



# **ISOGATE®**

Slurry Valves

**Isogate WB Series**

**Knife Gate Valve**

**IOM Manual**

(INSTALLATION, OPERATION, AND MAINTENANCE MANUAL)

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*Congratulations on your purchase of the Isogate WB Series Knife Gate Valve. This is reliable equipment that will offer a long operational life if you follow the simple guidelines described in this manual.*

## Foreword

This manual is designed as a reference for users of the Isogate WB Series knife gate valve. The purpose of this manual is to:

- Outline the installation procedures of the valve
- Outline the principles and methods of operation of the valve, and
- Describe how to maintain and store the valve.

If more technical information is required, please feel free to contact your local Weir representative or the Weir factory in your area.

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The information in this manual has been checked and is believed to be accurate and reliable. HOWEVER, NO RESPONSIBILITY IS ASSUMED BY WEIR FOR ITS USE OR FOR ANY INACCURACIES. Specifications are subject to change without notice. WEIR WILL NOT ASSUME ANY LIABILITY ARISING OUT OF USE OR OTHER APPLICATION OF ANY PRODUCT DESCRIBED HEREIN.

### WARNING

**THIS PRODUCT CAN BE FITTED WITH AIR, HYDRAULIC OR ELECTRIC ACTUATORS. DO NOT PUT YOUR HANDS OR FINGERS INTO THE YOKE OR PORT AREAS WHEN THE VALVE CYCLES.**

**THIS VALVE IS RATED FOR PRESSURE AS TAGGED AND WILL NOT BE SUITABLE FOR HIGHER PRESSURES WITHOUT POSSIBLE SERIOUS DAMAGE TO THE VALVE OR HARM TO OPERATING PERSONNEL. PLEASE CONSULT ATTACHED MANUFACTURER'S INSTRUCTIONS ON AIR OR HYDRAULIC ACTUATOR PRESSURE REQUIREMENTS.**

**NOTE: UNDERLINED ITEMS IN THIS MANUAL MUST BE FOLLOWED EXACTLY TO ASSURE GOOD SAFETY PRACTICES.**

### REVISION HISTORY

Revision Level	Principal Changes	Date of Publication
A	First Publication	November 2004
B	Updated Logos	May 2006
C	Changed Valve on Cover page	June 2006
D	Added 42" and 54" Valve Dimensions and Hydraulic Actuators Information	May 2008

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## **Operational Principle Description**

This Knife gate valve is a packingless valve.

All the sealing is done by the elastomeric sleeves installed in the valve body.

The sleeves also form the replaceable wear section for the valve.

Actuation of the valve involves sliding a stainless steel gate between the elastomeric sleeves to shut off the flow.

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# IDENTIFICATION

## VALVE IDENTIFICATION

Every Isogate WB Series Knife Gate Valve has a nameplate attached to the yoke. The valve serial number and model number are stamped on the nameplate. Maximum temperature and pressure ratings are also indicated on this nameplate.

The valve model number is made up of digits and letters. Table below lists the designation of the digits and letters.

The port diameter is expressed in inches.

## Valve Identification Codes

### EXAMPLE

MODEL NUMBER: 24WBRSWHUS

- 24 = 24 Inch Valve Port Size
- WB = Valve Series K/G Wide Body
- R = Natural Rubber Sleeve
- S = 316 (C23) Stainless Steel Gate
- W = Wiper
- H = Hydraulic Actuator
- U = UNC Inch Measurement System
- S = ANSI Bolt Pattern

Size	Series	Sleeve Material	Gate Material	Packing	Actuator	Measurement System	Add Ons
18	WB=KG Wide	R=Nat Rub(R70) S=EPDM (S01)	- = OMIT	- = OMIT	- = OMIT	U=UNC Inch	03=Filter Regulator (Air)
20			S=316 (C23)	W=Wipers	G=Bevel Gear		06=Cover Rising Stem
24			N=HAST C (N04)		H=Hydraulic		07=Bellows Closed
26			A=17-4PH (A2006)		A=Air		08= 06 + 07
30			T=Alloy 2205		L=Elect/Limitorque		09=Manual Override For Coil S/V
36			Z=Special		E=Elect/Other		10=Lock out
42					C=Chain Wheel manl		11=Solenoid Air 1 Coil
48					D=Manual Hydraulic		12=Solenoid Air 2 Coils
54			S=Stem Ext_Length	13=Solenoid Hyd 2 Coild			
			W=B/G W/Chainwheel	X=Air Spring	K=Flush Plate	14=Speed Control	15=Junction Box
				Extended		18=Limit Switch SPDT- T & B	19=Limit Switch DPDT- T & B
				R=Air Spring		25=Prox Switch SPDT- T & B	29=Prox Switch DPDT- T & B
				Retracted		35=Wired ValveLocaton Tag	36=Pinned Valve Location Tag
				N=Oversized Air		37=Wired Cust Nameplate	38=Pinned Cust Nameplate
				I=H.P. Hydraulic		41=Hydraulic Coupler	99=Chain FT ___ Lgth.
				Z=Special		ZZ =Special	

# STORAGE PROCEDURES

When new or unused valves are sitting idle for long periods, the following procedures should be complied with:

## **Short-Term Storage**

### **For Periods of 18 Months or Less**

1. Indoor storage is recommended.
2. Protect the equipment from temperature and humidity extremes and exposure to excessive dust, moisture, vibration and sunlight.
3. It is preferred to store valves with the gate in the up, open position.
4. Avoid dirt and/or moisture contamination of the stem (threaded rod).
5. Insure pneumatic and hydraulic cylinder actuators have appropriate pipe plugs installed in the respective supply ports to prevent contamination of the cylinders.
6. Protect valve sleeves from heat, light and exposure to ozone.
7. The sleeve flange openings are to be covered unless connected to piping.
8. For outdoor or excessively unfavorable environment, cover the equipment with some type of protective tarpaulin that will allow proper air circulation.
9. Remove pipe flanges from the valve so that the sleeves are totally relaxed during storage.
10. Do not store heavy objects on the elastomer sleeves.
11. Follow actuator instructions for storage. See manual attached.

## **Long-Term Storage**

### **For Periods Greater Than 18 Months, (But Less Than 36 Months)**

1. Prior to storage, thoroughly drain valves of any and all liquid.
2. Indoor storage is required.
3. Protect the equipment from temperature and humidity extremes, and exposure to excessive dust, moisture, vibration and sunlight.
4. Store valve with the gate in the open position.
5. Avoid dirt and/or moisture contamination of the stem (threaded rod).
6. Insure pneumatic and hydraulic cylinder actuators have appropriate pipe plugs installed in the respective supply ports to prevent contamination of the cylinders.
7. Protect valve sleeves from heat, light and exposure to ozone.
8. Remove pipe flanges from the valve so that the sleeves are totally relaxed during storage. The sleeve flange openings are to be covered.
9. Do not store heavy objects on the elastomer sleeves.
10. For outdoor or excessively unfavorable environment, cover the equipment with some type of protective tarpaulin that will allow proper air circulation.
11. When possible, remove pipe flanges from the valve so that the sleeves are totally relaxed.
12. Prior to start-up, wipe that gate clean and apply a new coat of silicone lubricant to both sides of the gate.
13. Follow actuator instructions for storage. See manual attached.

Note: For storage period greater than 36 months, please contact Weir.

# INSTALLATION PROCEDURES

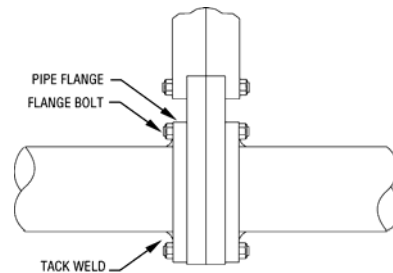
When installing your new Isogate WB Series knife gate valve in new construction, consideration should be given to the following details to insure smooth start up and performance of the equipment.

## New Construction

1. Isogate valves have been designed to be used with full flat faced metal flanges.
2. Isogate valves are rubber lined. As such, caution must be used when welding or cutting with a torch near the valves. If welding is required to build the pipe system, it is recommended that tack welding only is done, and the valve is removed from between the pipe flanges prior to finish welding of the pipe flanges. Allow adequate time after welding for the welds to cool so as not to damage the elastomer valve sleeves.
3. Insure pipe alignment and flange face parallelism is maintained to within 1/8" and the pipe opening is wide enough to allow the valve to be removed and replaced easily (see Table 1 on Page 7 for installation dimensions). Piping which is significantly mis-aligned may cause the valve sleeves to not properly engage, resulting in a leak or otherwise improper support of the valve sleeves.
4. Whenever possible, attempt to position the valve with the actuator directly above the valve in a "top vertical" orientation. When this is not possible, a "bottom vertical" orientation is the next best installation. Any valve, which requires an installation other than zero or 180 degrees, should have the valve actuator adequately supported. This is to prevent damage to the pipe and the valve, due to the strain caused by the weight of the actuator.
5. Proper pipe supports should be placed on either side of the valve to support the weight of the pipe. The valve should never be used to support the pipes.
6. The valve gate should always be positioned to full open before installing the valve and tightening the pipe flanges.
7. Pipe flange bolt torque ranges are published in Table 2. When in doubt, consult the pipe manufacturer for recommended torque. Exceeding the recommended torque may damage FRP (Fiberglass Reinforced Pipe) pipe and also engage the elastomer valve sleeves

incorrectly. Use good cross bolting sequence when tightening pipe flange bolts to insure equal loading of the flanges.

8. Finally after the valve is installed in the pipe, cycle the valve closed and open again to insure it operates properly. And make sure any accessories related to the valve are in proper adjustment. Though the valve is fully tested and adjusted at the factory, occasional mishandling during transit may alter a factory adjustment.
9. Isogate valves must have an engaging pipe flange on both sides. Note: Isogate valves are suitable for process flow in either direction.



**Fig. 1 – Alignment of Flange**

### CAUTION !!

Do not lift entire valve by the actuator. Use holes in the valve yoke to lift the whole valve assembly.

# INSTALLATION PROCEDURES

## ***Installing an Isogate valve in an existing pipe system***

1. Isogate WB Series knife gate valves 18" to 24" are manufactured with slotted flanges that match ANSI B16.5 Class 150 dimensions. Isogate WB Series knifegate valves larger than 24" have slotted flanges to match MSS SP44.
2. All of the considerations described in 1 through 9 on the previous page also apply to installing an Isogate valve into an existing pipeline.
3. Many existing pipe systems will have encountered a variety of revisions over their service life such as the installation of your new Isogate valve. These revisions can cause pipe strains and alignment problems that did not originally exist. Special attention must be paid to how the valve fits into these systems to insure the valve operates satisfactorily
4. When the valve is being positioned between the pipe flanges use caution not to displace the valve sleeves or to cause damage to the sleeves by forcing the valve into an opening that is too narrow.
5. If a lubricating fluid will be used to help slip the valves between the pipe flanges, use a non-petroleum-based lubricant such as silicone or ordinary liquid soap. It is desirable that the minimum pipe opening to install the valve be adequate, per the table below, to eliminate the need for lubrication.

**CAUTION !!**

Do not lift entire valve by the actuator.  
Use holes in the valve yoke to lift the whole valve assembly.

Valve Size Inches/mm	Minimum Opening required between Mating Pipe Flanges to Install Valve (Inches/mm)	Body & Yoke Bolt Torque Ft. Lbs. (N/m)
18 / 450	12.2 / 308	375 (506)
20 / 500	14.2 / 360	560 (756)
24 / 600	14.7 / 372	690 (931)
26 / 650	14.7 / 372	690 (931)
30 / 750	15.7 / 397	690 (931)
36 / 900	18.4 / 467	1100 (1485)
42 / 1050	21.0 / 534	1100 (1485)
48 / 1200	21.8 / 553	1100 (1485)

\*Dimension does not include gaskets, if required.

**Table 1 – Dimensional and Torque Specifications**

## PIPE FLANGE BOLTING DATA

Isogate valves do not include connecting bolts and nuts, unless specifically requested by the customer.

Table assumes standard configuration.

Table assumes standard thickness flange for hole pattern listed. Does not include flange backing

rings, flat washers, lock washers, etc. or other non-standard flange arrangements.

Fasteners torque value assumes Grade 5 or equal. Consult the factory when S. S. fasteners are used.

Valve Size Inches/mm	Number of Bolts Per Valve	Bolt Size	Bolt Length	Flange Bolt Torque Ft. Lbs. (N/m)
18 / 450	32	1-1/8-7	5-1/2	475 (644)
20 / 500	40	1-1/8-7	5-1/2	475 (644)
24 / 600	40	1-1/4-7	6	660 (895)
26 / 650	48	1-1/4-7	7	660 (895)
30 / 750	56	1-1/4-7	7	660 (895)
36 / 900	64	1-1/2-6	7	1055 (1430)
42 / 1050	72	1-1/2-6	8	1055 (1430)
48 / 1200	88	1-1/2-6	8	1055 (1430)

**Table 2 – ANSI Bolt Specifications.**

**NOTE:**

WB valves 18" through 24" have flat-faced flanges slotted to match ANSI B16.5 Class 150 companion flanges. On valve sizes 26" through 48" the flanges are slotted to match MSS SP44 companion flanges.

# OPERATION

## Operation

The Isogate WB Series Knife Gate Slurry Valve is designed for leak tight shut off of slurries and liquids within a pipeline. This valve is only designed to be operated in fully open or fully closed position. If the valve is not operated in this manner, premature wear of the gate and sleeve will occur.

### CAUTION

**THIS VALVE IS NOT SUITABLE AS A THROTTLING VALVE. THE KNIFE GATE SHOULD ALWAYS BE POSITIONED FULL OPEN OR CLOSED DURING OPERATION.**

The open bottom design of this valve allows for solids and some liquid to purge out the bottom of the valve while the valve cycles.

It is normal for the valve to discharge media during opening and closing cycles. The benefit is the tight seal gained in the fully open or closed position when solids are purged from the sleeves during cycling.

Caution should be used in the installation of a valve. Vertical, upright mounting is recommended. Other positions are acceptable, consult Weir factory. Be aware that a small amount of solids and liquid will purge from the bottom of the valve and may accumulate on the floor. Normal safety procedures should be followed.

**Pneumatic actuators** on Isogate valves are sized based on 80 psig minimum air pressure supply. The cylinder stroke is a fixed length and does not require external controls or adjustments to position the knife gate.

**Hydraulic actuators** on Isogate valves are sized based on 1,800 psi hydraulic supply pressure. The cylinder stroke is a fixed length and does not require external controls or adjustments to position the knife gate.

**RECOMMENDED OPENING/CLOSING SPEED IS 2-3 SECONDS PER INCH OF TRAVEL – IN NO CASE SHOULD TRAVEL EXCEED 1 SECOND PER INCH OF TRAVEL.**

Weir standard solenoid valve arrangement is set to allow the knife gate valve to “fail closed” on loss of electric unless otherwise specified.

**Electric motor driven actuators** have the open and closed limit switch pre-set at the factory. If owner installed electric drive, consult factory for proper adjustment.

# LUBRICATION RECOMMENDATIONS

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## Isogate Valves

For smooth operation and extended service life, the following suggestions regarding lubrication are recommended.

1. Approved Lubricant
  - Dow #111 silicone based lubricant
2. Approved Alternates
  - Rhone-Poulenc Rhodorsil III
  - General Electric Compound G661
  - Dow 44
  - Dow 7
  - NFO Complex 825
  - Sil Glyde by AGS Company
3. When replacing Sleeves in Isogate valves, a liberal coating of lubricant should be applied to the complete seal end of both sleeves. A thin film should be applied to the outer diameter of the sleeve and a thin film should be applied to both faces of the knife-gate.

# MAINTENANCE

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## ***Maintenance***

To ensure smooth operation and long life, some periodic maintenance is required. The following is offered as a guideline. Schedules will vary with applications.

1. A new valve is shipped with the seats and gate, factory adjusted. Torque specifications are found in Table 1 on Page 7 of this manual.
2. Manually operated valves require periodic lubrication of the valve stem. Depending on location, semi-annually should be adequate.
  - a. All bevel gear driven and electrically actuated valves should have a suitable lubricant applied directly to the threads on the valve stem (if a grease port is not available).
  - b. If valve stems are located in areas with atmospheric contamination (dust, corrosives, etc.), stem protectors are recommended.
4. It is recommended that low cycle or infrequently used valves be cycled periodically to exercise the elastomer sleeves and prevent components from seizing.
5. Pneumatic valve actuators may accumulate moisture, which can allow rust to form and jam the actuator. Appropriate air system moisture traps and lubricators should be installed to extend the service life of the valve actuator.

Where actuators are installed horizontally, it may also be an advantage to rotate the actuators/valve so that the air supply ports are on the bottom. This allows any trapped moisture to accumulate in the air supply lines rather than in the air cylinder actuator.

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# DISASSEMBLY/ASSEMBLY

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The Isogate WB Series Knife Gate Slurry Valve is designed to be field repairable. Replacement of the sleeves, wiper and sleeve retainer offer a cost-effective restoration of a worn valve to like new condition.

## Valve Disassembly

The sequence for disassembling the knife gate slurry valve is described below. Refer to the general assembly drawing for component location.

1. Actuate valve to the open position.
2. Remove valve from the pipeline.
3. Remove cotter pins from CLEVIS PIN (8). Remove the CLEVIS PIN (8) from the GATE (4).
4. Remove the ACTUATOR ASSEMBLY from the YOKE (5).
5. Remove the YOKE BOLTS and YOKE (5) from the VALVE BODY (1).
6. Remove the WIPER (6) & WIPER RETAINER (7). Check WIPER for wear.
7. Remove the GATE (4).
8. Remove SLEEVE RETAINERS (3)
9. Remove SLEEVES (2) from the VALVE BODY (1).
10. Scrape residue from BODY (1) and clean as necessary.

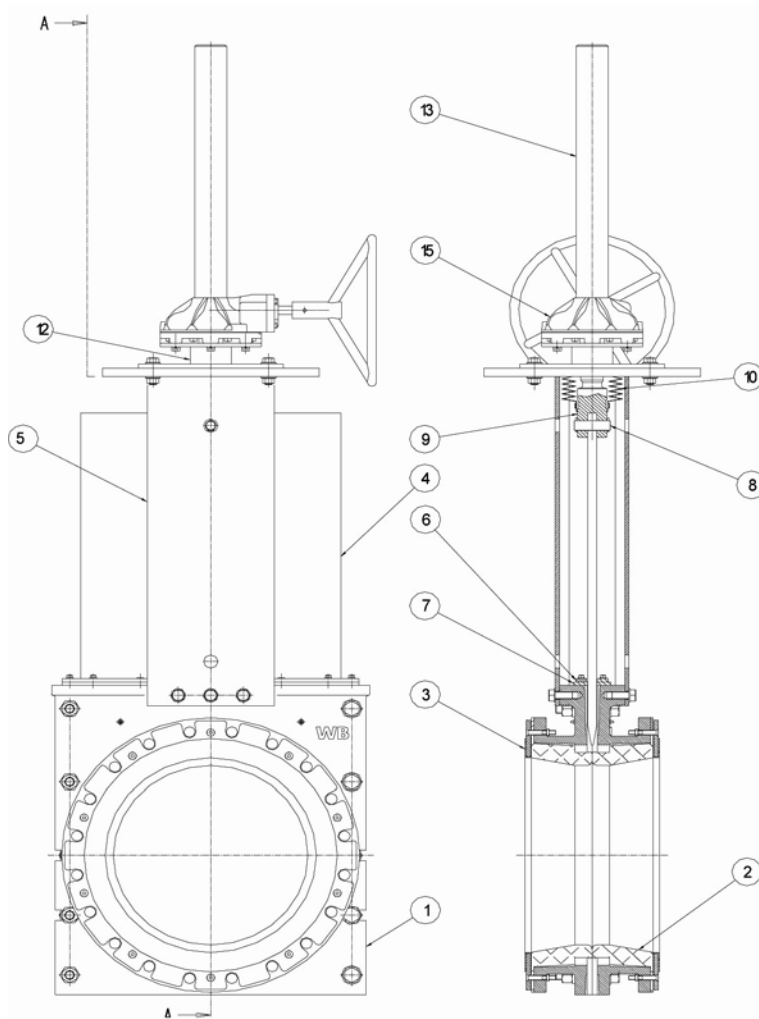
## Valve Assembly

The assembly sequence for the knife gate slurry valve is described below. Refer to the general assembly drawing for component location.

1. Apply Dow 111 or Weir Minerals approved equal to OD and sealing surfaces of sleeve. Install new VALVE SLEEVES (2) by inserting them from the flange side of the VALVE BODY (1). Tap the SLEEVE (2) lightly with a rubber mallet to seat it in the BODY (1).
2. Install SLEEVE RETAINERS (3).
3. Insert the GATE (4) into the body cavity.
4. Install the WIPER (6) & WIPER RETAINER (7) at the top of the BODY (1).
5. Install the YOKE (5) onto the BODY (1).
6. Insert the YOKE BOLTS through the YOKE (5) and into the BODY (1). Torque the nuts to the same torque as in step 8 below.
7. Assemble ACTUATOR ASSEMBLY to the YOKE (5).
8. Torque the bolts that hold the yoke to the body per the table.
9. Position CLEVIS (9) over GATE (4) and align pinhole. Assemble CLEVIS PIN (8) through the CLEVIS (9) and GATE (4). Install new cotter pins on end of CLEVIS PIN.
10. Actuate Valve to open position for storage and installation.
11. Reinstall the valve in the system as instructed in "Installation Procedures" of this manual

# WB Series Knife Gate Valve Assembly Diagram

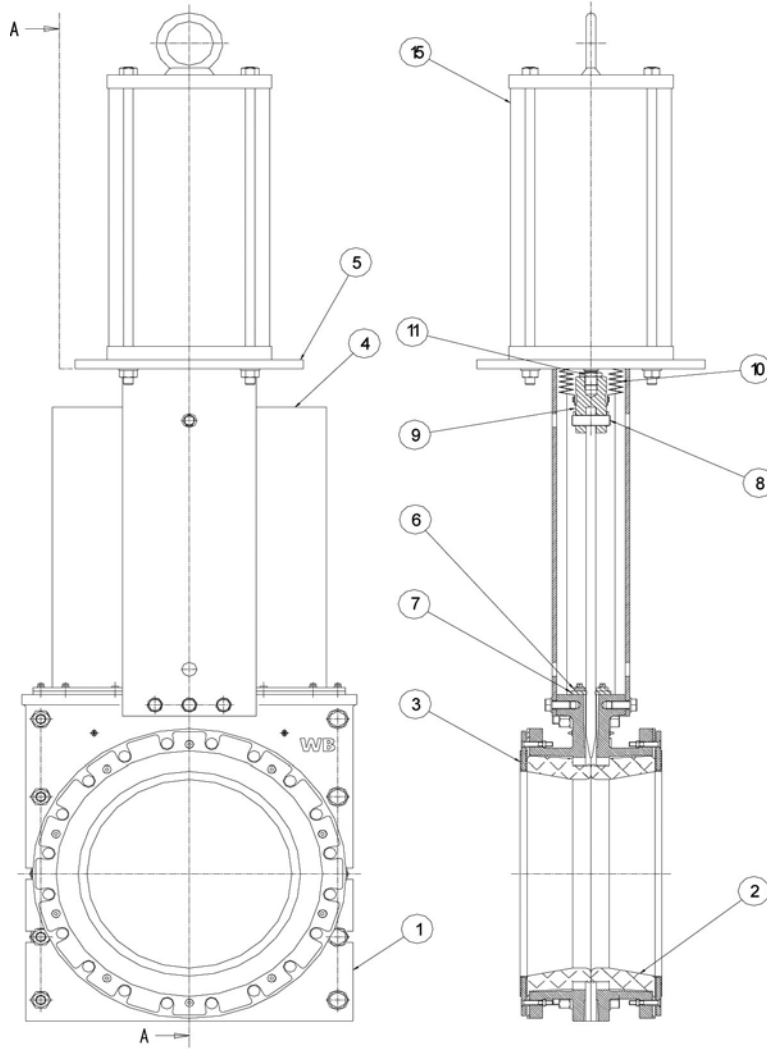
## Valve Sizes 18”-24” – BEVEL GEAR ACTUATOR



Item	Quantity	Description
1	2	Body
2	2	Sleeve
3	2	Sleeve retainer
4	1	Gate
5	1	Yoke
6	1	Wiper
7	2	Wiper retainer
8	1	Clevis Pin
9	1	Stem with clevis
10	1	Stem Guard (Optional)
12	1	Actuator adapter
13	1	Stem pipe guard (Optional)
15	1	Gear Box

# WB Series Knife Gate Valve Assembly Diagram

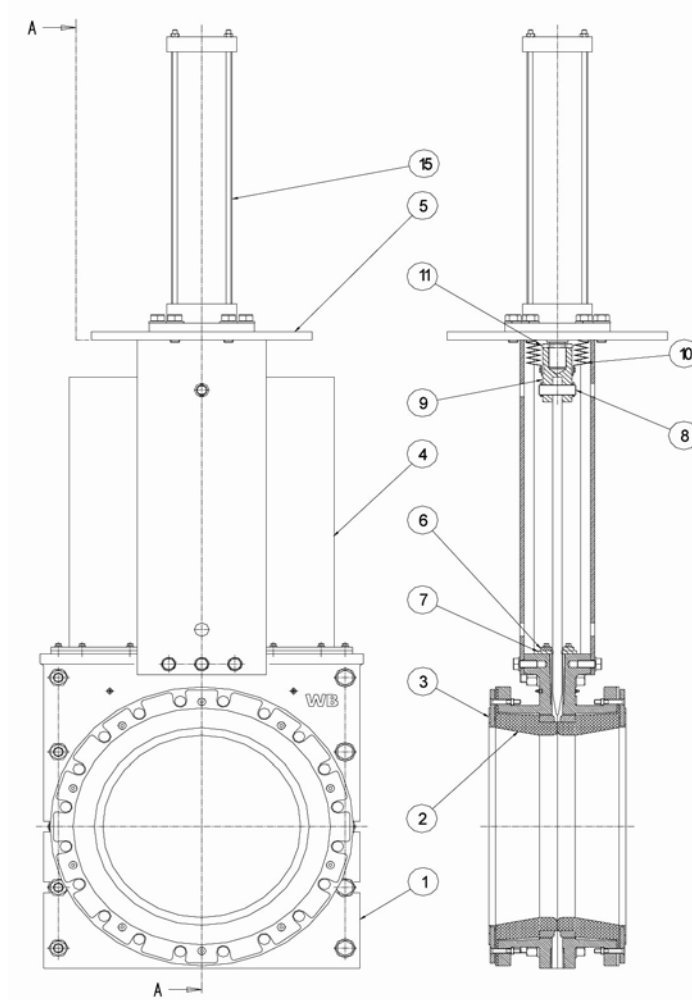
## Valve Sizes 18"-24" – PNEUMATIC ACTUATOR



Item	Quantity	Description
1	2	Body
2	2	Sleeve
3	2	Sleeve retainer
4	1	Gate
5	1	Yoke
6	1	Wiper
7	2	Wiper retainer
8	1	Clevis pin
9	1	Clevis
10	1	Stem guard (optional)
11	1	Jam Nut
15	1	Pneumatic Cylinder

# WB Series Knife Gate Valve Assembly Diagram

## Valve Sizes 18"-54" – HYDRAULIC ACTUATOR



Item	Quantity	Description
1	2	Body
2	2	Sleeve
3	2	Sleeve retainer
4	1	Gate
5	1	Yoke
6	1	Wiper
7	2	Wiper retainer
8	1	Clevis Pin
9	1	Clevis
10	1	Stem Guard (Optional)
11	1	Jam Nut
15	1	Hydraulic Cylinder

# GENERAL DIMENSIONS

<b>Bevel gear valve dimensions</b>								
Sizes	A	B	C	D	E	F	H	J
inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm
18/457	14.8/376	16.8/426	12.2/308	26.5/672	12.8/325	85.11/2162	11.0/279	16.5/420
20/508	16.6/421	18.5/470	14.2/360	28.4/720	14.2/360	93.3/2369	15.0/381	16.5/420
24/610	21.2/538	23.0/585	14.7/372	33.9/860	16.5/420	110.6/2808	24.0/609	23.6/600

<b>Air valve dimensions</b>							
Sizes	A	B	C	D	E	F	G
inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm
18/457	14.8/376	16.8/426	12.2/308	26.5/672	12.8/325	81.8/2076	18.9/480
20/508	16.6/421	18.5/470	14.2/360	28.4/720	14.2/360	90.6/2302	23.6/600
24/610	21.2/538	23.0/585	14.7/372	33.9/860	16.5/420	107.2/2722	23.6/600

<b>Hydraulic cylinder valve dimensions</b>							
Sizes	A	B	C	D	E	F	G
inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm	inches/mm
18/457	14.8/376	16.8/426	12.12/308	26.5/672	12.8/325	81.8/2076	18.9/480
20/508	16.6/421	18.5/470	14.2/360	28.4/720	14.2/360	90.6/2302	23.6/600
24/610	21.2/538	23.0/585	14.7/372	33.9/860	16.5/420	107.2/2722	23.6/600
26/660	23.5/597	24.6/624	14.7/372	36.8/934	17.51/445	115.7/2939	19.7/500
30/762	26.7/679	29.0/737	15.62/397	41.5/1054	20.3/515	128.5/3263	17.7/450
36/914	31.9/810	35.0/890	18.4/467	48.3/1226	23.6/600	154.3/3918	26.7/550
42/1067	38.3/972	41/1042	20.8/528	56.3/1430	27.2/690	176.9/4494	27.6/700
48/1219	44.0/1117	45.669/1160	21.3/541	63.0/1600	30.3/770	200.0/5081	27.6/700
54/1372	49.0/1244	49.6/1260	23.6/600	67.7/1720	33./860	229.9/5890	31.5/800

Note 1: Dimensions provided are for information only. Certified drawings are recommended prior to construction.D

Note 2: Flanges are slotted to match ANSI B16.5 class 150# in sizes up to 24", and MSS SP44 in sizes from 26" up to 54". Other flange options are available upon request.

