FIGURE 61B
KNIFE GATE VALVES

This instruction manual includes installation, operation, and maintenance information for 2" through 30" stainless steel and stainless steel-lined knife gate valves. This manual addresses handwheel-operated knife gate valves only. Please refer to other FNW manuals for other knife gate valves, actuated valves, modifications, or accessories.

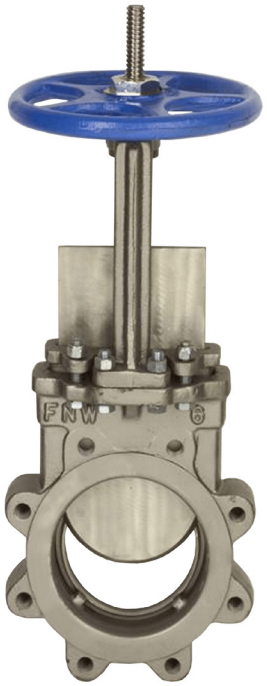


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FIGURE 61B
KNIFE GATE VALVES

INSTALLATION

WARNING:

To avoid personal injury to yourself, fellow workers, or damage to property from release of process fluid, before installation:

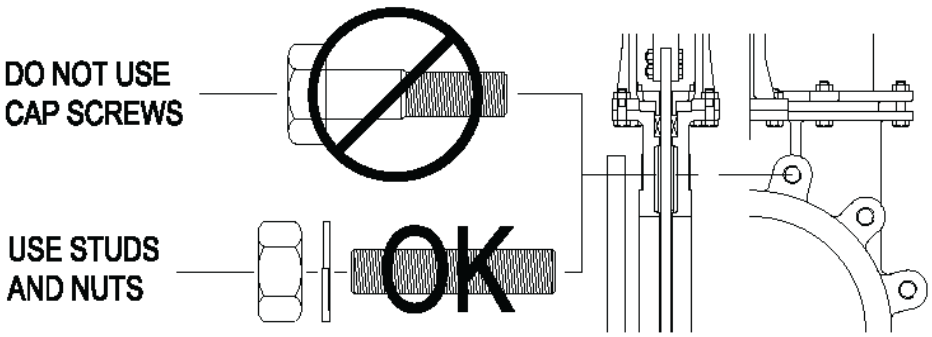
- Shut off all operating lines to the valve site
- Isolate the valve site completely from the process
- Release process pressure
- Drain the process fluid from the valve site

1. If the valve was supplied with an actuator, secondary support may be necessary. Contact FNW for recommendations.
2. Before installing the valve, inspect the valve body port and associated equipment for any damage that may have occurred and for any foreign matter that may have collected in shipping or storage. Make certain the body interior is clean.
3. Before installing the valve, inspect the pipeline and mating flanges, making sure the pipe is free of foreign material and the flanges are clean and have no burrs or pits that could cause leakage.
4. Due to stainless steel castings, machining tolerances, and flange thickness, the body tapped hole depth may vary slightly from valve to valve. It is therefore recommended that all knife gate valves be installed with stainless steel ASTM ASTM A193 B8 (304SS) or B8M (316SS) studs. The use of carbon steel B7 studs may also be considered. We further recommend the use of Teflon thread compound.

For stainless steel-lined valves, **STUDS ONLY** are highly recommended. Damage to liner can result if cap screws are used.

NOTE:

The use of cap screws or bolts may harm the chest in the knife gate by bottoming out and should never be used on this area of the knife gate valve.



STUD SIZES FOR FLANGE BOLTING (INCHES)

Valve Size	Stud* Diameter	Valve Size	Stud* Diameter	Valve Size	Stud* Diameter	Valve Size	Stud* Diameter	Valve Size	Stud* Diameter
2	5/8	4	5/8	10	7/8	16	1	24	1-1/4
2-1/2	5/8	6	3/4	12	7/8	18	1-1/8	30	1-1/4
3	5/8	8	3/4	14	1	20	1-1/8	*National Coarse	

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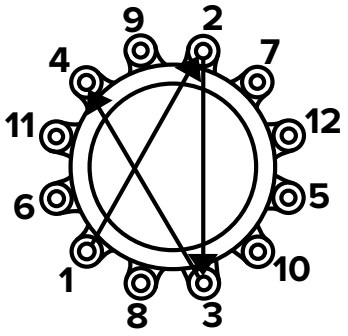
FIGURE 61B
KNIFE GATE VALVES

5. The FNW knife gate is manufactured with ANSI B 16.5-150# raised face flange dimensions. The use of a suitable gasket between the body and the pipeline flange shall be selected by the customer. We recommend the use of a PTFE gasket.
6. FNW knife gate valves may be installed in any orientation in the pipeline; however, the normal method is with the handwheel vertical above the valve body. Other positions are acceptable; however, they may result in uneven valve wear.
7. Verify that the valve is either unidirectional or bidirectional. Care must be taken with the unidirectional valve as the valve seals in one flow direction only. Typically, the valve will have a seat side indicated by the word “SEAT” cast into the body and is usually installed with the seat downstream of flow. In rare occasions, it may be advantageous to install the valve with the seat upstream (usually with modification to the valve); contact FNW regarding these applications.
8. Carefully place the valve between the flanges and loosely assemble the valve by putting in the bottom two or three studs, then carefully insert the gaskets into place. The bottom studs will help locate the gasket and hold it in position.
9. Carefully insert the balance of the studs into place and tighten all of them evenly by using the cross-over pattern. Do not tighten in rotation.

CAUTION:
Do not overtighten chest cavity studs.

Resilient Seated Valves

All resilient seated knife gate valves require the resilient seat to be lubricated before stroking, regardless of the type of actuator. The fit pressure of the gate against the resilient seat, on the sides of the valve up through the packing gland, is such that stroking the valve dry, that is with no lubrication of any kind, will cause the resilient seat to cold flow beyond safe limits and will damage the seat with just a few strokes. CRC 6-56™ or WD-40® **(Note: Make sure the lubricant used is compatible with the seat material and process media)**, sprayed on the seat, up in the chest area, on both sides, will normally provide sufficient lubrication. This should be repeated every 2 or 3 strokes. This is **CRITICAL** to the life and performance of the seat. In operation, the process product normally supplies adequate lubrication.

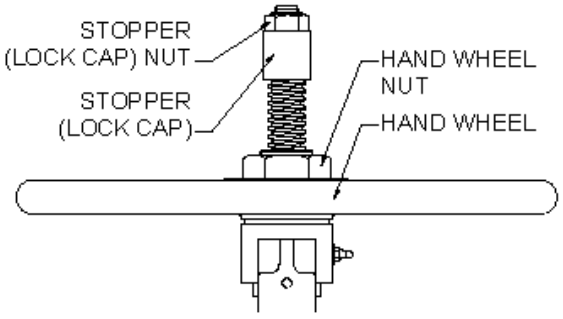


Typical Cross-Over Pattern

Valves With Stoppers (Lock Caps)

After installing resilient seated valves with stoppers, be sure to determine that the stopper and stopper nut are set properly.

1. Remove the stopper nut and stopper.
2. Turn the handwheel in a clockwise motion until the gate bottoms out.
3. For perimeter resilient seated valves, turn the handwheel an additional 1/4 turn, and then go to step 7.
4. For high performance knife gate valves, spin the handwheel once, letting it spin freely, counterclockwise until it stops on its own.
5. Turn the handwheel an additional 1/2 turn counterclockwise.
6. Now freely spin the handwheel clockwise once, until it stops on its own.
7. Return the stopper and run it down until it meets the wheel nut.
8. Return the stopper nut and run it down tight against the stopper to hold it in position.



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FIGURE 61B
KNIFE GATE VALVES

OPERATION

1. After the valve has been installed, cycle the valve once completely. Open the valve by turning the handwheel counterclockwise, reverse the operation for closing. (Note: This will detect if any damage has been incurred due to either shipping or installation processes.) After cycling the gate valve, turn the handwheel counterclockwise several turns, allowing partial opening for preparation to fill system.
2. Open upstream valve slowly, building system pressure gradually, allowing installation personnel to detect any excessive packing gland leakage, making necessary adjustments.
3. After the system has come to full pressure, open the knife gate valve fully by turning the handwheel counterclockwise, then close the valve fully by turning the handwheel clockwise. In resilient seated knife gate valves, this process will result in "seating in the valve". This step may be eliminated with the metal seated valve.
4. You may now use the valve for its intended purpose, keeping in mind that a knife gate valve should be used in a full open or full closed position. Knife gate valves **should not** be used for throttling service unless specifically configured for such use.

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FIGURE 61B
KNIFE GATE VALVES

MAINTENANCE

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of the service conditions. This section includes instructions for packing adjustments, repacking, seat replacement, and seating adjustment.

Normal Maintenance

Normal maintenance of FNW knife gate valves may only include a periodic tightening of the packing gland. Should a leak occur at the packing gland, simply tighten the packing gland bolt closest to the leak. This may require tightening two or three bolts on larger valves. After the leak has stopped, tighten all packing gland bolts 1/4 turn. Do not overtighten. The only other normal maintenance required would be to grease the valve stem by using a grease gun at the grease fitting located on the valve yoke.

WARNING:

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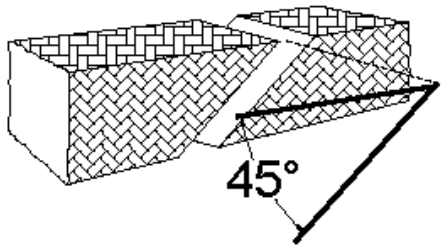
- Shut off all operating lines to the valve site
- Isolate the valve site completely from the process
- Release process pressure
- Drain the process fluid from the valve site

Repacking

From time to time, it may be necessary to repack the valve completely. This can be done following the warning procedure listed above. Standard repacking kits are available from FNW. Packing kits include the necessary packing which ensures a tight seal. When ordering packing kits, be sure to specify valve model number, seat type, and type of valve.

Repacking the valve includes the following steps:

1. Isolate and clear the valve as mentioned in the warning procedure listed above.
2. Remove packing gland nuts and lock washers.
3. Raise blade to full open position.
4. Pull up the packing gland to the top of the blade and secure it to the top of the blade
5. Using a packing hook, remove all of the old packing.
6. Carefully clean the stuffing box. If oil, grease, or graphite-impregnated packings were used, it may be necessary to use a solvent to clean the stuffing box.



CUT BUTTING ENDS AT 45° ANGLES

7. Use precut packing kits purchased from FNW, or carefully cut each ring by wrapping a length of packing around the blade snugly, but without tension. With packing snips, cut each ring individually, making 45° cuts at the butting ends.
8. If the valve was supplied with a gate scraper(s), install it into the stuffing box, first making sure the scraper is centered around the blade (this will require unbolting of the stem clevis). Then insert the packing rings one at a time.
9. Tamp each ring lightly in place using a flat packing iron. Successive layers are installed in the same manner. Alternate packing joints at 90° or 180° with each layer to minimize leakage as shown in illustration.
10. It may be necessary to compact the lower packing to get all rows installed. If so, pull the packing gland down and tighten using the two end studs until the packing gland almost bottoms out.
11. Remove the packing gland again as previously described. Continue inserting packing as described above.
12. Pull down the packing gland over the gland studs. Using lock washers and nuts, tighten the packing gland using the cross-over method. **Do not overtighten.**
13. Bring the valve up to pressure and tighten the packing gland following the procedures listed in the maintenance section.

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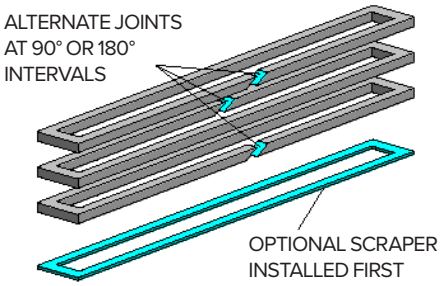
FIGURE 61B
KNIFE GATE VALVES

Seat Replacement (Resilient Seated Valves)

Replacement of the seat requires that the valve be removed from the line.

Unidirectional O-ring Seats

1. Open the valve (note that the gate does not come completely off the seat).
2. Remove the yoke bolts. With a hoist or comealong winch, lift the yoke assembly and blade until the entire seat is exposed as shown in Figure 1. Do not remove the assembly past the packing, unless the packing will also be changed.
3. Remove the existing seat O-ring.
4. Install the replacement seat O-ring. Note where the O-ring is joined and insert that seamed portion into the top center of the O-ring groove (the gate will cover and protect this portion of the seat).
5. While installing the seat O-ring, make sure it does not twist. Firmly press the O-ring into the groove. Added effort may be needed to fit the O-ring near the gate stoppers (blade guides) as shown in Figure 2. Be sure the O-ring is fully seated.
6. Lightly cover the new seat with Sil-Glyde® (NAPA 765-1351 or equivalent) or light-grade oil. This will prevent the new seat from rolling as the valve is initially closed.
7. Tap the top of the stem until the gate passes the top of the seat.
8. Bolt and tighten the yoke assembly to the valve body.
9. Close the valve and ensure the seat ring placement does not cause it to roll or be cut.



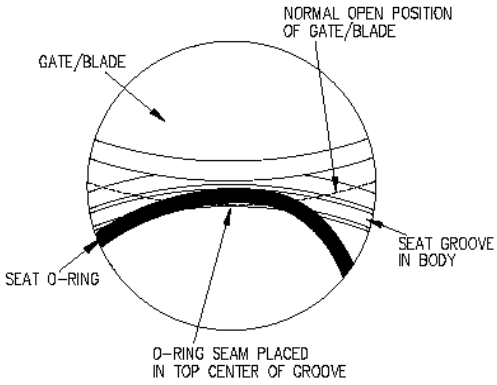


Figure 1

Bidirectional Perimeter Seats

1. Disassemble the entire valve and remove old packing as described below.
2. Remove the old seat and clean the seat body cavity with a wire brush and a solvent, making sure the entire cavity is clean of foreign matter.
3. Place the new seat, with reinforcing seat wire, on the top of the valve body, centering it on the valve per Figure 3.
4. Take hold of the ends of the seat material and, with equal pressure, push the new seat into the body cavity. This action should produce a “U” shaped form as the seat slides into the valve cavity.
5. Push the seat down until it reaches the bottom of the valve, keeping both ends of the seat extending equally from the top of the valve as shown in Figure 4.
6. Using a flat blade screwdriver, gently work each side of the seat under the retaining lip in the bottom of the valve. It may be necessary to gently tap the seat with a rubber mallet as the seat is worked under the retainer.
7. Once the seat is positioned under the retaining lip, as in Figure 5, use a blunt piece of wood or plastic to gently tap the seat to the bottom of the seat trough.

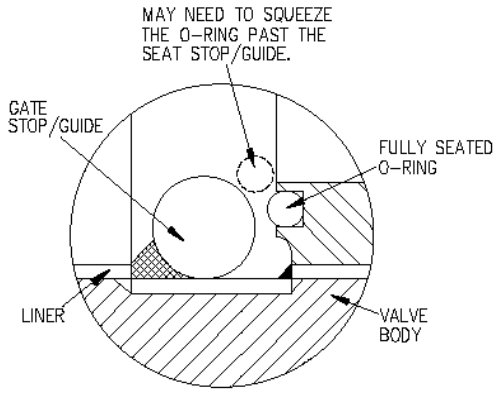


Figure 2

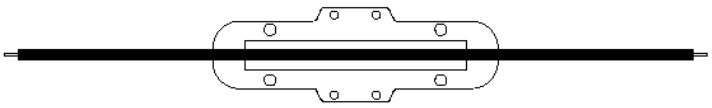


Figure 3

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FIGURE 61B
KNIFE GATE VALVES

8. Trim the remaining material at the top of the valve body approximately 1/2" above the mounting flange per Figure 4.
9. Lubricate the exposed seat surfaces with Syl-Glyde® (NAPA 765-1351 or equivalent) or light-grade oil.
10. Insert valve gate into the body, keeping the gate centered in the cavity as it is installed. Push firmly or lightly tap with a rubber mallet until it reaches the bottom of the valve. The gate should be in contact with the seat along the entire edge of the gate.
11. Repack the valve following the repacking procedures previously outlined.
12. Reinstall packing follower and tighten the bolts equally starting at the center and working to the ends.
13. Reinstall the yoke assembly while making sure the valve operates freely and the gate is properly seated to the seat material.

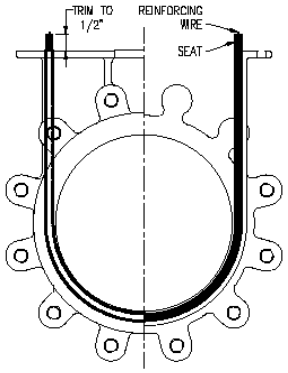


Figure 4

High-Performance Seats

1. Replace the seats with the valve in the closed position.
2. Remove the retainer ring bolts and slide the assemblies out from both sides of the valve as shown in Figure 6.
3. Slide both the seat ring and seat backing O-ring off the retainer.
4. Lubricate the replacement O-rings with Syl-Glyde® (NAPA 765-1351 or equivalent) or light-grade oil. This will ensure that the O-rings do not roll when placed on the retainer rings and will also help the installation of the seat assemblies into the valve body.
5. Place the new seat rings over the O-rings on the retainers (The retaining lip on the seat should be placed against the O-ring) as shown in Figure 7.
6. Place the seat assemblies into the valve body and lightly secure with retainer ring bolts.
7. Tighten the retainer ring bolts using the cross-over method describe in step 8 of the installation instructions.
8. Using a straight edge, tighten the bolts until the retainer rings are flush with the valve body as shown in Figure 8. **Do not overtighten.**

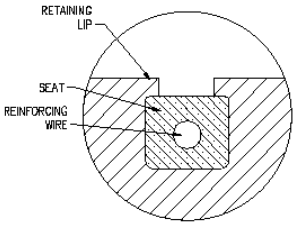


Figure 5

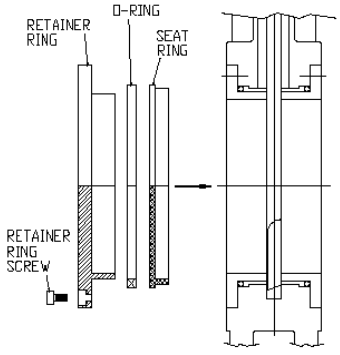


Figure 6

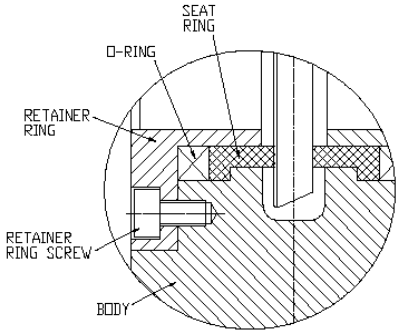


Figure 7

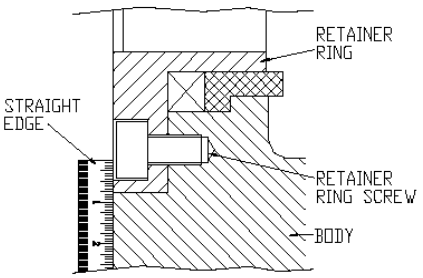


Figure 8

NOTE:
If the gate of the high-performance knife gate valve is removed for any reason, make sure the seat retaining rings are loosened prior to the gates reinsertion into the valve body. This will help prevent the seat rings from being damaged.

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FIGURE 61B
KNIFE GATE VALVES

WARRANTY

Limited Warranty

Subject to the limitations expressed herein, Seller warrants that products manufactured by Seller shall be free from defects in design, material and workmanship under normal use for a period of one (1) year from installation but in no case shall the warranty period extend longer than eighteen months from the date of sale. This warranty is void for any damage caused by misuse, abuse, neglect, acts of God, or improper installation. For the purpose of this section, “Normal Use” means in strict accordance with the installation, operation and maintenance manual. The warranty for all other products is provided by the original equipment manufacturer.

Remedies

Seller shall repair or replace, at its option, any non-conforming or otherwise defective product, upon receipt of notice from Buyer during the Manufacturer’s warranty period at no additional charge. SELLER HEREBY DISCLAIMS ALL OTHER EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OR FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Liability

UNDER NO CIRCUMSTANCES SHALL EITHER PARTY BE LIABLE TO THE OTHER FOR INCIDENTAL, PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. BUYER HEREBY ACKNOWLEDGES AND AGREES THAT UNDER NO CIRCUMSTANCES, AND IN NO EVENT, SHALL SELLER'S LIABILITY, IF ANY, EXCEED THE NET SALES PRICE OF THE DEFECTIVE PRODUCT(S) PURCHASED DURING THE PREVIOUS CONTRACT YEAR.

Labor Allowance

Seller makes NO ADDITIONAL ALLOWANCE FOR THE LABOR OR EXPENSE OF REPAIRING OR REPLACING DEFECTIVE PRODUCTS OR WORKMANSHIP OR DAMAGE RESULTING FROM THE SAME.

Recommendations by Seller

Seller may assist Buyer in selection decisions by providing information regarding products that it manufacturers and those manufactured by others. However, Buyer acknowledges that Buyer ultimately chooses the product’s suitability for its particular use, as normally signified by the signature of Buyer’s technical representative. Any recommendations made by Seller concerning the use, design, application or operation of the products shall not be construed as representations or warranties, expressed or implied. Failure by Seller to make recommendations or give advice to Buyer shall not impose any liability upon Seller.

Excused Performance

Seller will make a good faith effort to complete delivery of the products as indicated by Seller in writing, but Seller assumes no responsibility or liability and will accept no back-charge for loss or damage due to delay or inability to deliver, caused by acts of God, war, labor difficulties, accidents, inability to obtain materials, delays of carriers, contractors or suppliers or any other causes of any kind whatever beyond the control of Seller. Under no circumstances shall Seller be liable for any special, consequential, incidental, or indirect damages, losses, or expense (whether or not based on negligence) arising directly or indirectly from delays or failure to give notice of delay.

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