DSS VALVES

M81 KNIFE GATE VALVE

Installation, Operation and Maintenance Manual

AIS AMERICAN IRON & STEEL COMPLIANT

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Thank You for Choosing DSS Valves

At DSS Valves we have mastered the design and manufacture of the preeminent Severe Service Knife Gate Valves on the market. We're excited that you've decided to put your trust in our product.

To make sure you achieve maximum service life and trouble free operation from your investment, we've put together this **instruction, operation and maintenance manual** that highlights the key features and benefits of your valve, as well as important information for valve upkeep.

Should you have any questions, please feel free to contact us directly.

Sincerely,

The Team at DSS Valves

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DISCLAIMER:

Working with industrial valves is inherently dangerous, and appropriate precautions should be taken at all times. Only skilled professionals with qualified experience using the tools and equipment required should be involved.

Proper understanding of the system and application the valve is being inserted into is a must.

Safety equipment should always be worn during the process, and should include but is not limited to steel toed boots, hard hats, ear and eye protection, and high visibility clothing.

Any alteration or modification to the valve supplied by DSS Valves must receive written approval. DSS Valves is not responsible for consequential damages should this written approval not be obtained.

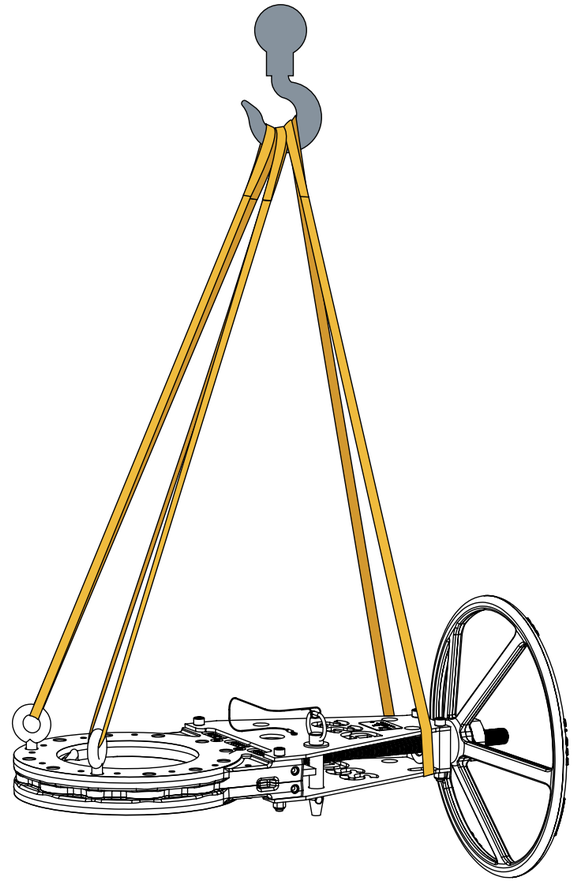
Installation Guidelines

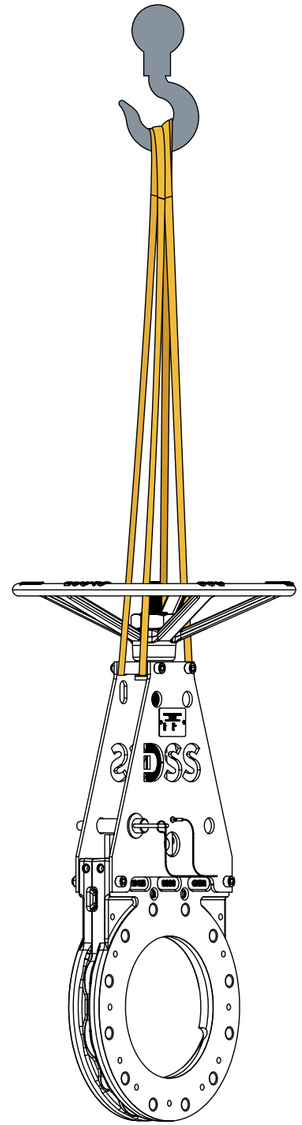
STORAGE

Prior to installation, keep this valve in the factory applied shrink wrapping and store in a dry environment.

TRANSPORTATION

The safest and easiest way to move this valve is to leave it in the supplied shipping crate and use a forklift and/or pallet jack as appropriate. When the time comes to unpack and move it without the crate, be sure to **attach proper lifting straps or covered chains** in the following positions:





Installation Guidelines

CLEANING THE INSTALLATION SITE

Remove dust, dirt, debris, and any applied corrosion protection from pipeline and flanges before installing the valve.

FLOW DIRECTION AND INSTALLATION POSITION

This valve can be installed in any required position, and comes factory tested for zero leakage isolation in either direction. It is preferred that the back body (21) is facing upstream, while the front body (20) is facing downstream. Please note that (20) and (21) are item numbers in the **parts lists on pages 12 & 14**.

When installing, remember to make sure at least one side of the valve body is accessible so that the repacking screws can be adjusted.

PIPELINE ALIGNMENT

Inaccurately aligned pipelines can cause stress to the valve body. Be sure to have any misalignments corrected before installation of the valve.

MATING FLANGES

Always check to make sure the mating flanges have a proper seal—the bolts used in the blind flange holes in the valve's chest area should not touch the bottom of the holes. DSS valves come standard with tapped flange holes, however through bolts are available upon request.

If further technical advice is required, feel free to consult DSS Valves directly: info@dssvalves.com

INSTALLING INTO A PIPELINE:

Note: This valve can be installed with the actuator in any position, with no need to support the actuator.

1. Bolt the valve to the mating flange using the proper size fasteners. DSS recommends the use of studs to ensure the full thread engagement of tapped holes. If using stainless steel fasteners, lubricate to prevent galling.
2. Adjust fastener length for mating flange thickness, gaskets, and support rings.
3. Tighten the flange bolts in an alternating sequence.
4. Prepare the valve for hydro testing.

   Hand Wheel Operated or Bevel Gear Operated Valves: no action required.

   Air Cylinder-operated valves—connect the control air supply to the air cylinder. Standard configured valve required pressure is 50–100 psi.
5. Hydro test the system. For more information, see the repacking the primary seal section in the maintenance portion of this manual.

Note: After the valve is installed and is under pressure, be sure to observe closely for the first 24 hours. Occasionally a small leak may occur if the gate seal integrity was impacted by rough transport, lengthy storage, or extreme temperature variations. This can be remedied by tightening the packing screws accordingly.

Flange Bolts and Studs

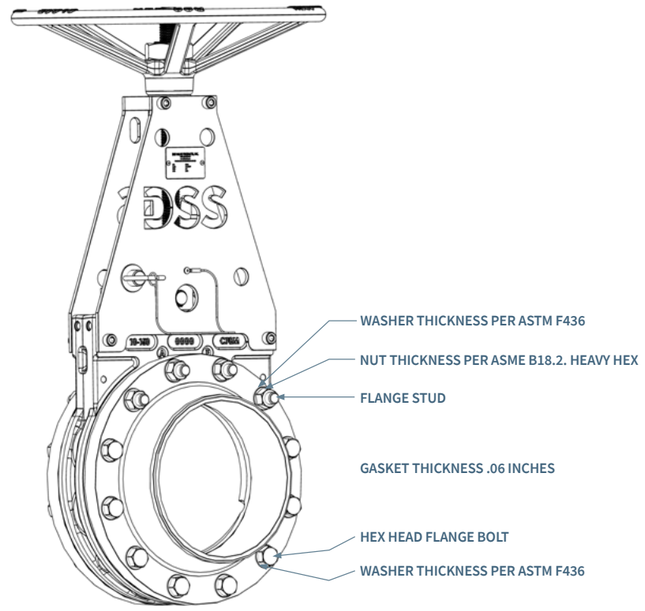
ASME B16.5

CLASS 150		
NPS	Hex Head Flange Bolt	Flange Stud
2	5/8-11 X 1.25 Long (Qty. 4)	N/A
3	5/8-11 X 1.75 Long (Qty. 4)	N/A
4	5/8-11 X 1.75 Long (Qty. 6)	5/8-11 X 3.00 Long (Qty. 2)
5	3/4-10 X 1.75 Long (Qty. 2)	3/4-10 X 2.75 Long (Qty. 6)
6	3/4-10 X 2.00 Long (Qty. 6)	3/4-10 X 3.00 Long (Qty. 2)
8	3/4-10 X 2.25 Long (Qty. 4)	3/4-10 X 3.25 Long (Qty. 4)
10	7/8-9 X 2.25 Long (Qty. 8)	7/8-9 X 3.25 Long (Qty. 4)
12	7/8-9 X 2.25 Long (Qty. 8)	7/8-9 X 3.50 Long (Qty. 4)

Hex screws and studs sized according to the use of the following hardware:

- Nuts per ASME B18.2.2 dimensions.
- Gasket thickness of .06 of an inch.
- Washers per ASTM F436 dimensions.
- Flange fitting per ASME B16.5.

End user to assure that any deviation from these components is accounted for when selecting screw and bolt length.



Operation Guidelines

LOCKOUT-TAGOUT INSTRUCTIONS

Closed lockout-tagout procedure:

1. Actuate the valve to the fully closed position isolating upstream flow from downstream piping.
2. Insert the orange lockout-tagout pin through the bottom hole of the front top plate from the front body side. Lockout-tagout pin must pass through the front top plate over the top of the gate and then through the back top plate.
3. A hole is provided on the back body side of the pin for attaching lockout-tagout hasps, padlocks or other similar items.
4. The M81 Knife Gate Valve is now fully locked out in the closed position. Do not attempt to open the valve as this may compromise the bubble tight seal and damage the pin.
5. To actuate the valve after lock and tag condition is no longer required, completely remove the pin.
6. The valve can now be actuated when needed.

Open lockout-tagout procedure:

1. Actuate the valve to the fully open position allowing upstream flow to downstream piping.
2. Insert the orange lockout-tagout pin through the top hole of the front top plate from the front body side. Lockout-tagout pin must pass through the first wall of the front top plate then into the in the gate and through the back top plate.
3. A hole is provided on the back body side of the pin for attaching lockout-tagout hasps, padlocks or other similar items.
4. The M81 Knife Gate Valve is now fully locked out in the open position.
5. To actuate the valve after lock and tag condition is no longer required, completely remove the pin.
6. The valve can now be actuated when needed.

CYCLING

This M81 Knife Gate Valve can be cycled at any speed and as frequently (or infrequently) as needed. As you may be using a hand wheel, chain wheel, bevel gear, or pneumatic actuator to open and close this valve, we recommend following the standard procedures that accompany these actuation devices.

Maintenance Guidelines

REPACKING THE VALVE

Required Tools and Parts

Energizing the cavity seal only requires the following Allen wrench (based on size and class).

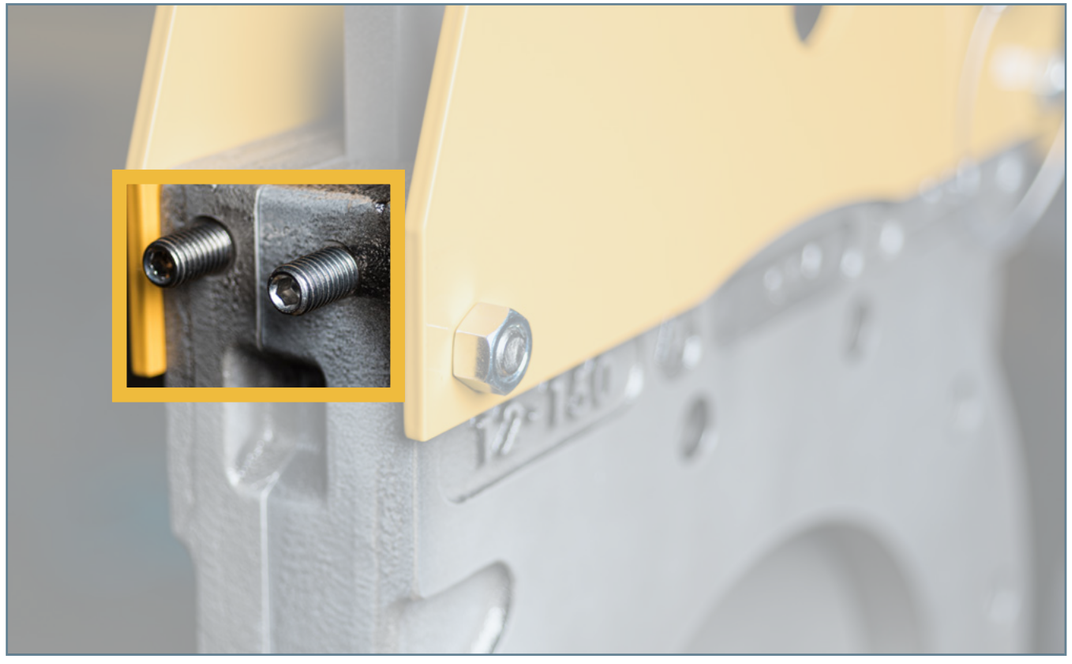
Additional packing pellets (available from local distributors) and a handled dowel (to push the packing into the Allen screw holes) may also be needed if the screws have reached the end of travel and more packing is required.

By Size Range / Class	Allen Wrench (Hex Key)
Class 150 2″–4″	1/8
Class 150 6″	3/16
Class 150 8″–12″	1/4

CAUTION

Valves made by DSS are designed to be repacked while in service, under full line pressure. However, it is always recommended that the proper precautions are taken when working on a valve in service. These include, but are not limited to:

- Wearing the correct personal protective equipment (i.e. safety glass, safety gloves)
- Avoiding potential pinch points



Maintenance Guidelines

WHEN TO REPACK THE VALVE

The required frequency to repack a DSS valve is dependent on the application and maintenance practices.

Trigger	Procedure	Frequency
Installation	The cavity seal should be checked for signs of leakage. If any leakage is seen use the procedure below. If no leakage is seen, we recommend a quarter turn per packing screw or half a turn for applications where the process temperature is 25°C above ambient temperature.	24 Hours after Start-up
Signs of Leakage	As described above	As required
High Cycle Applications: 1 cycle per hour or more	Inspect valve for signs of leakage. If leakage is observed, follow the procedures as described above.	Monthly
Elevated Temperatures: Above 80% of elastomers rated	Inspect valve for signs of leakage. If leakage is observed, follow the procedures as described above.	Monthly
Scaling Applications	Inspect valve for signs of leakage. If leakage is observed, follow the procedures as described above.	When lines are “Weak Washed” or “Flushed” with a solution designed to break down the scale lining the walls of the pipe.

PROCEDURE

M81 DSS valves can be repacked while installed in line, under full pressure. Simply tighten the packing screws on each side of the valve (**see page 9**) using the following guidelines:

- The amount of revolutions required of each screw to fully repack a valve will vary.
- Start by turning each screw a half turn and observe if the leakage stops. If the valve continues to leak, adjust each screw a quarter turn at a time, until the leakage stops. If possible, and safe to do so, cycle the valve partially to help distribute the packing after every 1-2 adjustments.
- Ensure that each screw is adjusted equally to evenly distribute the packing and reduce the risk of over loading one area of the cavity seal against the gate.
- If one of the packing screws has reached the end of its travel, the screw can be safely removed, and additional packing pellets inserted. A round 1/8” diameter handled dowel (cut off screw driver or welding rod will also work) can be used to press the pellets into hole until enough threads are exposed to reinstall the screw. Ensure that the threads are not damaged in the process. Depending on the size, normally one or two additional pellets is all that is required.

CAUTION

Overpacking or adding an excessive number of pellets can affect the actuation. Repack only until the valve seals completely or for preventative maintenance a quarter turn for each screw.

Maintenance Guidelines

REPLACING THE PRIMARY SEAL

Attention: Damaged or worn seals need to be replaced. Seal kits can be purchased separately if this is being done on site. Alternatively, the valve can be sent back to the DSS factory for maintenance.

If you choose to do this yourself, replacement kits include a resilient seal, primary and secondary seals, TFE packing pellets, and scraper blades (**see parts lists on pages 12 & 14**).

Warning: This is a labor-intensive operation, which should be conducted by a qualified valve technician using the appropriate safety equipment.

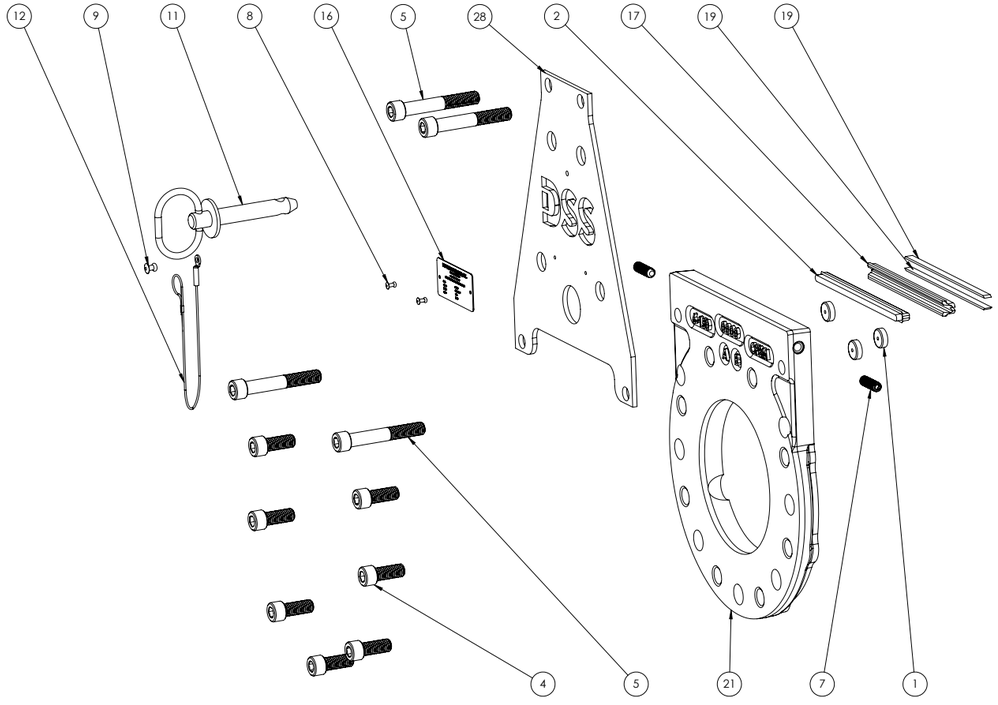
1. Remove the actuator and top structure from the valve bodies.
2. Remove the body screws, and then separate the bodies.
3. Note the position of the existing seals, and then gently pry out the old seals.
4. Remove any debris around the sealing area on the interior of the valve body.
5. Prep the replacement resilient primary seal by removing any packaging material.
6. The stranded green packing material must remain in the pocket of the primary resilient seal. If stranded material falls out, simply push it back into place.
7. Place the resilient seal in the machined seal groove on the body half by starting at one end of the groove.
8. Once the new primary seal is installed in the groove, insert the scrapers between the seal and the side of the machined groove. This process should be repeated for each seal in each body.
9. On the front body half (with the gate pocket), insert the end of the resilient seal into the tuck hole below in the gate pocket. The seal should seat securely on the bottom of the tuck hole.
10. Install the gate in the body half. Push the resilient seal into the machined groove all the way around the gate. Insert the end of the resilient seal into the other tuck hole. Any excess seal material should be cut so that the seal seats securely on the bottom of the tuck hole.
11. Close the valve by sliding the gate until it fully seats.
12. Install the Teflon corner seals on both sides of the gate where the seal enters the tuck hole.
13. Push packing pellets into the area between the resilient seal and the Teflon corner seal. An Allen wrench or other blunt ended tool to will aid in this operation.
14. Gently place the back body half on the front body half, and reinstall all body screws that were previously removed. Install the top structure which includes the front and back top plates and actuator.
15. Proper sealing of the primary resilient and secondary seals can be maintained during operation by further packing through the external holes on each side of the valve bodies.

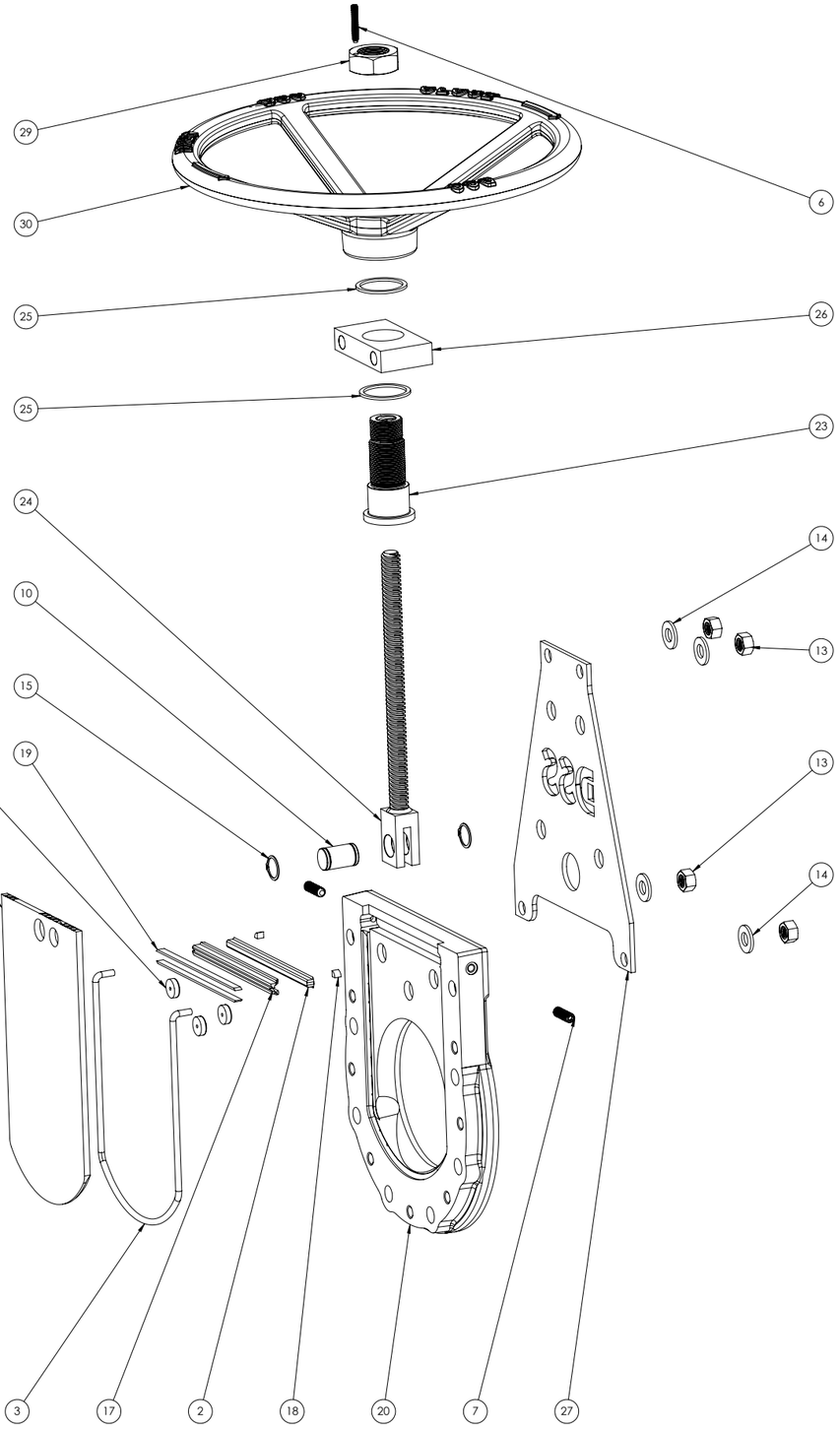
M81 Knife Gate Valve

Parts Diagram and List—Handwheel

ITEM #	QTY	DESCRIPTION
1	6	Disc, Gate Glide
2	1	Packing
3	1	Seal, Primary
4	7	SHCS, 1/2-13 X 1.250
5	4	SHCS, 1/2-13 X 3.250
6	1	Set Screw, Extended-Tip
7	4	SSS, 3/8-16 X 1.250
8	2	Pop-Rivet, Domed Head, 1/8” Dia. X .188”-.250” Range
9	1	Pop-Rivet, Domed Head, 3/16” Dia. X .126”-.250” Range
10	1	Pin, Clevis
11	1	Pin, Locating
12	1	Lanyard, 12 inch
13	4	Locknut, Steel Center Lock Distorted
14	4	Washer
15	2	Ring, External Retaining

ITEM #	QTY	DESCRIPTION
16	1	Tag, Identification
17	2	Seal, Cavity
18	2	Seal, Quarter
19	4	Blade, Seal Scraper
20	1	Body, Front
21	1	Body, Back
22	1	Gate
23	1	Bushing, Threaded Stem
24	1	Assembly, Rising Stem
25	2	Bearing, Thrust
26	1	Plate, Screw
27	1	Plate, Back Top
28	1	Plate, Front Top
29	1	Nut, Hex Jam 1-1/4-12
30	1	16” Handwheel, Rising Stem





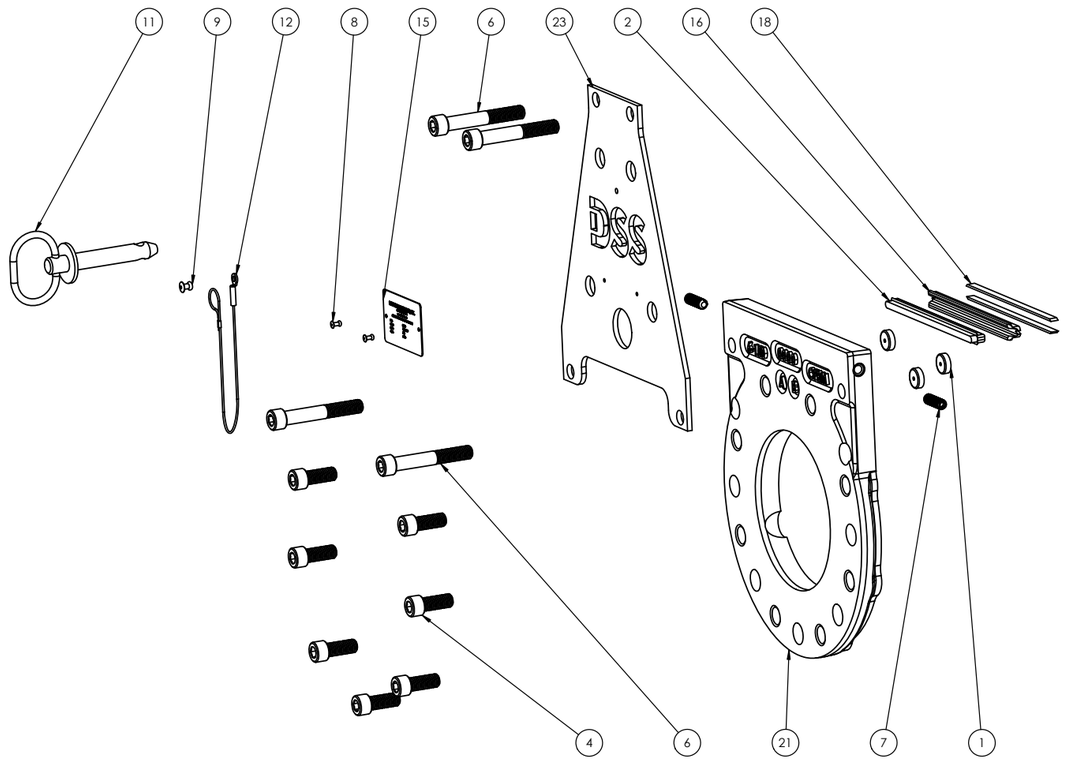
DSS VALVES

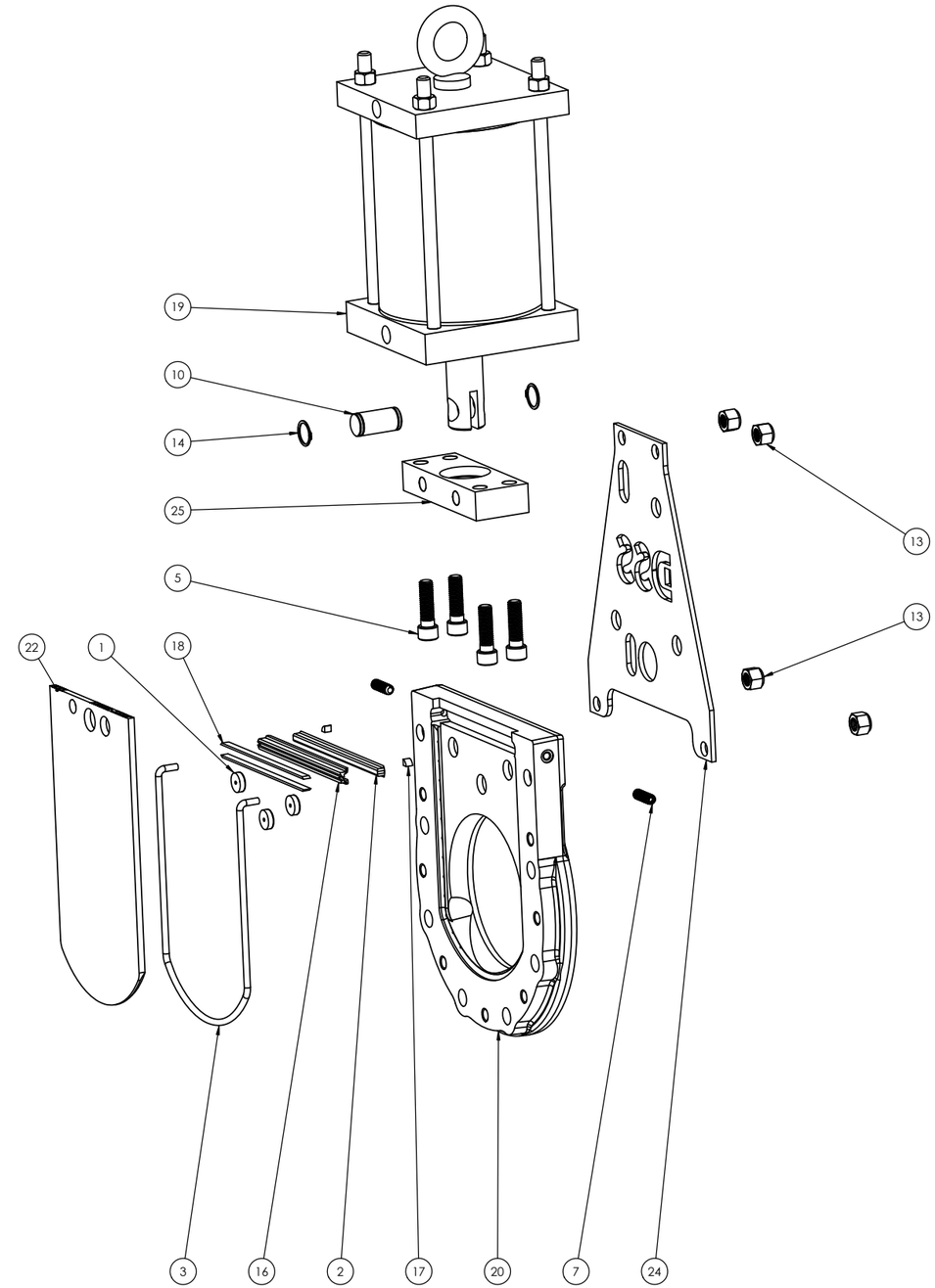
M81 Knife Gate Valve

Parts Diagram and List—Pneumatic Cylinder

ITEM #	QTY	DESCRIPTION
1	6	Disc, Gate Glide
2	1	Packing
3	1	Seal, Primary
4	7	SHCS, 1/2-13 X 1.250
5	4	SHCS, 1/2-13 X 1.750
6	4	SHCS, 1/2-13 X 3.250
7	4	SSS, 3/8-16 X 1.250
8	2	Pop-Rivet, Domed Head, 1/8" Dia. X .188"-.250" Range
9	1	Pop-Rivet, Domed Head, 3/16" Dia. X .126"-.250" Range
10	1	Pin, Clevis
11	1	Pin, Locating
12	1	Lanyard, 12 inch
13	4	NHN, 1/2-13

ITEM #	QTY	DESCRIPTION
14	2	Ring, External Retaining
15	1	Tag, Identification
16	2	Seal, Cavity
17	2	Seal, Quarter
18	4	Blade, Seal Scraper
19	1	Cylinder, 6" Pneumatic
20	1	Body, Front
21	1	Body, Back
22	1	Gate
23	1	Plate, Front Top
24	1	Plate, Back Top
25	1	Plate, Screw





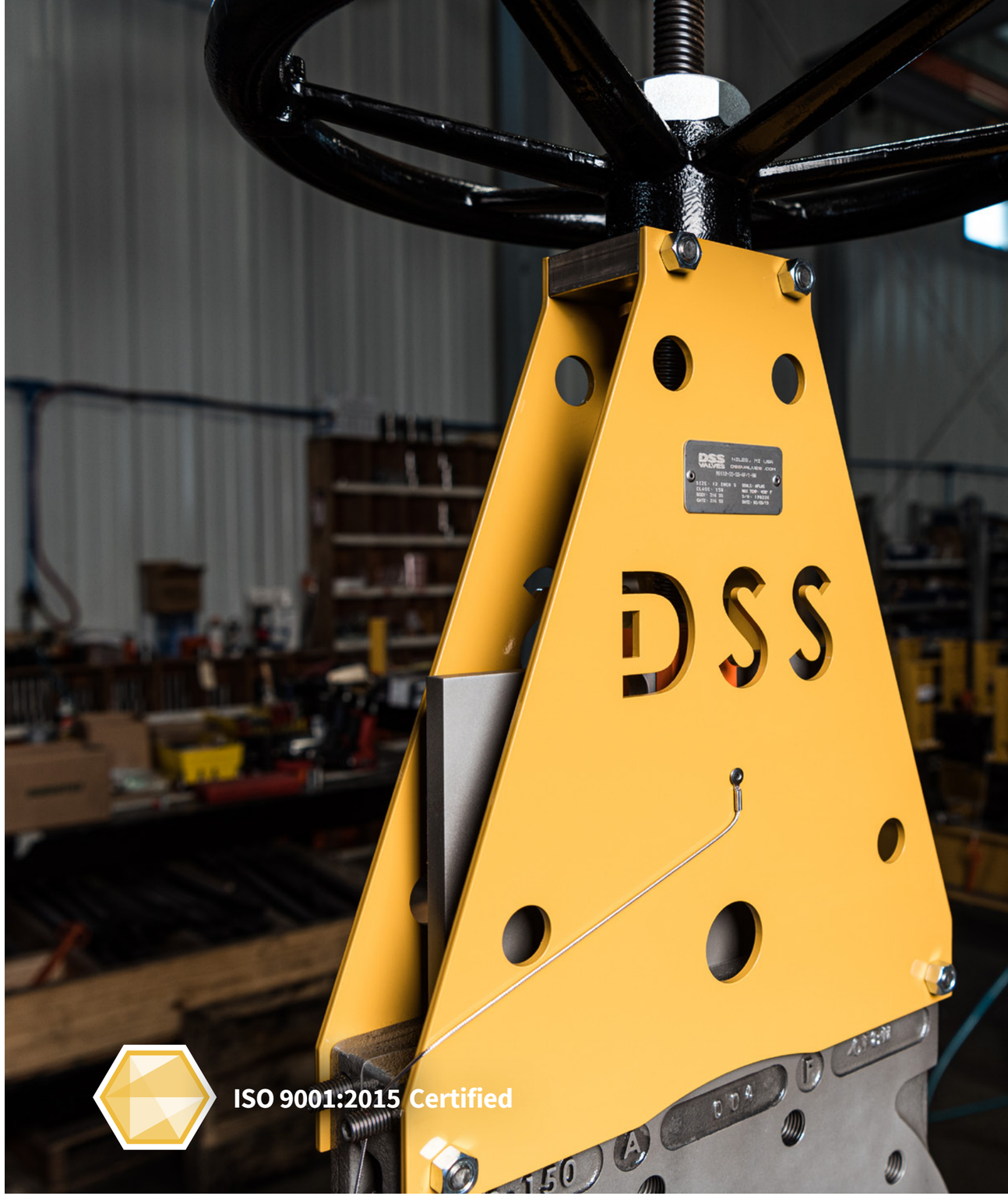
Troubleshooting

PROBLEM	STEPS	POSSIBLE CAUSE	SPARE PARTS	RECOMMENDATIONS
Fugitive emissions leak (Bonnet area or between body halves)	1	Insufficient packing pressure on primary seal	Packing	Follow *Repacking the Valve* guidelines on page 9.
	2	Primary seal is damaged	Seal Kit	Follow primary seal replacement guide in IOM, a repair kit is required.
Leaking past gate	1	Improper seating in closed position	None	If manual operator, cycle the valve full closed; lockout-tagout pin should slide through left yoke over the gate. Caution: ensure the pin is removed before further cycling is attempted.
	2	Insufficient packing pressure on primary seal	Packing	Follow *Repacking the Valve* guidelines on page 9.
	3	Improper limit switch adjustment	None	Consult factory, or limit switch manufacturer, for adjustment procedure.
	4	Build-up on seat seal	None	Consult factory.
	5	Compromised primary gate seal	Seal Kit	Remove valve from pipe, with gate fully open, visually inspect primary seal for signs of damage. Follow primary seal replacement guide in IOM, a repair kit is required.
Open lockout-tagout pin will not engage	1	Various	None	Consult factory.
Valve will not cycle, moves slowly or erratically	1	Lockout-tagout pin left in	None	Ensure safe work practices are followed, remove Lockout-Tagout Pin if easy to do so. If the pin is pinched between the gate and yoke, stroke the valve open or close to alleviate force on the pin and remove it. Visually inspect the pin and yokes; consult factory if bent or damaged.
	2a	Hex Head Flange bolts in chest/blind holes	None	Consult *Installation Guidelines* on page 6.
	2b	Flange bolts are over-tightened	None	Loosen flange bolting and re-torque the bolts after consulting the gasket manufacturers' torque specification. *All DSS valve flanges have a max torque that should not be exceeded. More information can be found in TECH-003 bulletin.*
	3	Overpacked primary seal	Packing	Remove packing screws and attempt to actuate valve. If the valve is over-packed, once the valve begins to cycle, excess packing will extrude from the packing screw holes.

WARNING
It's highly recommended that persons working with DSS Valves products are factory trained or approved to complete teardown, reassembly and testing.

IMPORTANT
Please ensure recommended spares are on hand in the event the product needs to be overhauled.

ADDITIONAL GUIDELINES
Please consult your designated distributor for current Technical Bulletins and additional troubleshooting guidelines.



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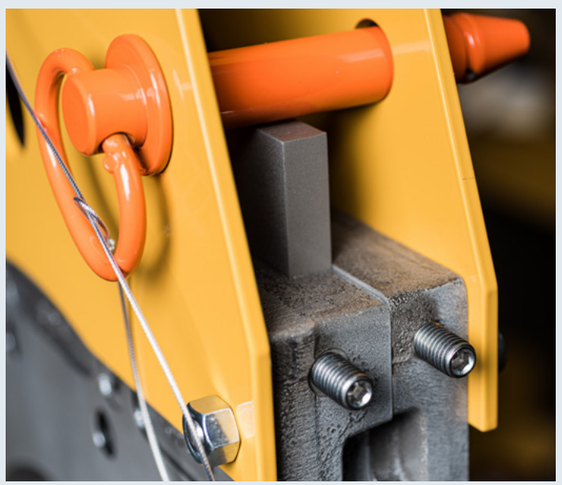

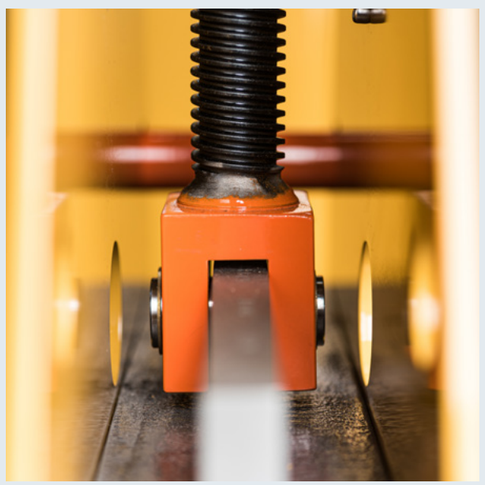

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