

# FIGURE 75M - 78R - 80X

## KNIFE GATE VALVES



### INTRODUCTION AND INSTALLATION

This instruction manual includes installation, operation, and maintenance information for 2" through 24" 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.



### INSTALLATION

#### Warning

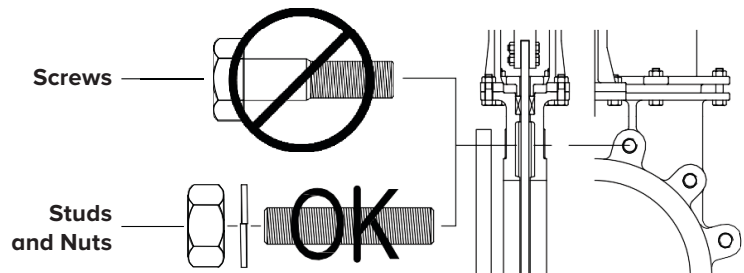
To avoid personal injury to yourself, fellow workers, or damage to property from release of process fluid, before installation:

- 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
- If the valve was supplied with an actuator, secondary support may be necessary. Contact FNW for recommendations.
  - 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.
  - 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.
  - 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 A193 B8 (304SS) studs. The use of carbon steel B7 studs may also be considered. We further recommend the use of Teflon thread compound.

#### NOTES:

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

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.



# FIGURE 75M - 78R - 80X

## KNIFE GATE VALVES



### INSTALLATION

#### 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           | —                 | —               |
| 3          | 5/8             | 8          | 3/4             | 14         | 1               | 20         | 1-1/8           | * National Coarse |                 |

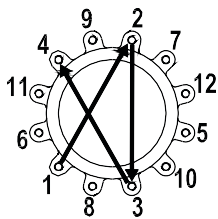
- The FNW Knife Gate Valve is manufactured with ANSI B 16.5 - 150# raised face flange dimensions. The use of a suitable gasket between the body and the pipeline flange shall be selected by the customer.
- FNW Knife Gate Valves may be installed in any orientation in the pipeline; however the normal method is with the handwheel vertical above the valve body. Other positions are acceptable; however, they may result in uneven valve wear.
- Verify that the valve is either uni-directional or bi-directional. Care must be taken with the uni-directional 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.
- 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.
- 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 over-tighten chest cavity studs.

#### TYPICAL CROSS-OVER PATTERN



- 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.

## FIGURE 75M - 78R - 80X KNIFE GATE VALVES



### OPERATION AND MAINTENANCE

#### 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 adjustments necessary.
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.

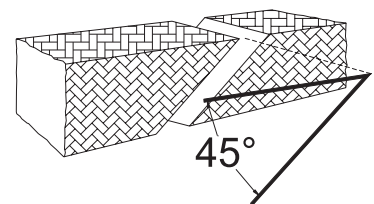
#### MAINTENANCE

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.

#### Warning

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

- a. Shut off all operating lines to the valve site
  - b. Isolate the valve site completely from the process
  - c. Release process pressure
  - d. Drain the process fluid from the valve site
1. **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 over-tighten. 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.
  2. **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 insures 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:
    - a. Isolate and clear the valve as mentioned in the warning procedure listed above.
    - b. Remove packing gland nuts and lock washers.
    - c. Raise blade to full open position.
    - d. Pull up the packing gland to the top of the blade and secure it to the top of the blade.
    - e. Using a packing hook, remove all of the old packing.

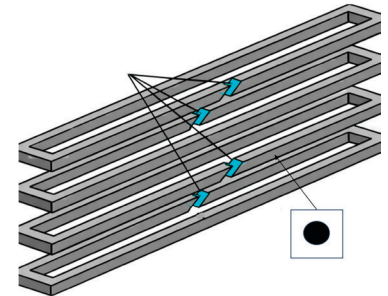


Cut Butting Ends at 45° Angles

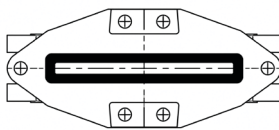
## FIGURE 75M - 78R - 80X KNIFE GATE VALVES



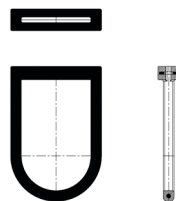
- f. Carefully clean the stuffing box. If oil, grease, or graphite impregnated packings were used, it may be necessary to use a solvent to clean the stuffing box.
  - g. Use precut packing kits purchased from FNW, or carefully cut each ring by wrapping a length of packing around the blade snugly, but without tension. With packing snips, cut each ring individually, making 45° cuts at the butting ends.
  - h. 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. On the second layer, insert EPDM CORE packing.
  - i. 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.
  - j. Remove the packing gland again as previously described.
  - k. Continue inserting packing as described above.
  - l. 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 over-tighten.**
  - m. Bring the valve up to pressure and tighten the packing gland following the procedures listed in the maintenance section.
3. **SEAT REPLACEMENT (Resilient seated valves)** – Replacement of the seat requires that the valve be removed from the line.
- a. **FNW 78R Bi-directional Cassette Type Seats**
    - Disassemble the entire valve and remove old packing as described above.
    - Remove the old seat and clean seat body cavity with a wire brush and a solvent, making sure the entire cavity is clean of foreign matter.
    - Place the new seat, with reinforcing seat wire, on the top of the valve body, centering it on the valve per Figure 3.



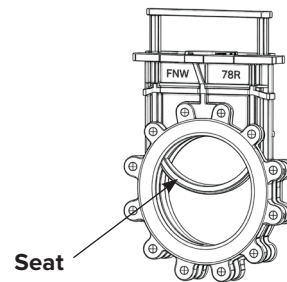
**Alternate Joints at  
90° or 180° Intervals**



**Figure 3**



**Seat Shape**



**Seat**

- Inspect and lubricate the seat – Inspect the seat for any signs of damage such as cuts, tears, or surface defects. Do not install the seat if damage is found. Apply a light, even coat of Syl-Glyde® (NAPA p/n 765-1351 or equivalent) or an equivalent silicone-based lubricant to both the inner and outer seating surfaces. Carbon-based greases must not be used. This lubrication assists with smooth insertion of the seat into the valve body and proper engagement of the gate. If a silicone lubricant is not available, a mild soap-and-water solution may be used as an alternative.
- With the radiused side facing downward, guide the seat through the packing box and straight into the valve throat.
- Using a flat-faced, round installation bar with no sharp edges, gently tap around the circumference with a hammer. Continue until the seat is fully seated at the bottom of the packing box. Exercise care to prevent damage to the elastomer surface during installation. At this stage, the seat should be securely positioned within the seat recess.

## FIGURE 75M - 78R - 80X KNIFE GATE VALVES



- Insert the gate through the packing box with the radiused end first, passing it through the packing support bar and into the valve throat. Push the gate down as far as possible by hand.
- Repack the valve in accordance with the instructions on Pages 3 and 4. Do not fully tighten the packing at this time.
- Align the actuator top plate with the yoke and align the gate bolt holes with the valve lifter. Lower the assembly into position and secure the top plate using hex nuts.
- Fasten the gate to the actuator assembly using hex nuts.
- Cycle the valve to the fully open position.
- Cycle the valve to the fully closed position.
- Apply pressure to the pipeline and verify proper operation.

### b. FNW 80X High-Performance Seats

- Replace the seats with the valve in the closed position.
- Remove the retainer ring bolts and slide the assemblies out from both sides of the valve as shown in Figure 6.
- Slide both the seat ring and seat backing O-ring of the retainer.
- Lubricate the replacement O-rings with Syl-Glyde® (NAPA p/n 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.
- 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.
- Place the seat assemblies into the valve body and lightly secure with retainer ring bolts.
- Tighten the retainer ring bolts using the cross-over method describe in Step 8 of the installation instructions.
- Using a straight edge, tighten the bolts till the retainer rings are flush with the valve body as shown in Figure 8.

**Do not over-tighten.**

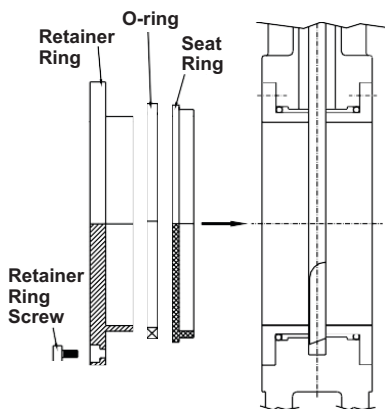


Figure 6

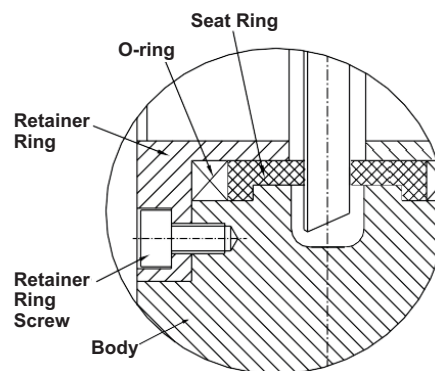


Figure 7

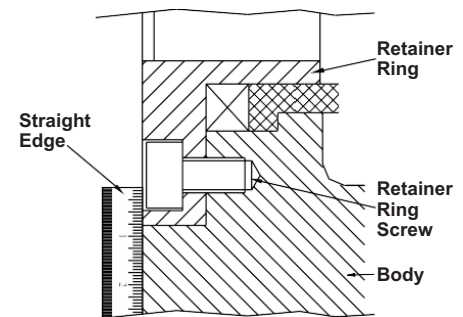


Figure 8

**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 gate's reinsertion into the valve body. This will help prevent the seat rings from being damaged.

## FIGURE 75M - 78R - 80X

### KNIFE GATE VALVES



#### WARRANTY

1. **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.
2. **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.
3. **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.
4. **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.
5. **RECOMMENDATIONS BY SELLER:** Seller may assist Buyer in selection decisions by providing information regarding products that it manufactures 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.
6. **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.