



## CLARKSON SEVERE SERVICE KNIFE GATE VALVE

MODEL KS1

Installation and maintenance instructions

### GENERAL INFORMATION

The KS1 has many features designed to improve service life and lower cost of ownership. It is suitable for a wide range of severe service slurry applications in:

- Mining and Mineral processing
- Coal Preparation plants
- Pulp and Paper plants
- Oil Sands processing
- Power
- Steel processing

### IMPORTANT FEATURES

- True bi-directional flow and zero leakage shut-off; can be installed in either direction
- Heavy cross section precision-molded elastomer seat provides more surface area for superior isolation
- Field-adjustable patent-pending gate edge seal and transverse seal prevent leakage through top of valve
- Enclosed body design prevents any leakage to the outside environment
- Full round port and seat design offers low pressure drop across valve and longer service life in abrasive applications
- Dual replaceable and rotatable integral Ni-resist wear rings extend service life
- Modular frame design allows for installation of any standard accessory without modification
- Fully piggable
- Available in raised or flat face



### LABEL CONTENTS

Item	Description	Example
MAWP	Maximum Allowable Working Pressure	2000 kPa
Comply	Standard	B31.3 & SP135
Manuf. ref.	Manufacturer's Reference	Unique identifier
CRN	Canadian Registration Number	TBC
Patent	Patent	TBC
Size	Valve nominal size	DN250
Flange	Valve mounting flange standard	ASME 150
Body	Body material	ASTM A439-D2
Gate	Gate material	2205 S/S
Temp	Maximum working temperature	80°C (NR)

### COMPLIANCE LABEL

 <b>EMERSON.</b>		PATENT <input type="checkbox"/>
		SIZE
<b>CLARKSON</b> <b>KS1</b>		FLANGE
		<b>2000 kPa</b>   <b>B31.3 &amp; SP135</b>
MAWP	COMPLY	BODY
MANUF. REF		GATE
CRN	TEMP (Seat) <input type="checkbox"/>	

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### INITIAL INSPECTION

1. Examine entire valve and report any damage or discrepancies to supplier prior to installation.
2. Inspect accessories, if any, including solenoids, limit switches, positioners, etc. for functionality prior to installation.
3. Large manual hand wheels may sometimes be shipped loose in container.
4. Packing screws should be checked and adjusted to torque stated in IOM as these could loosen during transport — overtightening will reduce seal life.

**⚠ WARNING**

Take safety precautions to avoid risk to personnel from unexpected leakage through packing when valve is first exposed to pressure.

### FLANGE BOLTING AND INSTALLATION INSTRUCTIONS

1. KS1 standard pipe connection is “flanged” where port flange mounting holes are tapped.
2. All flange holes in a valve size are same depth.
3. KS1 Series valves are designed to suit flanges compliant to ASME B16.5 and B16.47, and gaskets designed to ASME VIII-1 Appendix 2, and ASME B16.20 and B16.21.
4. Torque on flange bolt should not exceed values shown in Table 1.

**⚠ WARNING**

Incorrect bolt or stud length may damage thin wall at bottom of flange hole and risk integrity of pressure boundary.

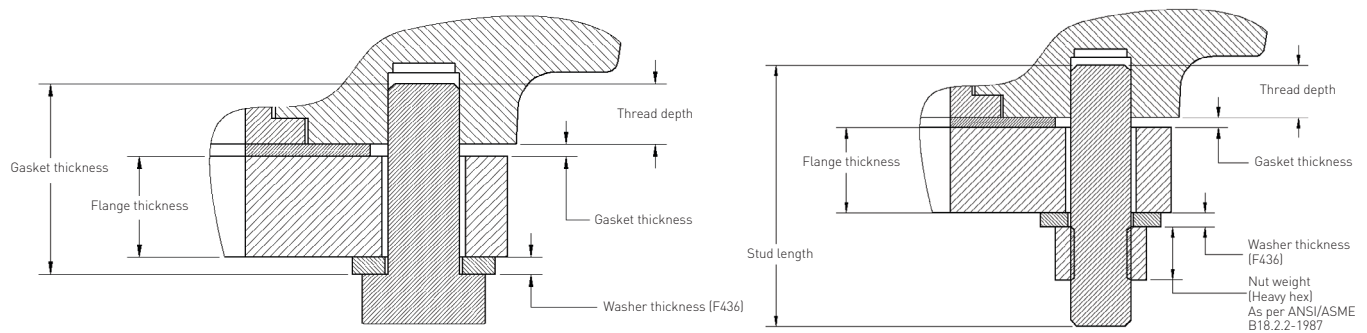
**TABLE 1 - MAXIMUM TORQUE ON FLANGE BOLTS OR STUDS**

Valve size		Bolt size	Torque		Recommended no. of washer for bolt	Recommended bolt length		Recommended no. of washer for stud	Recommended stud length	
NPS	DN	in	ft-lb	Nm	-	in	mm	-	in	mm
2	50	5/8-11	35	50	1	1.50	38.1	1	2.50	63.5
3	80	5/8-11	35	50	3	2.00	50.8	1	2.75	69.9
4	100	5/8-11	35	50	3	2.00	50.8	1	2.75	69.9
6	150	3/4-10	50	65	2	2.00	50.8	1	3.00	76.2
8	200	3/4-10	65	90	2	2.25	57.2	1	3.25	82.6
10	250	7/8-9	80	110	2	2.25	57.2	1	3.50	88.9
12	300	7/8-9	95	125	1	2.25	57.2	1	3.50	88.9
14	350	1-8	135	185	2	2.50	63.5	1	3.75	95.3
16	400	1-8	145	195	1	2.50	63.5	1	4.00	101

### NOTES

1. Maximum torque should not be exceeded to ensure threaded flange holes in valve body are not damaged.
2. Recommended bolt length assumes; Gasket thickness = 0.125 in.; F436 Flat washer thickness; Min 6 threads engagement; Common heavy hex bolt heights.
3. Below diagrams provide details on calculation of flange bolt/stud length.
4. Incorrect bolt or stud length may damage thin wall at bottom of flange hole and risk integrity of pressure boundary.
5. Consult sales for recommended torques for hole sizes other ASME.

### BASIS OF BOLT LENGTH AND STUD LENGTH CALCULATION



**Bolt length** = Washer thickness + Flange thickness + Flange raised face + Gasket thickness + Valve body recess + 1 x Bolt diameter

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### OPERATIONAL CONSIDERATIONS

#### **⚠ WARNING**

Valves must be operated within published design pressure and temperature limits stated on Emerson Label.

1. An operator should have an understanding of the effects of opening/closing a valve within overall piping system and should ensure a valve is in good operating condition prior to operating it under pressure.
2. An operator should be aware if media contains hazardous material and specific health and safety risks associated with that medium, as a damaged liner can result in leakage between body halves.
3. Stand clear of any moving parts such as stem and/or gate assembly when operating and use of gloves when operating manual valves to minimize risk of injury.
4. All manual handwheel operated valves are designed for hand input of less than 88 lbs (40 kg) — do not apply excessive input torque via pipe wrenches, 'cheater bars', or other devices.
5. If a manual handwheel actuated valve is difficult to operate due to torque requirements, valve should be serviced.
6. Electric motor actuated valves should be left in their factory set condition unless system operating parameters dictate a change. In these cases, perform cycling in small increments using the lightest/slowest settings possible in order to achieve desired performance, as excessive torque may result in unexpectedly high thrust and damage the valve.
7. KS1 valves are position-seated and should never be torque-seated; do not use motor torque settings to seat a valve.
8. Care should be taken to ensure that electrical motors are wired correctly; incorrect phasing of 3-phase wiring may cause valve/motor damage.

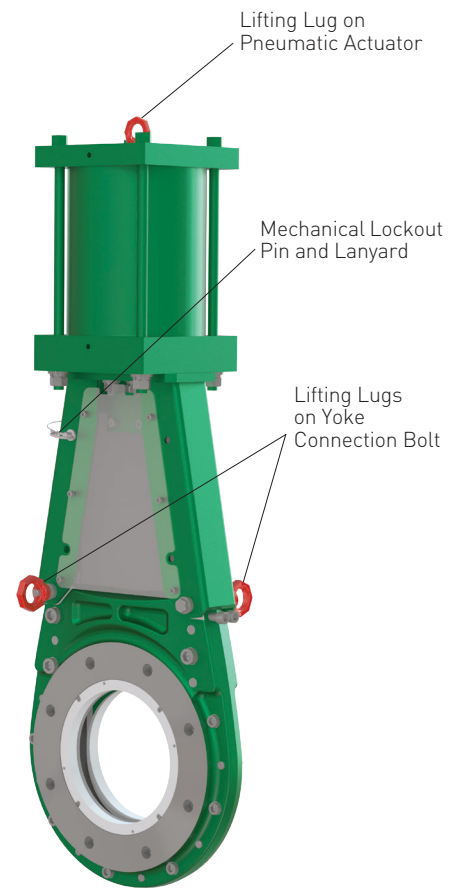
### LIFTING LOCATION AND LOCKOUTS

#### **⚠ WARNING**

##### **Product limitation**

Mechanical lockouts on a linear-actuated valve are designed to prevent gate movement caused from line pressure or gravity and to provide a visual indication of gate position.

1. KS1 valves may be supplied with lifting lugs either at yoke connection bolts or on top of pneumatic cylinder.
2. Mechanical lockout for open/closed is provided as standard on all valves.
3. Handwheel-style lockouts are also provided on bevel gearbox valves.
4. Energy lockouts are required for electric, pneumatic and hydraulic cylinder actuators to remove energy and avoid damage to mechanical lockout.

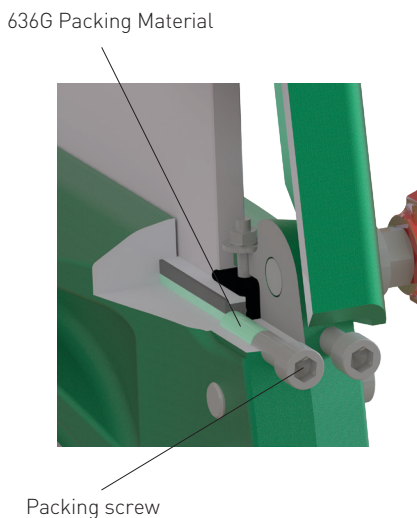


# CLARKSON SEVERE SERVICE KNIFE GATE VALVE

## MODEL KS1

### ADJUSTMENTS TO PACKING

1. KS1 valves have incorporated a “transverse” type packing gland which can be adjusted with valve in-line under pressure.
2. Each valve has four packing screws: a pair on each side of the valve and one on each side of the port centerline near the yoke connection.
3. Packing material to be used is Balmar LLC 636G in a stick form of a diameter less than packing screw size per Table 2, which also includes recommended torque settings for each valve size.
4. To adjust, remove one packing screw on upstream side of valve, insert 636G into hole, and torque screw to value in Table 2.
5. If torque in Table 2 is not reached before screw reaches full engagement, remove packing screw on opposite side of upstream side, insert 636G into hole, and torque screw to value in Table 2.
6. Repeat Steps 4 and 5 on upstream side until both packing screws are set to torque in Table 2.
7. Repeat Steps 4, 5 and 6 for downstream side of valve.



**TABLE 2 - PACKING SCREW DETAILS AND RECOMMENDED TORQUE**

Valve size		Packing screw size	Packing screw length (mm)	Hex drive (mm)	Packing torque setting (N.m)
NPS	DN				
2	50	M8 x 1.25	35	6	20-34
3	80	M8 x 1.25	30	6	20-34
4	100	M12 x 1.75	30	10	20-34
6	150	M12 x 1.75	35	10	20-38
8	200	M12 x 1.75	35	10	20-38
10	250	M12 x 1.75	35	10	20-38
12	300	M12 x 1.75	35	10	20-38
14	350	M12 x 1.75	35	10	25-41
16	400	M16 x 2.00	40	14	25-41

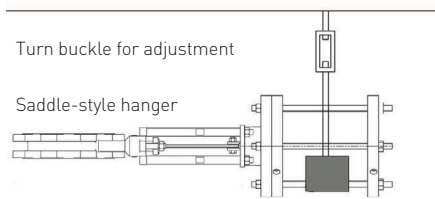
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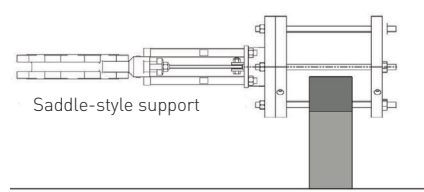
### CYLINDER SUPPORT METHODS FOR HORIZONTALLY OR OFF-VERTICAL MOUNTING

1. Pneumatic and hydraulic cylinders require additional support when mounted in an orientation other than vertical, and failure to do so could lead to failure of cylinder and/or valve.
2. Suggested methods included in this document are conceptual in nature, and design of supporting structures is responsibility of user.
3. It is important that linear actuator and gate are aligned axially.
4. Supports shall be designed to maintain alignment and carry bulk weight of actuator and own weight considering all loads.

#### INSTALLATION A

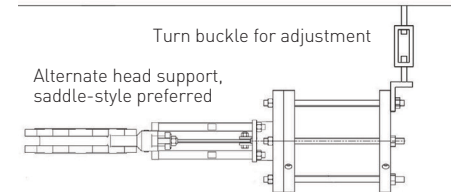


#### INSTALLATION B



Appropriate tie-in capable of supporting load

#### INSTALLATION C



### RECOMMENDED LONG-TERM STORAGE

Storage procedures maximize product integrity during extended storage up to 5 years.

#### Storage facility

1. Location to be clean, dry and covered from direct exposure to sunlight — ideally in a container or building protected from the environment.
2. OEM shipping containing is not suitable for storage exposed to the environment.

#### Periodic inspection

Visual inspections shall be performed at 6-month intervals of the following and a record maintained:

1. Environment is clean, dry and goods are covered from direct exposure to sunlight.
2. If goods are unwrapped:
  - Check flange covers are in-place.
  - Apply Loctite® 9660 rust inhibitor (or equivalent) to flange face and holes.

#### Maintenance

Maintenance shall consist of correcting deficiencies noted during inspection and recorded in a log.

#### Cylinder storage

These cylinder storage instructions are not intended to replace the instructions of the specific cylinder manufacturer and are to be used as a guide only. If specific instructions are required, contact Emerson Sales.

For storage of up to 3 years:

1. Apply by injection a high-quality grade of hydraulic oil or synthetic lubricant into cylinder ports.
2. Operate cylinder 6-12 times on a yearly basis.

For storage 3-5 years:

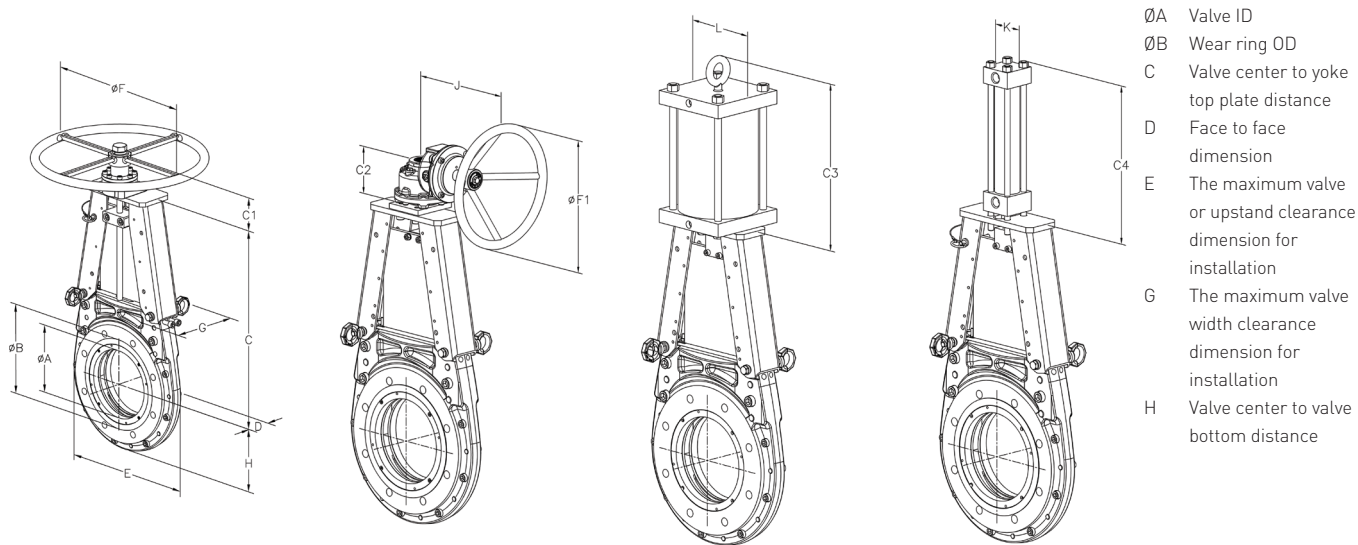
1. Lubricate as above. Additionally, extend cylinder rod until the valve is fully closed, then coat cylinder rod with high-quality heavy grease or synthetic lubricant.
2. Retract cylinder rod until valve is fully open, drawing lubricant into rod end of cylinder.
3. If cylinder is not pre-piped to control accessories, securely plug cylinder ports with pipe plugs.
4. If cylinder is pre-piped to accessories, plug all input and output ports of accessories.

#### WARNING

Contact your local Emerson representative prior to performing any maintenance if valve is still covered under warranty.

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### DIMENSIONS (inches)

NPS	ØA	ØB	C	C1	C2	C3	C4	D	E	ØF	ØF1	G	H	J	K	L
2	2.0	3.6	9.9	3.4	-	7.3	7.8	2.0	8.5	12.0	-	6.6	4.2	-	2.5	4.5
3	3.0	5.0	12.0	3.4	-	8.3	8.8	2.0	10.0	12.0	-	6.6	5.0	-	2.5	4.5
4	4.0	6.2	14.0	3.4	-	10.1	10.2	2.0	11.2	12.0	-	6.6	5.6	-	2.5	5.5
6	6.0	8.5	18.4	3.4	-	12.8	12.3	2.3	13.4	20.0	-	7.2	6.7	-	2.5	7.5
8	8.0	10.6	22.9	3.4	5.1	15.0	14.9	2.8	16.0	20.0	11.8	8.7	8.0	11.8	3.0	8.5
10	10.0	12.8	27.0	-	5.1	18.0	17.0	2.8	18.2	-	11.8	8.6	9.1	11.8	3.5	10.6
12	12.0	15.0	31.3	-	5.1	19.5	19.0	3.0	21.5	-	11.8	9.8	10.8	11.8	3.5	12.8
14	13.3	16.3	34.4	-	5.5	22.5	21.2	3.0	23.5	-	15.8	9.9	11.8	14.4	4.5	14.8
16	15.3	18.5	38.5	-	5.5	24.7	23.3	3.5	26.3	-	15.8	10.7	13.5	14.4	4.5	17.0

### MHW/BG TORQUE

Ft-lb
2
3
5
16
42 (MHW) / 16 (BG)
24
35
39
52

### DIMENSIONS (mm)

DN	ØA	ØB	C	C1	C2	C3	C4	D	E	ØF	ØF1	G	H	J	K	L
50	51	92	250	86	-	186	186	51	215	305	-	168	107	-	64	114
80	76	127	304	86	-	210	224	51	254	305	-	168	127	-	64	114
100	102	157	355	86	-	257	259	51	284	305	-	168	142	-	64	140
150	152	216	468	86	-	325	311	57	341	508	-	183	170	-	64	191
200	203	270	582	86	129	380	379	70	406	508	300	220	203	299	76	216
250	254	324	685	-	129	456	431	70	462	-	300	219	231	299	89	270
300	305	381	794	-	129	495	483	76	546	-	300	250	273	299	89	324
350	337	413	872	-	139	572	539	76	597	-	400	251	299	366	114	375
400	387	470	977	-	139	627	591	89	668	-	400	272	343	366	114	432

### MHW/BG TORQUE

N-m
2
4
6
22
57 (MHW) / 21 (BG)
33
47
53
70

### NOTES

1. Torque is value to open valve at rated pressure.
2. Actuator bore size based on required thrust to open valve at rated pressure with 80 psi pneumatic or 2,000 psi hydraulic supply pressure.

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### VALVE WEIGHT (lbs)

Valve size (NPS)	AC Actuation			HC Actuation			BG Actuation			MHW
	Bare valve Assembly	AC Actuator	Total AC Valve Assembly	Bare valve Assembly	AC Actuator	Total AC Valve Assembly	Bare valve Assembly	AC Actuator	Total AC Valve Assembly	Total MHW Valve Assembly
2	20	13	33	31	9	40	-	-	-	46
3	43	14	57	44	9	53	-	-	-	57
4	62	22	84	55	9	64	-	-	-	71
6	94	49	143	83	10	93	-	-	-	104
8	160	63	223	142	19	161	149	27	176	163
10	225	145	370	197	28	225	205	27	231	-
12	324	205	529	285	30	315	291	27	317	-
14	432	315	747	370	53	423	380	37	417	-
16	595	443	1038	515	56	571	523	37	560	-

### VALVE WEIGHT (kg)

Valve size (DN)	AC Actuation			HC Actuation			BG Actuation			MHW
	Bare valve Assembly	AC Actuator	Total AC Valve Assembly	Bare valve Assembly	AC Actuator	Total AC Valve Assembly	Bare valve Assembly	AC Actuator	Total AC Valve Assembly	Total MHW Valve Assembly
50	9.1	5.9	15	14	4.1	18	-	-	-	21
80	20	6.4	26	20	4.1	24	-	-	-	26
100	28	10	38	25	4.1	29	-	-	-	32
150	43	22	65	38	4.5	42	-	-	-	47
200	73	29	101	64	8.6	73	68	12	80	74
250	102	66	168	89	13	102	93	12	105	-
300	147	93	240	129	14	143	132	12	144	-
350	196	143	339	168	24	192	172	17	189	-
400	270	201	471	234	25	259	237	17	254	-

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