean-out area at the base of the housing assembly. The clean-out area may be enclosed by an optional, removable splash guard assembly. This splash guard will allow controlled drainage of any accumulated solids that may prevent full gate closure. Flush water can be used to improve the drainage efficiency. With the splash guard in place, any solids, slurry, or flush water ejected from the valve can be handled in a controlled manner. See Section 'Installation instructions for splash guard'.
- All valves should be operated within the design pressure and temperature ranges. Under no circumstances should the valves be operated at conditions outside these parameters.  
**Note:** actuated Clarkson valves have a maximum recommend stroke speed of 1" (25 mm) per second. Exceeding this speed can shorten sleeve life and may void warranty. Speed controls provided by factory will require adjustment in the field to obtain proper stroke speed against actual operating conditions.



# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

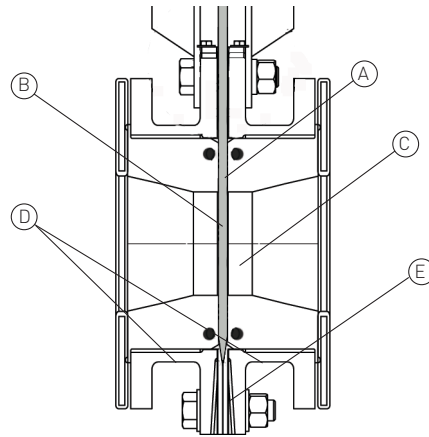
FIGURE 2 - OPEN POSITION



### Open position

- A. Gate positioned above seals, out of flow.
- B. Matching elastomer sleeves seal against each other under a high compression load.
- C. Sleeves act as pressure vessel.
- D. No metal parts in contact with slurry.
- E. Unobstructed port area eliminates turbulence, minimizes pressure drop across valve.
- F. No seat cavity where solids can collect and prevent full gate closure.

FIGURE 3 - CLOSED POSITION



### Closed position

- A. Gate travels through sleeves to provide blind flange shut-off, allowing opportunity for media to expel to atmosphere.
- B. 100% Isolation-bubble tight shut-off results in absolutely zero downstream leakage.
- C. When properly installed and maintained, the KGA is designed to provide man-safe isolation.
- D. Double-seated design provides bidirectional flow and shut-off.
- E. Controlled stroke prevents gate from penetrating too far, minimizing stress on sleeve.

- 7. The operator of any valve should have an understanding of the effects of opening/closing the valve with regards to its role in the overall piping system. Operators of valves under pressure should take caution to ensure that the valve is in good operating condition prior to operating it under pressure.
- 8. Certain processes contain hazardous and/or otherwise unstable media. Care should be taken in these circumstances to ensure the operator is aware of the specific health and safety risks associated with that medium.
- 9. When operating the valve stand clear of any moving parts such as the stem and/or gate assembly, use of gloves is suggested when operating manual valves to minimize the risk of injury.
- 10. All manually operated valves are designed for hand input. Do not apply excessive input torque via pipe wrenches, 'cheater bars', or other devices. If a manual handwheel actuated valve is difficult to operate due to torque requirements, it is recommended that the valve be supplied with or converted to a bevel gear, air/hydraulic cylinder or electric motor actuator.
- 11. Electric motor actuated valves should be left in their factory set condition, unless the system operating parameters dictate a change. If changes are necessary, they should be performed in small increments using the lightest/lowest setting possible to achieve the desired performance and then the valve/actuator function inspected. Excess torque and/or thrust in the motor settings may damage or lockup the valve.
- 12. Clarkson KGA valves are position seated and should never be torque seated. Do not use the motor torque settings to seat the valve.
- 13. Care should be taken to ensure that electrical motors are wired correctly to the power source. Incorrect phasing of 3-phase wiring may cause valve/motor damage.

# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 24 LOCKOUTS

Lockouts are optional on the KGA. If provided, the open-closed lockout brackets are designed to resist the normal valve operating thrust. In order to assure complete lockout compliance, any AC, HC or EM actuated valve must be placed in a ZERO ENERGY STATE by isolating all potential energy sources including electricity, operator supply air or hydraulic fluids. Please contact factory for complete details.

#### CAUTION

*Valves supplied with spring to extend (fail close) or retract (fail open) cylinders contain a mechanical spring which is compressed. In this case, the mechanical energy of the compressed spring cannot be placed in a ZERO ENERGY STATE. Take extreme care when inserting and removing the lockout pin. If the valve is actuated or the opposing pneumatic force is removed during the insertion process, the cylinder rod, gate and accompanying hardware will move and injury could occur.*

### 25 GENERAL MAINTENANCE

We recommend that all Clarkson products be inspected at least every 60 days. The following points should be examined and corrected as required:

1. Exterior overview: piping system components are subject to certain levels of erosion and corrosion. Periodic inspections should be made as valves/components may wear over time. Regular inspection of the housing assembly and gate should be performed, check for general signs of corrosion, component wear and/or damage caused by process media. Severe applications may require additional inspection types and/or frequency.
2. Valve stems, extension stems, and stem nut: look for excessive corrosion, galling or lack of lubrication. If valve stem requires lubrication, utilize the grease fitting provided and pump standard bearing grease through the yoke hub to lubricate the stem and stem nut assembly. Additional lubrication may be applied directly onto stem or stem threads. (Use material which meets ASTM 4950 GBLB.)

3. If possible stroke the valve through the full open and closed position to make sure it is functioning properly.

**Note:** it is normal for the KGA valve to discharge media during opening and closing cycles.

4. Valve housing and sleeve lubrication
  - A. The KGA valve is equipped with lubrication fittings located in the chest of the valve. Through these lubrication fittings, approved silicone based-lubricant can be inserted into the valve chest area. This is the primary means of gate and sleeve lubrication.
  - B. As a minimum, the Clarkson KGA valves should be lubricated every 100 strokes for NPS 3 - 10 (DN 80 - 250) sizes and every 50 strokes for NPS 12 - 60 (DN 300 - 1500) sizes. An individual application may require more or less frequent lubrication depending on the process and chemistry. If a valve cycles very infrequently, less than once per month, lubrication prior to each stroke is recommended. (See below for approved lubrication).
  - C. The gate may also be lubricated by applying lubricant directly onto the exposed gate surface.
  - D. Sleeve wear can be minimized if the valve gate is scraped or wiped clean occasionally.
  - E. For dry material handling service, liquid or grease type lubricants should not be used.

#### NOTE

Failure to use the recommended type of lubricant will considerably reduce the life of both the sleeves and secondary seal. Under no circumstances should a hydrocarbon-based lubricant be used. The use of improper lubrication will void any remaining warranty.

FIGURE 4

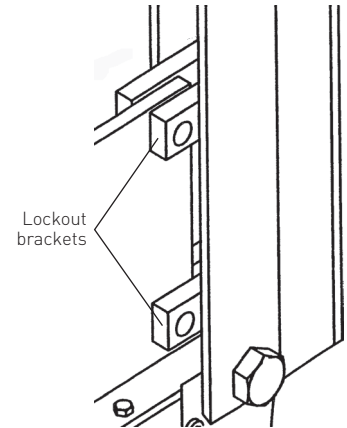
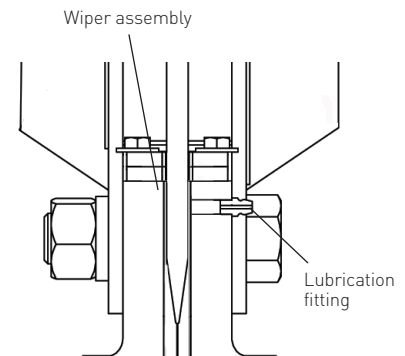


FIGURE 5



### APPROVED SILICON BASED LUBRICANTS

Dow III - Dow corning	Complex 821 - NFO
Dow 44 - Dow corning	Dow 7 - Dow corning
Rhodorsil 111 - Rhone-poulenc	Compound G661 - G E
Sil glyde - AGS Company	

For compatibility of other lubricants, consult Emerson Engineering.

# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 26 SPARE PARTS

With the update to the KGA+, it is important to understand the impact on spare parts and interchangeability with the KGA. When ordering spare parts, keep in mind the new KGA+ uses the 'plus' sign as part of the model code. This will allow quick identification to assure proper spares are provided.

If tag is missing or unreadable, there are several exterior clues to tell the difference (refer to Figure 6):

**KGA+:** At the top of the valve housing, the secondary seal retainer is a single piece and goes all-around the gate.

**KGA:** At the top of the valve housing, in place of the secondary seal retainer, the KGA has a wiper retainer. This is a two piece assembly and the wiper (black plastic) is visible.

1. **Encapsulated sleeves:** no changes, 100% interchangeability with all sizes.
2. **Gates:** to accommodate the new secondary seal, gates have been redesigned for sizes NPS 3 - 16 (DN 80 - 400). New gates for the KGA+ sizes NPS 3 - 16 (DN 80 - 400) are not interchangeable with the prior design KGA and older gates will not fit the KGA+. As a result, peripheral parts including gate clevises, stem assemblies are also impacted and not interchangeable in these sizes.
3. **Retainer flanges:** no changes, 100% interchangeability with all sizes.
4. **Housings:** all sizes have been redesigned to accommodate the secondary seal, full face flanges and spacer bar elimination. They are not interchangeable with older housings. Materials of construction remain the same.
5. **Frames (yokes):** no changes, 100% interchangeability with all sizes excluding special heavy duty designs.
6. **Stem nut assembly:** no changes, 100% interchangeability with all sizes.
7. **Handwheel:** no changes, 100% interchangeability with all sizes.
8. **Stem nut base:** no changes, 100% interchangeability with all sizes.

9. **Stem assembly:** as noted above, due to the gate redesign on sizes NPS 3 - 16 (DN 80 - 400), stems are not interchangeable. Sizes above NPS 16 (DN 400) are 100% interchangeable.
10. **Wiper assembly:** a wiper assembly is standard on the KGA, the KGA+ uses a secondary seal assembly, the two assemblies are not interchangeable between the two valve types.
11. **Actuation:** no changes have been made to the AC or HC actuators, 100% interchangeability. The clevis assembly (gate to cylinder rod connection) has been changed for sizes NPS 3 - 16 (DN 80 - 400) and is not interchangeable. The BG actuator remains the same however, the stem has been revised in sizes NPS 3 - 16 (DN 80 - 400) so it is not interchangeable with prior designs.

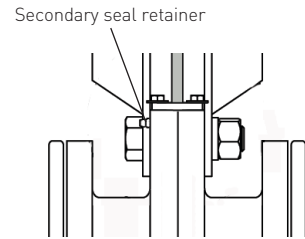
#### Recommended spare parts (see Figure 7)

Valves:

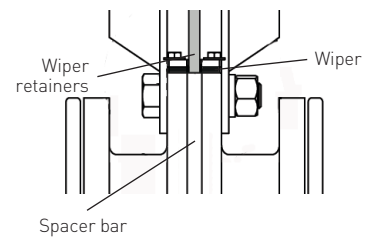
- 2-replacement sleeves
  - 1-replacement wiper set (includes wiper, retainer and fasteners)
- Cylinder operator (if applicable):
- 1-repair kit

1. When ordering replacement parts for a Clarkson product or cylinder operator, please include valve or cylinder size and complete description including serial number with your request.
2. Additional replacement parts such as handwheels, stem nut assemblies, retainers, frames (yoke), stems and gates are available from factory. Again, please provide complete description with serial number when ordering.
3. Spare sleeve storage: molded elastomer sleeves have a practical recommended shelf-life. Genuine Clarkson sleeves are laser etched on the outside surface with date of manufacture to use in calculating estimated shelf-life.
  - Natural rubber - 2 years
  - EPDM - 4 years
  - NBR/HNBR - 4 yearsContact factory for additional elastomers.

FIGURE 6

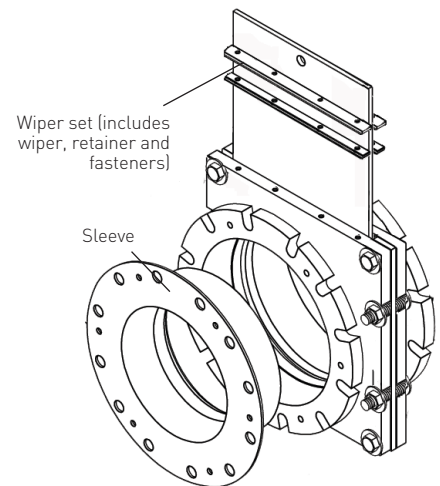


KGA+, secondary seal retainer is a single piece, goes all-around the gate, no spacer bar.



KGA, wiper retainer is two piece, wiper (black plastic) is visible. Spacer bar is also visible.

FIGURE 7



# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

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To maintain shelf -life, spare sleeves should be stored in accordance with the following.

The shelflife listed is guideline data and is not a substitute for examination of cured material at the time of intended use.

1. Store at ambient temperature up to 80°F (27°C), with 60 - 90% relative humidity away from direct sunlight and at a minimum distance of 15 feet (5 meters) away from electric motors is mandatory.
2. Care must be taken to avoid storage in a stressed condition such as piled too high or on a plain pallet overhanging a sharp edge.
3. First in - first out inventory control should be practiced.
4. The above elastomer shelf life guidelines are for components that are not already installed in a valve.

### NOTE

Emerson recommends customers always use genuine Clarkson OEM sleeves, secondary seals and other replacement parts to maintain the expected, superior, performance of their KGA. Genuine Clarkson sleeves from Emerson are easily recognized by the laser etched identifying marks found on the outside surface. These marks include the size, part number, applicable patent number, elastomer batch compound and date of manufacture; all of which allow complete traceability of the part. Clarkson replacement sleeves, wiper sets and other parts from Emerson are the only ones authorized for use and offer the best fit and continued performance that non-OEM parts simply cannot give. The use of copycat parts may invalidate any remaining warranty. If valve requires further repair, please contact our office for an estimate of feasibility and cost of repair.

### 27 STORAGE

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The following are the factory's recommendations for storage procedures to retain maximum product integrity during long term storage of 1 to 5 years.

1. Valves are normally shipped with gate in open position, the recommended position for storage. During storage, the gate should always be in the open position. Storage should be in an area out of direct sunlight, away from heat, ozone and extreme weather conditions. Freezing is not considered detrimental as long as the valve is kept dry. High voltage rectifiers and other ozone generating equipment and sources should not be near the storage area.
2. The preferred storage location is a clean, dry protected warehouse. If valves are to be stored outside, precautions should be taken to keep valves clean and dry. Standard packaging materials provided in valve shipment cannot be considered sufficient for outdoor storage.

3. If outdoor storage is required, the equipment should be totally covered with a heavy, light colored, plastic covering. It is essential that the plastic be opaque to eliminate sunlight, and light colored to minimize heat buildup. The covering should be spread in a manner that allows underside ventilation. To insure proper ventilation the equipment should be elevated 2" - 4" (50 - 100 mm) above the ground.
4. Manual actuated valves may be stored in the vertical or horizontal position. For air or hydraulic actuated valves, the preferred orientation for optimum protection is with the valve fully opened and the cylinder in the vertical position. This position gives the best support to the cylinder rod and helps reduces the chance of a 'flat spot' developing on the cylinder seals. An acceptable alternate position for valves with cylinder diameters of less than 6" (150 mm) is with the cylinder in the horizontal position. Motor actuated valves should be oriented in the direction as preferred by the actuator manufacturer.
5. Valves with cylinder and motor actuators should be stored in accordance with actuator manufacturer's recommendations. Access ports or panels should be secured to prevent unauthorized entry and prevent contamination.
6. Where auxiliary equipment is included, such as limit switches, solenoid valves, etc., care must be taken to avoid moisture and condensation conditions on the equipment.
7. Storage inspection: visual inspection shall be performed on a semiannual basis and results recorded. Inspection as a minimum shall include reviewing the following:
  - Packaging
  - Flange covers
  - Dryness
  - Cleanliness
8. Maintenance shall consist of correcting deficiencies noted during inspection. All maintenance shall be recorded. Contact factory prior to performing any maintenance if valve is still covered under warranty.

### CAUTION

*Valves supplied with spring to extend (fail close) cylinder actuators are shipped with the gate in the closed position. DO NOT store a KGA with a spring to extend (fail close) in the open position. This would put the spring in a compressed, fully energized position. For storage, it is recommended the valve sleeves be removed from the valve housing and stored separately from the valve. Reinsert sleeves prior to installation.*

# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 28 SLEEVE REPLACEMENT

#### NOTE

Sizes NPS 8 (DN 200) and below may or may not have the optional retainer flanges. Retainer flanges are standard on sizes NPS 10 (DN 250) and larger. Larger diameter valves are supplied with segmented (multipart) retainer flanges. If your valve has segmented retainer flanges, take note of the special sections.

#### Inspection of components

1. Verify that for each valve there are two (2) sleeves, two (2) retainer flanges (if required), retainer flange bolts and nuts (if required). KGA NPS 30 - 60 (DN 750 - 1500), use segmented retainer flanges. Refer to the Clarkson certified parts list for the appropriate valve size to determine the quantity of retainer flange nuts and bolts required.
2. Visually inspect each sleeve and retainer flange for damage to surfaces resulting from shipping or post-shipping handling. The sealing surfaces (nose) must be free of depressions, slits or gouges.

#### Disassembly

1. Before working on the KGA valve, verify that the valve is in the open position. If it is not, move it to the open position.

#### CAUTION

*Assure line is not pressurized before removing valve. Valve assembly and parts may be heavy, use proper lifting and support techniques. See Section 33, Lifting.*

2. Remove the valve from the piping.
3. Visually inspect and verify that the sleeve bore is clear of all debris, scale and elastomer residue.
4. Remove the retainer flange bolts taking caution to prevent retainer flanges from falling free if in vertical position. Remove the retainer flanges from the valve.
5. For valves with segmented retainer flanges (see Figure 9), loosen retainer bolts and pull each individual segment straight up away from the valve, do not remove more than one section at a time.

6. Remove the two elastomer sleeves by simply pulling each sleeve out of the housing assembly. (Sometimes a putty knife, large screwdriver or pry bar is necessary to pry the retainer flange away from the sleeve and the sleeve from the valve flange.)

#### Installation

1. Lay valve down in a horizontal position, on a flat surface. (While it is possible to install valve sleeves with assembly in vertical position, this may make it more difficult to properly align the retainer flanges and sleeves, especially on larger valves.)
2. Check the bore diameter for unusual or excessive wear. If found, valve housing may require replacement.
3. Table 4 shows the maximum / minimum bore dimensions of a new KGA valve, along with the maximum allowable diameter figures of a housing affected by wear and usage. If housing is not within the maximum allowable range, it is recommended that the housing be replaced before installing new sleeves. In some cases, it may be possible to make minor repairs to the housing in order to continue using it. Please contact the factory for information.
4. Lubricate the O.D. of the seal end of the sleeve.
5. Install the sleeve, being careful to center the flange end in the bore of the housing.
6. Place a retainer flange on the top of the sleeve. Align the retainer flange bolt holes with the matching holes in the round flange. Align the I.D. of the sleeve and retainer flange.
7. For valves with segmented retainer flanges, position one retainer flange segment on the sleeve lip. Align with proper mounting holes in the round flange. Install the required bolts and nuts; hand tight. Position the next segment on the sleeve lip opposite the one previously installed. Install fasteners as before. Continue to install segments in this manner until complete flange is in position.

FIGURE 8

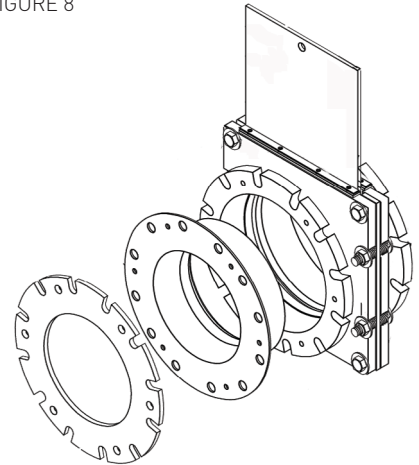
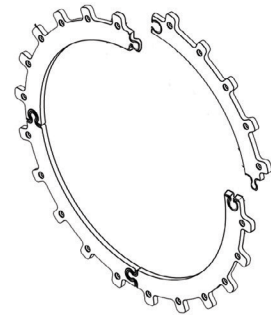


FIGURE 9

Example of a segmented retainer



# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

8. Install the retainer bolts. Only tighten sufficiently to allow installation of the next bolt. Continue this until all bolts are installed.
9. Once all bolts are in place, tighten the retainer flange bolts using a cross pattern until there is a 0" - 1/8" (0 - 3 mm) gap between the retainer flange and the housing. Do not cycle valve with only one sleeve in place.
10. Turn the valve over so the installed sleeve is on the flat surface.
11. Apply a silicone base lubricant to the sealing-nose radius of the installed sleeve. Also apply it to the second sleeve sealing nose and O.D. of seal end.
12. Install the second sleeve, following steps 1 through 11. It may be necessary to use two or more C-clamps to pull down the second retainer flange. Do not fully tighten retainer flange bolts until after checking the sleeve bores for concentricity; using a straight edge, check the sleeve position in four (4) places, 90 degrees apart in relation to the installed sleeve bore I.D. Adjust as required to make the sleeve concentric with the other sleeve.
13. Fully tighten retainer flange bolts per Paragraph 9.
14. Remove C-clamps, if used.
15. The valve is now ready for installation. Keep gate in the open position until valve is installed.

### NOTE

Certified Clarkson elastomer parts from Emerson are laser-etched with part number, date of manufacture, the Clarkson brand name and other appropriate information to assure you have a genuine Clarkson part. The use of non-OEM parts will void any remaining warranty.

## 29 WIPER REPLACEMENT

### CAUTION

*Since this procedure may be performed with the valve in an active pipeline, plant standard safety procedures must be followed. Use of personal protective equipment, tag out or other plant standard safety procedures must be followed. Procedure SHOULD NOT be done with valve in closed position. If valve is removed for this service, assure line is not pressurized before removing valve. Valve assembly and parts may be heavy, use proper lifting and support techniques, refer to Lifting, Section 33.*

### Disassembly

1. Replacement of the wiper assembly can be accomplished without having to remove the valve from service, however, this procedure **SHOULD NOT** be done with valve in closed position. If it is suspected that either one or both of the elastomer sleeves have failed, the valve should be removed from service before wiper assembly removal. If valve is to be removed, refer to Lifting section.
2. Open the valve, so the gate is in the fully raised position.
3. Remove the wiper retainer mounting screws, the retainer plates and wipers from the housing.
4. Examine wiper assembly parts for signs of wear or cracking, severe abrasion or chemical attack (softening or gumming). Replace if in doubt.

### Reassembly

1. If valve has been removed from pipe, lift valve to vertical position, refer to the lifting Section 33.
2. Install wipers and wiper retainers on each side of the gate.

## 30 DISASSEMBLY AND ASSEMBLY INSTRUCTIONS

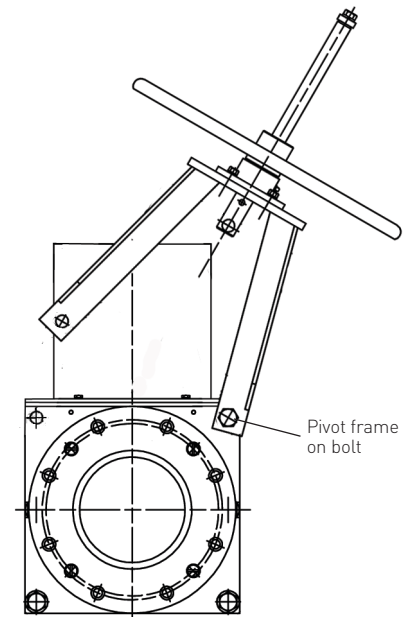
### NOTE

Sizes NPS 8 (DN 200) and below may or may not have the optional retainer flanges. Retainer flanges are standard on sizes NPS 10 (DN 250) and larger. Larger diameter valves are supplied with segmented (multipart) retainer flanges. If your valve has segmented retainer flanges, take note of the special sections.

### CAUTION

*Assure line is not pressurized before removing valve. Valve assembly and parts may be heavy, use proper lifting and support techniques. Refer to Lifting, Section 33.*

FIGURE 10



For gate and or wiper replacement, smaller valves may have the actuator frame swung out of the way as illustrated here. Remove frame bolts on one side only and loosen the opposite side just enough to allow movement. Be sure and properly support weight of actuator assembly, taking care to avoid injury.

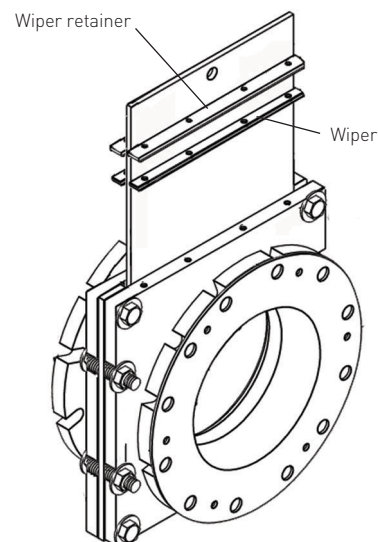
# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

**TABLE 4 - HOUSING I.D.**

Valve size		I.D. minimum		I.D. maximum		Maximum allowable housing I.D.	
NPS	DN	inch	mm	inch	mm	inch	mm
3	80	4.45	113.03	4.49	114.05	4.55	115.57
4	100	5.39	136.91	5.43	137.92	5.49	139.45
6	150	7.79	197.87	7.83	198.88	7.89	200.41
8	200	9.42	239.27	9.46	240.28	9.52	241.81
10	250	11.92	302.77	11.96	303.78	12.02	305.31
12	300	13.94	354.08	13.97	354.84	14.00	355.60
14	350	15.80	401.32	15.83	402.08	15.86	402.84
16	400	17.44	442.98	17.47	443.74	17.50	444.50
18	450	19.06	484.12	19.10	485.14	19.19	487.43
20	500	21.06	534.92	21.10	535.94	21.19	538.23
24	600	26.06	661.92	26.10	662.94	26.19	665.23
26	650	28.28	718.31	28.36	720.34	28.45	722.63
30	750	32.06	814.32	32.12	815.85	32.21	818.13
36	900	38.20	970.28	38.30	972.82	38.39	975.11
42	1050	45.06	1144.52	45.19	1147.83	45.31	1150.87
48	1200	50.74	1288.80	50.77	1289.56	50.89	1292.61
54	1350	55.74	1415.80	55.77	1416.56	55.89	1419.61
60	1500	63.95	1624.33	63.99	1625.35	64.11	1628.39

**FIGURE 11**



### Disassembly

- Before working on the KGA valve, verify that the valve is in the open position. If it is not, move it to the open position.
- Remove the valve from the piping.
- For ease of reassembly, using a permanent marker, draw a line on the gate face along the top of the wiper retainer plate. If marking gate is not an option, make note of the dimension from top of valve housing to top of gate in full open position (refer to Table 5, Figure 13, dimension A).
- Visually inspect and verify that the sleeve bore is clear of all debris, scale and elastomer residue.
- Remove the retainer flange bolts taking caution to prevent retainer flanges from falling free if in vertical position. Remove the retainer flanges from the valve.
- For valves with segmented retainer flanges (see Figure 9), loosen retainer bolts and pull each individual segment straight up away from the valve, do not remove more than one section at a time.
- Remove the two elastomer sleeves by simply pulling each sleeve out of the housing assembly. (Sometimes a putty knife, large screwdriver or pry bar is necessary to pry the retainer flange away from the sleeve and the sleeve from the valve flange).
- Remove the cotter pin from the clevis pin and remove the clevis pin from the gate. It may be necessary to actuate the valve down slightly in order to relieve pressure on the clevis pin to facilitate removal.
- Remove the actuator/frame subassembly at one time by removing the frame bolts that fasten the frames to the housing and pulling it away from the housing assembly.

- Remove the gate.

- Remove the wiper retainer mounting screws, the retainer plates and wipers from the housing.
- For ease in reassembly, mark the spacer plates in the as-assembled position. As there is a proper orientation to the plates, use these marks to properly place retainers at reassembly.
- Remove housing bolts, taking care as spacer plates may fall free.
- Pull housing halves apart, remove spacer plates.

### Visual inspection of parts prior to reassembly

- Check and ensure all housing interior surfaces and drain ports are free and clear of hardened slurry or other obstructions. Clean as required.
- Inspect the valve housing ensuring that the bores at the center of the valve are aligned with each other. Check the bore diameter for wear per Table 4. Replace if there are signs of excessive or unusual wear.
- Examine exterior housing surfaces for buildup of hardened slurry or other contamination, clean as required.
- Examine sleeves for signs of wear, cracking, chunking, deep cuts, severe abrasion or chemical attack (softening or gumming). Replace if in doubt; sleeves must be replaced as a set.
- Examine wiper assembly parts for signs of wear or cracking, severe abrasion or chemical attack (softening or gumming). Replace if in doubt.



# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

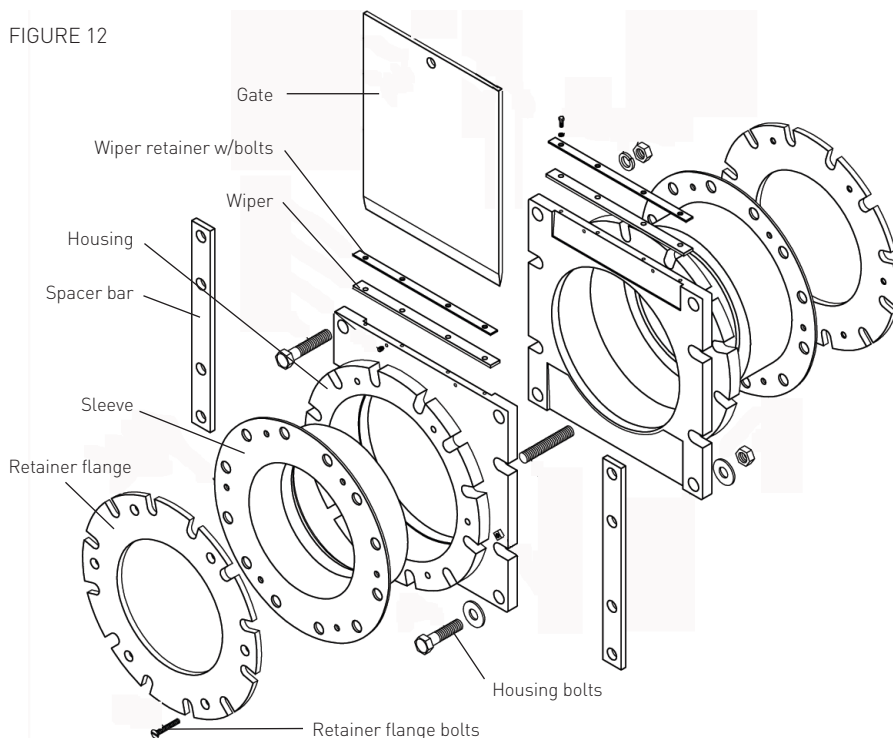
6. Inspect the gate for sharp edges or excessive damage. Some scoring will occur in normal use. If the gate has been bent beyond  $\frac{1}{16}$ " (1.5 mm) permanent deflection at the center, straighten or replace. If straightening is performed, use a hydraulic press. Use considerable care to minimize marks if a steel hammer is used. Use a belt sander to clean up score or other distress marks. If the gate is straight but has scale buildup, a putty knife or gasket scraper should be used to remove scale. Inspect the gate for wear and roughness. Use a disc grinder or belt sander to remove rough surfaces. Take particular care on the leading and beveled edge to remove burrs and other sharp edges.
7. Examine frame for signs of corrosion, damage or other potential problems.
8. Examine actuator assembly.
  - A. **Manual valves:** check stem for corrosion, straightness, etc. Look for signs of wear on brass stem nut.
  - B. **Air or hydraulic:** check for seal leaks around cylinder rod seal, heads and caps. Examine cylinder rod for signs of corrosion, straightness, etc. Service per manufacturer's instructions.
  - C. **Electric motor:** service per manufacturer's instructions.
9. Check spacer plates for corrosion and flatness.
10. Check all bolting hardware for thread integrity, signs of corrosion, straightness, etc. Replace as required.

### Reassembly

1. Lay the first housing half face down on a suitable flat surface.
2. Fill lube cavities with approved lubricant.
3. Place spacer plates into position using match marks to properly align the spacer plates.
4. Take second housing and fill lube cavities with approved lubricant. Place into position on the first housing, and properly align bolt holes making sure spacer plates remain in place.
5. Insert most of the housing bolts, leaving out the top bolts that are used to hold the actuator assembly to the housing and loosely tighten. Tap the edges of the housings to align the internal sleeve bores to within  $\frac{1}{16}$ " (1.5 mm), at the same time maintaining bolt hole alignment in the square flanges.
6. Adjust spacer bars:
  - For smaller valves where gate can be handled with relative ease:
    1. Slide the gate into position between the housing spacer bars.
    2. Tap the edge of the spacer bars to provide  $\frac{1}{8}$ " (3 mm) total running clearance between the bars and the edges of the gate. Remove gate when complete.
  - For larger valves:
    1. Measure the width of the gate.
    2. Adjust the distance between the spacer  $\frac{1}{8}$ " (3 mm) greater than the gate width, parallel to housing square flanges and an equal distance from the flange edges.

7. Install new sleeves and retainer flanges (if used) per Section 5 (one-piece retainers) or 9 (segmented retainers), as applicable.
8. Lift the valve assembly to vertical position, refer to Lifting, Section 33.
9. Liberally coat the knife edge along the entire knife area with approved lubricant. Position the gate between the frame resting on the joint between the sleeves. Additional support of gate may be required on larger valves.

FIGURE 12

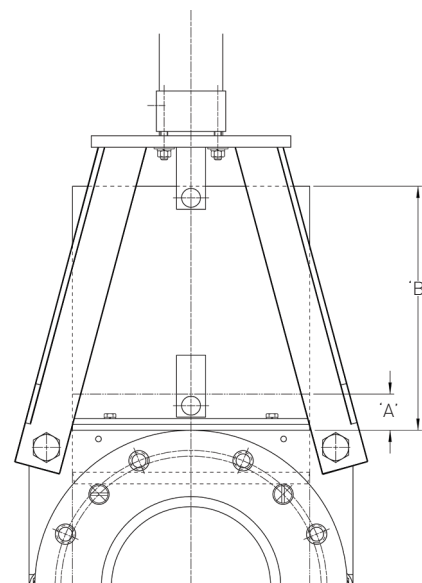


# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

10. Press the gate into the valve housing assembly until the mark drawn on the gate reaches the top of the retainer plate or gate reaches approximately dimension A, Table 5, Figure 13.
11. Reinstall the actuator / frame assembly with the housing / frame fasteners loosely.
12. Reconnect the gate to the actuator. (In order to facilitate installation and future removal, a coating or anti-seize compound should be applied to the outside of the clevis pin over the yoke contact area).
13. 'Stretch' the frame / actuator assembly with respect to the housing by pulling (not lifting) the frame / actuator assembly to its maximum movement away from the housing assembly (holding housing in place if valve is removed from pipeline). Tighten the frame / housing bolts and verify the tightness of the actuator to frame bolts.
14. Cycle valve to full open position and check the gate position using the data in the Table 5, Figure 13. Adjust as required.
15. Rattle the gate. It should be mostly disengaged from the sleeves. The outboard edges of the gate should be free and the center still partially engaged in between the sleeves.
16. Cycle gate full closed and full open.
17. Install wipers and wiper retainers on each side of the gate.
18. Inspect gate for pieces of rubber. If significant amount of rubber is present, a sharp edge(s) on the gate may be causing seal damage or the gate is extending too far on the up stroke. The ends of the gate should be free and the center still engaged. If the sleeve / gate is misaligned, loosen the frame actuator bolts and / or adjust the yoke until the proper position, open and closed, is obtained.
19. If out of pipeline, reinstall the valve, refer to Lifting section.

FIGURE 13



Dimensional tolerance:

NPS 3 - 10 (DN 80 - 250)	$\pm 1/16$ (1.5 mm)
NPS 12 - 16 (DN 300 - 400)	$\pm 3/32$ (2.4 mm)
NPS 18 - 26 (DN 450 - 650)	$\pm 1/8$ (3 mm)
NPS 30 - 60 (DN 750 - 1500)	$\pm 1/4$ (6 mm)

Dimension A = Distance from top of valve housing (not wiper plate) to top of gate in the closed position.

Dimension B = Distance from top of valve housing (not wiper plate) to top of gate in the opened position.

TABLE 5

Valve size		'A'		'B'	
NPS	DN	inch	mm	inch	mm
3	80	1.59	40.39	5.22	132.59
4	100	1.53	38.86	6.28	159.51
6	150	1.52	38.61	8.77	222.76
8	200	1.59	40.39	10.59	268.99
10	250	1.46	37.08	12.59	319.79
12	300	2.12	53.85	15.30	388.62
14	350	2.18	55.37	17.18	436.37
16	400	2.44	61.98	19.82	503.43
18	450	5.06	128.52	24.31	617.47
20	500	4.26	108.20	26.01	660.65
24	600	5.34	135.64	32.34	821.44
26	650	4.00	101.60	33.00	838.20
30	750	4.75	120.65	37.75	958.85
36	900	4.75	120.65	43.75	1111.25
42	1050	6.62	168.15	52.62	1336.55
48	1200	6.49	164.85	58.00	1473.20
54	1350	5.73	145.54	63.23	1606.04
60	1500	8.00	203.20	70.50	1790.70

# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 31 FIELD REPLACEMENT OF GATES

#### CAUTION

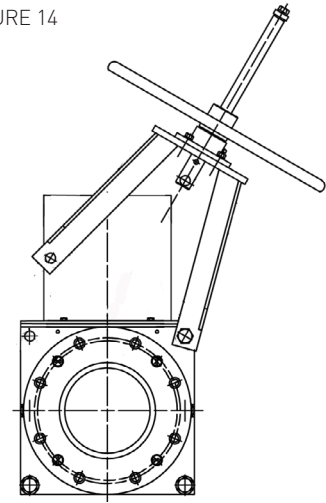
*Since this procedure may be performed with the valve in an active pipeline, plant standard safety procedures must be followed. Use of personal protective equipment, tag out or other plant standard safety procedures must be followed. If valve is removed for this service, assure line is not pressurized before removing valve. Valve assembly and parts may be heavy, use proper lifting and support techniques, refer to Lifting, Section 33.*

1. Open the valve, so the gate is in the fully raised position.
2. Remove the cotter pin and clevis pin from the gate. It may be necessary to actuate the valve down slightly in order to relieve pressure on the clevis pin to facilitate removal.
3. Actuator assembly removal:  
**Smaller valves:** remove the frame to housing bolts of one side except for the lowest bolt on the opposite side of the frame. This bolt will act as a pivot point for the frame / actuator assembly. Pivot the frame / actuator assembly away from the valve and temporarily support.  
**Larger valves:** remove the frame to housing bolts. Lift the frame and actuator assembly off the housing assembly to allow gate removal.
4. Remove the old gate.
5. Inspect the gate for sharp edges or excessive damage. Some scoring will occur in normal use. If the gate has been bent beyond  $\frac{1}{16}$ " (1.5 mm) permanent deflection at the center, straighten or

replace. If straightening is performed, use considerable care to minimize marks on gate surface. Scores or other distress marks may be cleaned up with a belt sander. Machining the gate surface is not recommended. Light scale buildup may be removed with a putty knife or gasket scraper. Inspect the gate for wear and roughness. Use a disc grinder or belt sander to remove rough surfaces. Take particular care on the leading and beveled edge to remove burrs and other sharp edges.

6. Apply a liberal amount of recommended lubricant to the two tapered faces of the 'sharp end' of the gate.
7. Press the gate into the valve housing assembly until the mark drawn on the gate reaches the top of the retainer plate or gate reaches approximately dimension A, Table 5, Figure 13.
8. Reinstall the actuator / frame assembly with the housing / frame fasteners loosely.
9. Reconnect the gate to the actuator. (In order to facilitate installation and future removal, a coating or anti-seize compound should be applied to the outside of the clevis pin over the yoke contact area.)
10. 'Stretch' the frame / actuator assembly with respect to the housing by lifting the frame / actuator assembly to its maximum movement up away from the housing assembly. Tighten the frame / housing bolts and verify the tightness of the actuator to frame bolts.
11. Tighten all of the frame to housing bolts.
12. Test stroke the valve to verify travel and wiper / wiper retainer interference with the yoke. Adjust / replace the wipers as required.

FIGURE 14



For gate replacement, smaller valves may have the actuator frame swung out of the way as illustrated here. Remove frame bolts on one side only and loosen the opposite side just enough to allow movement. Be sure and properly support weight of actuator assembly, taking care to avoid injury.

# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

13. 'Stretch' the frame / actuator assembly with respect to the housing by pulling (not lifting) the frame /actuator assembly to its maximum movement away from the housing assembly (holding housing in place if valve is removed from pipeline). Tighten the frame / housing bolts and verify the tightness of the actuator to frame bolts.
14. Cycle valve to full open position and check the gate position using the data in the Table 5, Figure 13. Adjust as required.
15. Rattle the gate. It should be mostly disengaged from the sleeves. The outboard edges of the gate should be free and the center still partially engaged in between the sleeves.
16. Cycle gate full closed and full open.
17. Inspect wipers and wiper retainers, replace as required (see Section 29).
18. Inspect gate for pieces of rubber. If significant amount of rubber is present, a sharp edge(s) on the gate may be causing seal damage or the gate is extending too far on the up stroke. The ends of the gate should be free and the center still engaged. If the sleeve / gate is misaligned, loosen the frame actuator bolts and / or adjust the yoke until the proper position, open and closed, is obtained.
19. If out of pipeline, reinstall the valve, refer to Lifting section.
2. Cut the gasket material into four pieces that will form the rectangular dimensions of the bottom of the valve if adhesive back strip is used. If the gasket is cut from sheet elastomer stock, 1/4" (6.4 mm) thick material is recommended. Material should be compatible with the slurry chemistry. The material used for the retainer flanges or sleeves will be suitable for the B7 gasket. Other choices may be possible. Consult the factory for recommendations.
3. Clean the flat machined surface of the splash guard so that there is no dirt, grit, grease, or other debris present. Remove the adhesive backing from the gasket material and apply to the splash guard on the machined flat mating surface (adhesive back strip). If a cut sheet gasket is used, it should be attached to the splash guard with an RTV type adhesive compound to hold it during installation. Attach gasket material to the flat surface along the edge of the machined slot.
4. Install the pipe cap on one end of the splash guard.
5. Position the guard below the valve and fit a U-bolt on each end with the fasteners loosely attached.
6. Verify the position of the gasket material and the bottom of the housing and tighten the installed U-bolts.
7. Tighten all U-bolt fasteners until the gasket is visually compressed.

### NOTE

It is normal for the KGA to discharge media during opening and closing cycles. This helps prevent any solids from building up between the sleeves that would prevent a tight seal when the valve is fully open or closed. Discharge can be controlled with the use of an optional splash guard or drain plate. Do not install valve over walkways, electrical or other critical equipment without the use of splash guards, drain plates or similar considerations.

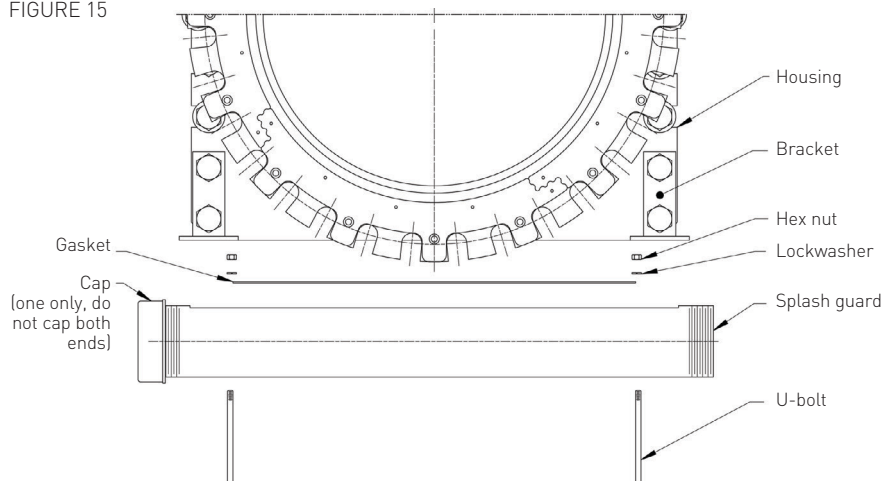
### 32 INSTALLATION INSTRUCTIONS FOR SPLASH GUARD (B7 OPTION)

1. Remove the splash guard, mounting hardware, and gasket from the valve crate. Verify that the proper number of mounting U-bolts, washers, nuts, along with the guard, end cap, and gasket material are present.

### WARNING

*Do not cap or close-off both ends of the splash guard. This can result in valve failure.*

FIGURE 15



# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 33 LIFTING

#### CAUTION

Valve assembly and parts may be heavy, use proper lifting and support techniques. DO NOT attempt to lift valve together with any adjoining pipe or other equipment. DO NOT attempt to lift valve if full of media. Lifting techniques may vary depending on valve size/weight. Small Clarkson KGA air and or hydraulic actuated valves may be equipped with eyebolts. These may only be used as lifting points on valve sizes NPS 10 (DN 250) and smaller for lifting valve and actuator ONLY. DO NOT Use these eyebolts on any larger valve.

For shipment, large KGA valves are normally palletized in the flat or horizontal position with the bore oriented vertically, flange faces down on pallet. The palletized valves are loaded on to trucks with a forklift. It is recommended unloading should also be done with a forklift. A crane can be used; however the weight must be supported by the pallet and not the valve. For KGA valves with slotted flanges, DO NOT lift or attempt to move valve with straps placed around the lugs of the mounting flanges, this is very dangerous.

Small Clarkson KGA air and or hydraulic actuated valves may be equipped with eyebolts.

These should only be used on valve sizes NPS 10 (DN 250) and smaller to lift valve and actuator assembly ONLY. Insert a properly rated strap and or lifting hook through eye of eyebolt and lift, taking care as center of gravity shifts. Do not drag the base of the valve during lifting as this can peel the rubber from the retaining flanges.

All valves can be lifted using the frame (yoke) assembly as the lift point. DO NOT USE LOCKOUT BRACKETS TO LIFT VALVE. Insert properly rated straps under the frame top plate, one for each leg, and lift, taking care as center of gravity shifts. Do not drag the base of the valve during lifting as this can peel the rubber from the retaining flanges.

Some larger KGA valves can be lifted using the lifting holes located near the top of each frame leg, on the side. DO NOT USE LOCKOUT BRACKETS TO LIFT VALVE. Appropriately sized and rated hoist rings can be placed in the lifting holes. Alternatively, two appropriately sized and rated steel bars can be slid through the holes and hoist rings threaded into the ends (see photo for a typical arrangement). For larger valves, all lifting should be done with chains. Shackles and straps, regardless of their weight ratings should never be used. Take care to not drag the base of the valve during lifting as this can peel the rubber from the sleeve retaining flanges.

FIGURE 16  
DO NOT use flange lugs to lift valve

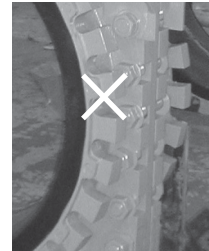


FIGURE 17

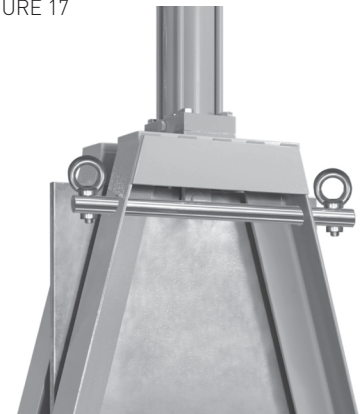


Illustration is for reference and not intended to show a recommended lifting apparatus. Be sure and follow proper lifting and support techniques.

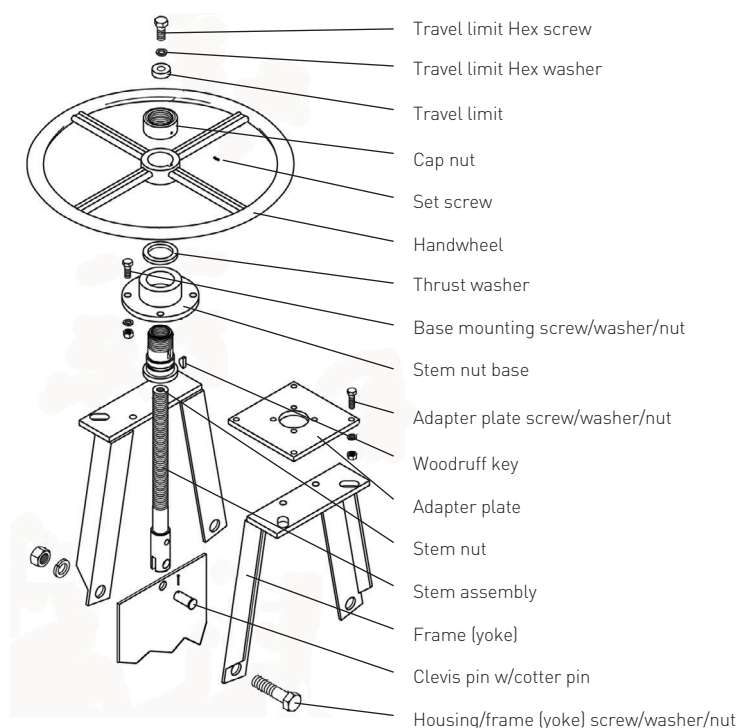
TABLE 6 - STANDARD VALVE ASSEMBLY WEIGHTS

Valve size		MH		BG		AC		HC	
NPS	DN	lbs	kg	lbs	kg	lbs	kg	lbs	kg
3	80	50	22.7	127	57.6	85	38.6	50	22.7
4	100	64	29.0	141	64.0	130	59.0	70	31.8
6	150	98	44.5	175	79.4	180	81.6	98	44.5
8	200	135	61.2	212	96.2	210	95.3	135	61.2
10	250	198	89.8	275	124.7	310	140.6	175	79.4
12	300	-	-	427	193.7	669	303.5	360	163.3
14	350	-	-	448	203.2	720	326.6	414	187.8
16	400	-	-	573	259.9	1125	510.3	550	249.5
18	450	-	-	875	396.9	1330	603.3	950	430.9
20	500	-	-	1054	478.1	1680	762.0	1200	544.3
24	600	-	-	-	-	2200	997.9	1400	635.0
26	650	-	-	-	-	-	-	1700	771.1
30	750	-	-	-	-	-	-	2150	975.2
36	900	-	-	-	-	-	-	3500	1587.6
42	1050	-	-	-	-	-	-	5200	2358.7
48	1200	-	-	-	-	-	-	6970	3161.5
54	1350	-	-	-	-	-	-	8275	3753.5
60	1500	-	-	-	-	-	-	9500	4309.1

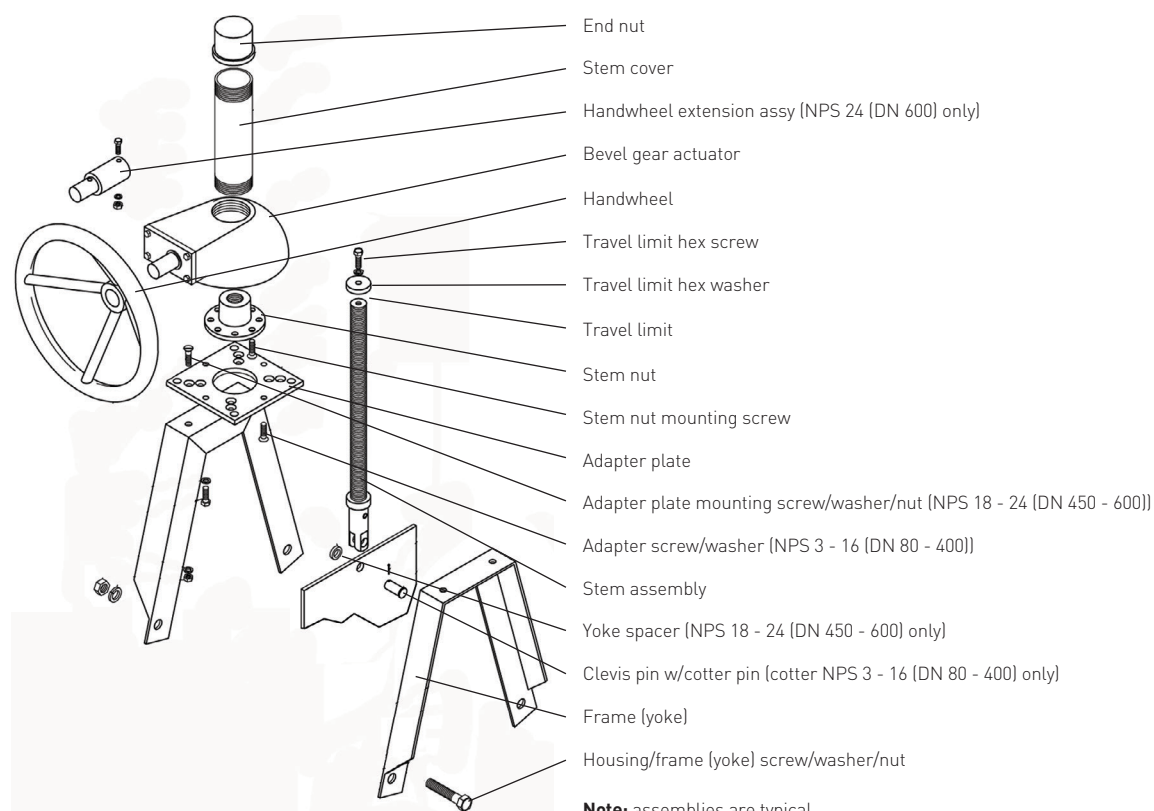
# CLARKSON SLURRY KNIFE GATE VALVES - KGA

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

### 34 MANUAL HANDWHEEL ACTUATOR ASSEMBLY - MH



### 35 BEVEL GEAR ACTUATOR ASSEMBLY - BG



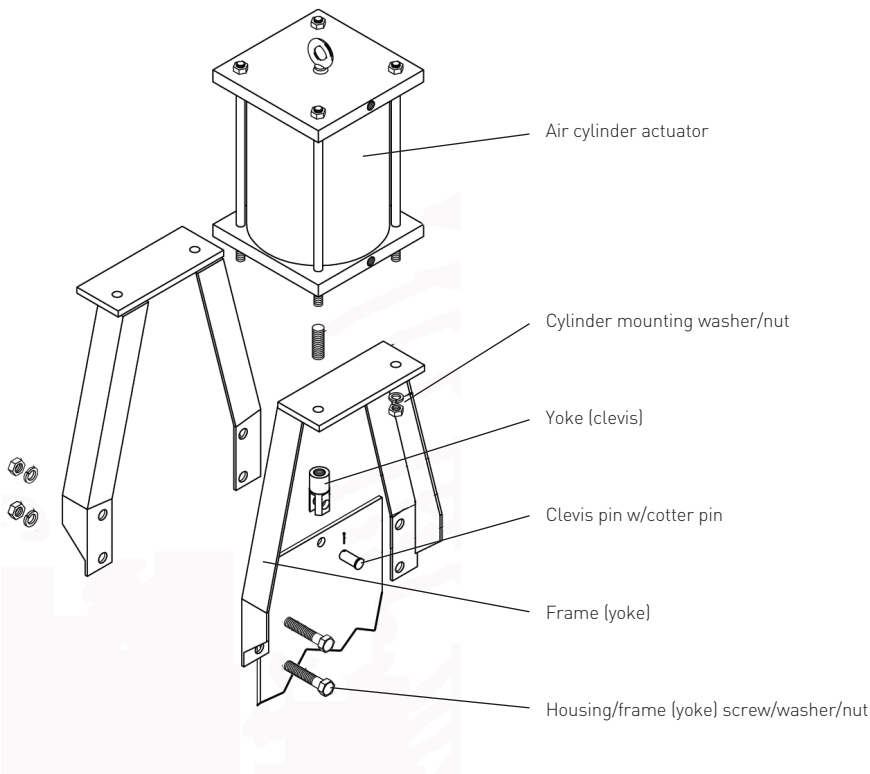
**Note:** assemblies are typical.

**CLARKSON SLURRY KNIFE GATE VALVES - KGA**  
INSTALLATION AND MAINTENANCE INSTRUCTIONS

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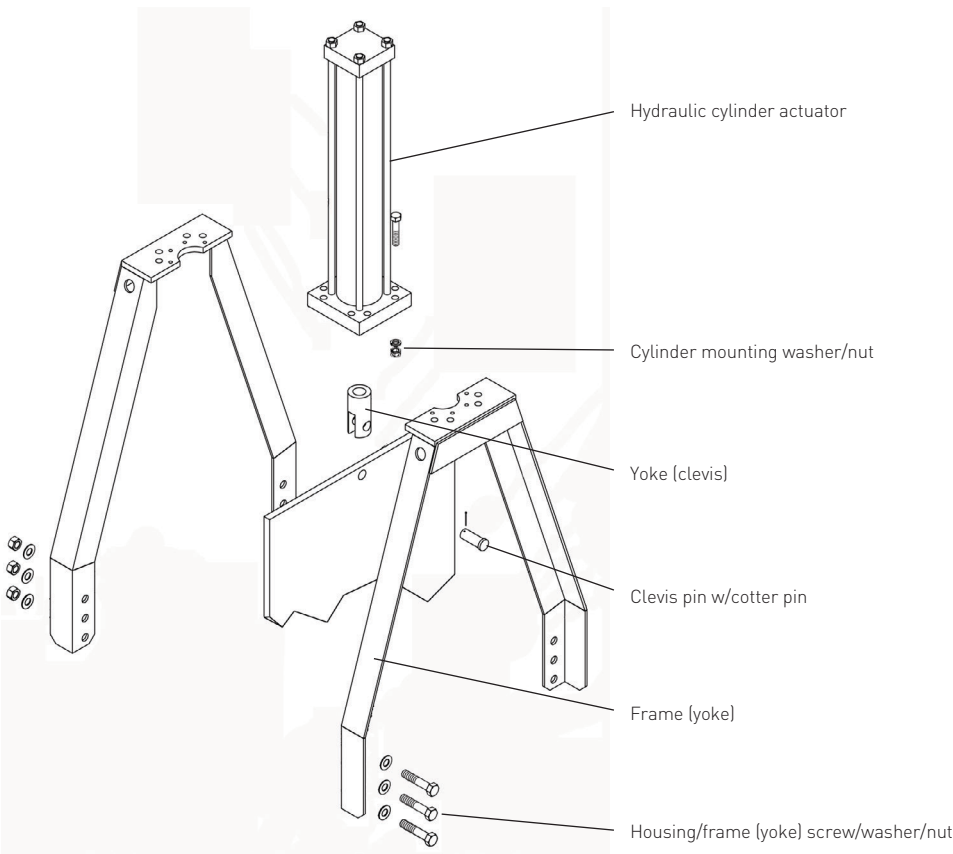
**36 AIR CYLINDER ACTUATOR ASSEMBLY - AC**

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**37 HYDRAULIC CYLINDER ACTUATOR ASSEMBLY - HC**

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