

# **FABRICATED SLIDE GATES**

## **Installation, Operation & Maintenance Manual**

Manufactured by:



The purpose of this booklet is to give information on correct procedures for installation, adjustment, operation and maintenance of fabricated slide gates manufactured by Fresno Valves & Castings, Inc.

Your gate, lift and accessories were accurately machined, assembled, adjusted and inspected before leaving the factory. For best results, follow the applicable parts of this manual carefully, including thorough cleaning and lubrication of moving parts.

### **CAUTIONARY STATEMENT FOR INSTALLATION MANUAL**

This manual describes the recommended procedures for installation, adjustment, operation and maintenance of Fresno Valves & Castings' fabricated slide gates. When it is used in conjunction with installation drawings that have been supplied by Fresno Valves & Castings, this manual will be sufficient for most installations. Proper care and precautions must be taken in handling and storing the gates at the delivery site. For further details on handling, storing and installation of a specific project, contact Fresno Valves & Castings.

**IMPORTANT NOTE:** Precise and accurate installation is critical to satisfactory operation. Fresno Valves & Castings, Inc. assumes no liability, expressed or implied, for interpretation of the contents of this manual. If you have any questions concerning the interpretation of the contents of this manual, or installation procedures in general, you should contact the Fresno Valves & Castings main office at (800) 333-1658 prior to installation. Fresno Valves & Castings expressly disclaims all liability, expressed or implied, for faulty installation of any gate or associated equipment and for any direct, consequential, or incidental damages that may result.

## **Fresno Valves & Castings, Inc.**

7736 East Springfield Avenue  
P.O. Box 40  
Selma, CA 93662-0040

**(800) 333-1658**



# Installation Tips

In order for you to complete this installation in the most effective manner, we recommend that the personnel responsible for installation of the gate(s) study this manual prior to installation and follow the directions carefully throughout the installation process.

All of our gates are precision machined, shop adjusted, and quality checked water control equipment intended for low leakage characteristics. Although durable and heavily constructed, attention must be given to proper storage, careful handling, and accurate location of embedded items for the gate structures to operate as designed.

## Do

- Do** Read and follow the instructions in this manual.
- Do** Carefully inspect the gates and accessories when received, prior to unloading trucks or cars. Report any and all shortages or suspected damage by marking the Bill of Lading and Receiving Reports prior to accepting the shipment.
- Do** Store gates evenly on planks or timbers.
- Do** Support stems for their full length when handling and protect threaded portions during storage and handling.
- Do** Accurately locate and brace embedded items during placement of concrete.
- Do** Store automatic lifts (cylinders, electrical actuators) in dry storage or under cover until installation. These units are not “weatherproof” until fully installed and functioning, and Fresno Valves & Castings guarantees these units only to the extent the manufacturer guarantees them to us. Refer to the manufacturer’s storage instructions.
- Do** Request your hydraulic or electrical subcontractor to familiarize themselves with the installation, adjustment and operating instructions furnished for automatic lifts during approval submittal. Manufacturer’s assistance in setting and adjusting these units is not included in the contract agreement unless specifically required. A purchase order is required for field service to adjust and inspect the installation. Field service rates are available on request.
- Do** Contact your Fresno Valves & Castings representative with any questions you have.

## Don't

- Don't** Stack gates without heavy wood blocking between gates.
- Don't** Disassemble the gates for installation.
- Don't** Tighten nuts for studs or anchors unevenly, or try to pull a gate frame tightly against an uneven wall surface. In most cases, this will cause excessive leakage.

## Placing Flange-Back Gates On Concrete

(figures 1-4 at right)

1. Secure all anchor bolts in proper position in the forms. For proper size, length, projection and spacing, see installation drawing.
2. Two nuts are provided per bolt. Sufficient grout space must be left for adjustment of the back nut on the anchor bolt.
3. Pour concrete as required. Strip forms.
4. Place a nut on each bolt and establish a preliminary flat vertical plane as close as possible to the wall.
5. Place assembled gate in position on the anchor bolts. Now using a plumb line, straight edges, or spirit levels, plumb the gate in place. Back up the nuts snug behind the gate allowing room for grouting. On the front of the gate, snug up the front nuts to pinch the gate securely sandwiched between the front and back nuts. Tighten the nuts, being careful not to move the gate out of the established plane.
6. Carefully grout in the gates with a cement based "non-shrink" grout such as U.S. Grout Corporation "5 Star Grout".

7. After the grout has set, make certain there are no voids between the gate seat and the concrete. NOTE: Due to possible shrinkage of certain types of grout, it may be necessary to loosen the gate and apply a sealing compound between the gate seat and the wall.

8. Tighten all nuts or anchor bolts uniformly, but do not warp gate to conform to uneven surface.

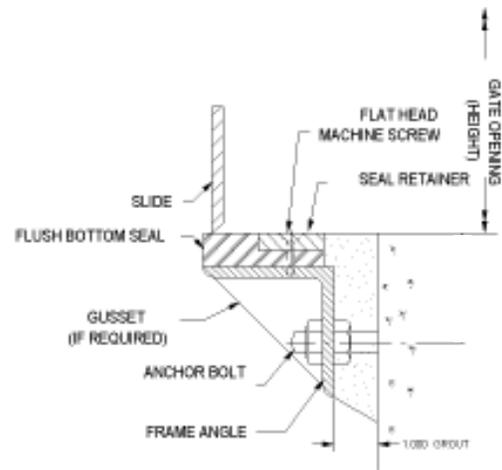


Figure 1 Flange-Back Bottom Section

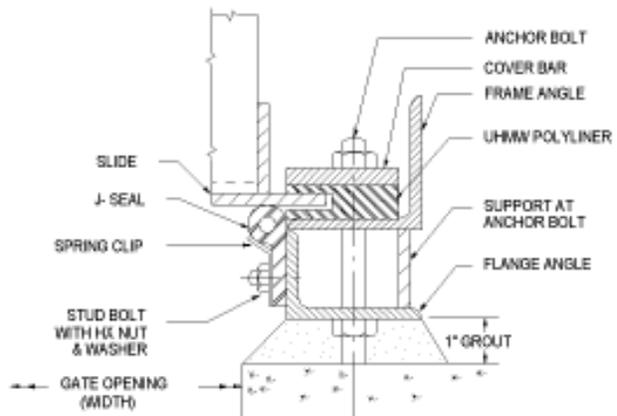
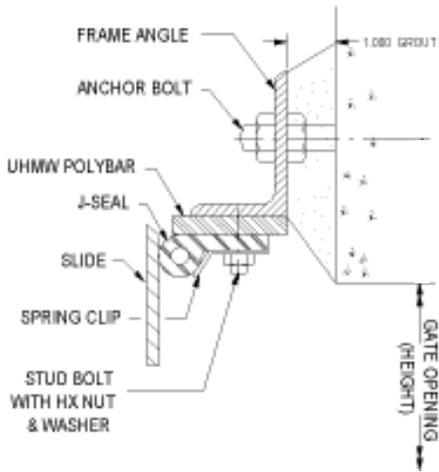


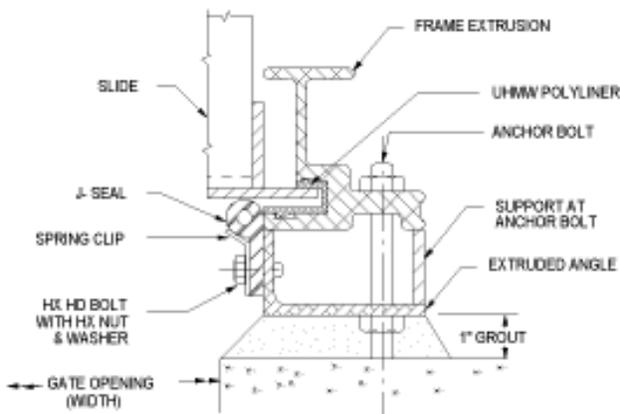
Figure 2 Flange-Back Side Section

## Placing Flange-Back Gates On Steel Flange Or Plate

1. Flange-back gates may be mounted on a steel plate or flange provided the flange is flat within  $\pm 1/16$ " of true flat plane. Use mastic such as Sika-Flex 1A or rubber gasket in the flange joint.
2. Tighten flange joint bolts uniformly. Do not warp the gate to an uneven surface.



**Figure 3** Flange-Back Top Section



**Figure 4** Flange-Back Side Section (Aluminum)

### Placing Spigot-Back Gate If Concrete Is Poured Before Gate Is In Place

1. Secure anchor bolts in proper position in the forms. For the proper size, length, projection and spacing, see gate installation drawing. A recess must be provided around the perimeter of the gate seat. the recess is necessary because of the spigot.

2. Pour concrete as required. Strip forms.

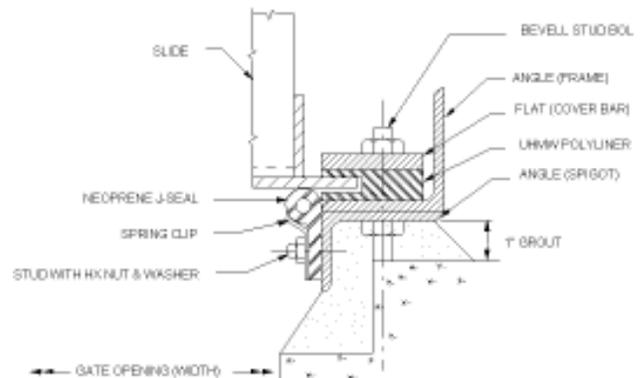
3. Two nuts have been provided for each anchor bolt for use with other methods of installation. For best results on this type of installation, use only one nut on each anchor bolt. Place the completely assembled gate into position on the anchor bolts, aligning anchor bolts as required. Block gate in correct position with respect to the location of the stem guides and lift. Bring nuts on anchor bolt into light uniform contact with gate. Check proper alignment on gate with respect to final location of stem, stem guides (if used) and lift.

4. Some gates have top frame members and may have anchor bolts to align and stabilize the top member. See the installation drawing for specific type and placement of anchors. The top member should be aligned so that it is straight and if equipped with a seal, the seal should make contact with the slide.

5. Carefully grout in the gate.

6. After the grout has set make certain that there are no voids between the gate seat and the concrete. Refill voids with grout or sealing compound if necessary.

7. Tighten all anchor bolts uniformly. Do not warp gate to conform to uneven surface.



**Figure 5** Spigot-Back Side Section

## Placing Flat-Back Gate if Concrete is Poured Before Gate Is In Place

(figures 6-9)

1. Secure all anchor bolts in proper position in the forms. For proper size, length, projection and spacing, see installation drawing.

2. Two nuts are provided per bolt. Sufficient grout space must be left for adjustment of the back nut on the anchor bolt.

3. Pour concrete as required. Strip forms.

4. Place a nut on each bolt and establish a preliminary flat vertical plane as close as possible to the wall.

5. Place assembled gate in position on the anchor bolts. Now using a plumb line, straight edges, or spirit levels, plumb the gate in place. Back up the nuts snug behind the gate allowing room for grouting. On the front of the gate, snug up the front nuts to pinch the gate securely sandwiched between the front and back nuts. Tighten the nuts, being careful not to move the gate out of the established plane.

6. Align the horizontal top cross flat member with the gate frame. Drill 3/8" by 3" deep holes in concrete using this flat as a template. Install cinch anchors, using washers, shims or blocks between the flat and the concrete wall to maintain frame alignment and straightness across the top. Tighten cinch anchor bolts uniformly.

7. Carefully grout in the gates with a cement based "non-shrink" grout such as U.S. Grout Corporation "5 Star Grout".

8. After the grout has set, make certain there are no voids between the gate seat and the concrete. NOTE: Due to possible

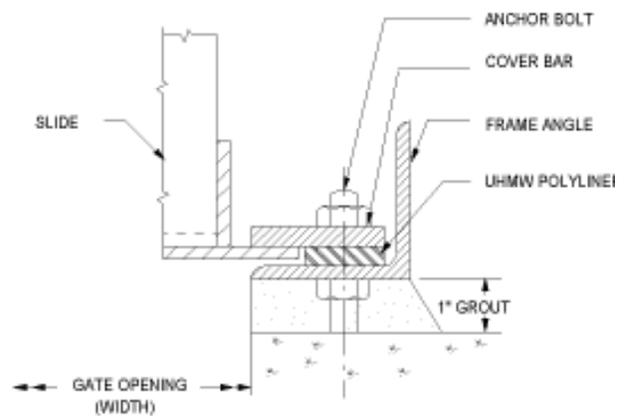


Figure 6 Flat-Back Side Section

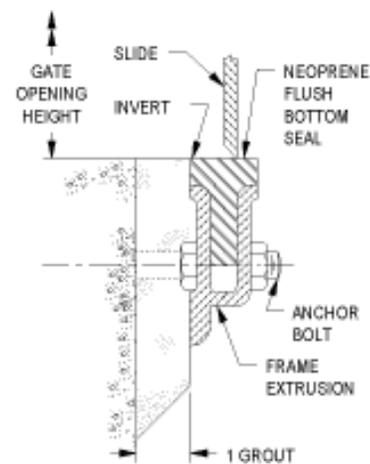
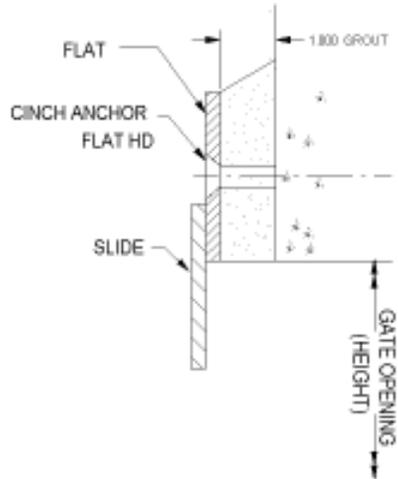


Figure 7 Flat-Back Bottom Section (Aluminum)

shrinkage of certain types of grout, it may be necessary to loosen the gate and apply a sealing compound between the gate seat and the wall.

9. Tighten all nuts or anchor bolts uniformly, but do not warp gate to conform to uneven surface.

## Installation Of Flush Bottom Closure Gates *(figure10 below)*

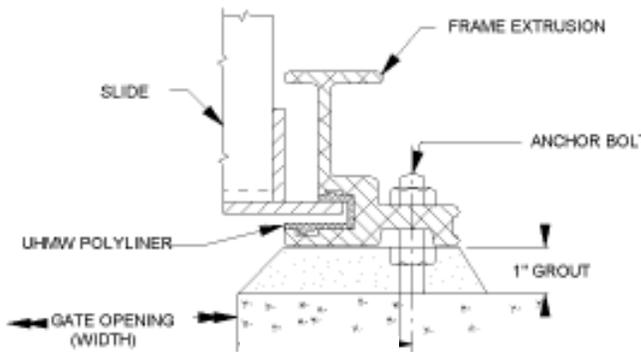


**Figure 8** Flat-Back Top Section

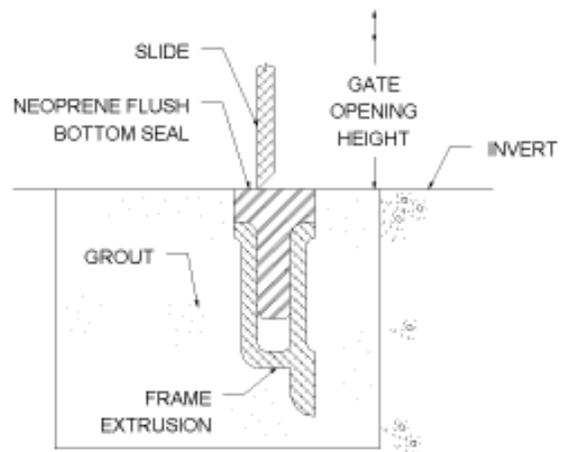
1. Those gates that are to be installed with bottom frame members embedded in the concrete are furnished with a rubber seal attached to the invert of the gate frame. The top surface of the rubber seal is installed at the same elevation as the invert of the gate opening. Check installation drawing.

2. Form a recess for the bottom of the gate in the original pour of concrete. The dimensions of this recess are shown on the installation drawing.

3. After the forms are stripped, instal the gate as shown for other types of installations in this manual.



**Figure 9** Flat-Back Side Section (Aluminum)



**Figure 10** Embedded Bottom Section (Aluminum)

## Placing Gates In A Concrete Channel After Original Pour Has Been Made

(figures 11-12)

1. A recess must be made in the original pour of concrete to receive the gate. For a minimum width and depth of this recess, see the installation drawing. These gates should all be flush bottom closure type. A recess for the flush bottom closure is required in the invert of the structure. (See figure 10)

2. Pour concrete. Strip forms including removal of material used to form the block out.

3. Set the completely assembled gate in the recess along the sides and across the bottom of the structure. Anchor bolts are not required. Grouting serves to hold the gate in firm position afterwards.

4. By blocking and shimming, align the gate in the vertical position. Use care to maintain the slide and the side guides in a plane without warping or distorting the guides and bottom member of the frame. Use plumb lines and spirit levels to be certain that the frame is straight and plumb before pouring concrete or grouting.

5. Carefully grout the gate in position.

6. After the grout has set, make certain that there are no voids between the gate frame and grout. When voids are detected, refill with the grout or seal with a compound that has low cold flow characteristics.

7. Large gates may have clips which help stabilize the frame during shipment and installation. Remove these clips after the installation and prior to operation.

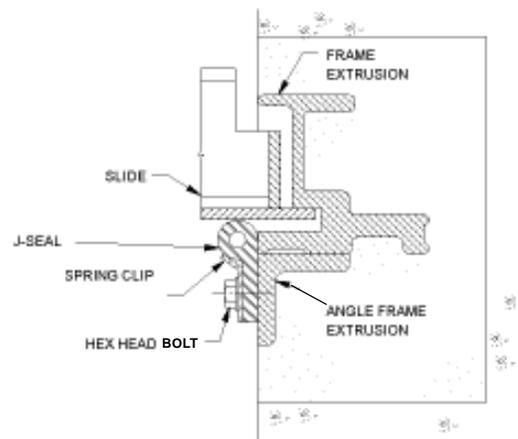


Figure 11 Embedded Side Section (Aluminum)

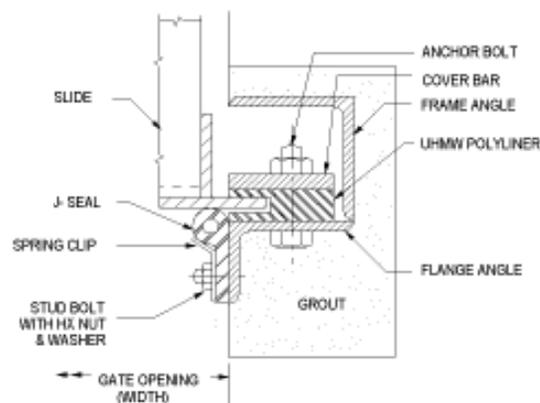


Figure 12 Embedded Side Section

## **Lift Installation And Adjustment Of Stem Guides** *(for gates not self-contained)*

- 1.** Manual devices are shipped with plastic plugs in the top and bottom of the tapped hole through the lift nut. Remove these plastic plugs. Check the interior of the threaded nut to make sure it is clean and that no foreign material has collected on the threads. Swab out threaded lift nut if necessary.
- 2.** Clean threaded section of stem of all foreign material and lubricate with a grease similar to Lubriplate No. 630AAA or AA.
- 3.** The top section of the stem may be threaded into the lift before or after the last section of stem is in place. When starting threaded stem into bottom of lift nut, care must be taken to avoid damage to the threads. Rough handling may result in damage to the bottom edge of the threaded lift nut and prevent the stem from being screwed into the lift nut freely. When all parts are thoroughly cleaned, the threaded lift nut will turn onto the threaded stem with very little effort. Hold lift to prevent its rotation. Turn the handwheel or crank to lower the pedestal onto its anchor bolts.
- 4.** By use of shims, double nuts or anchors, or other leveling devices under the base of the lift, align centerline of the stem. Snug up nuts on anchor uniformly.
- 5.** The handwheel or crank should be able to be turned freely in both directions. If there is any binding during the operation of the lift with the slight vertical movement of the gate slide, stem alignment should be checked. Slight misalignment will cause undue wear to the threaded lift nut. When binding is not caused by misalignment, recheck to make certain threads on stem and in lift nut are lubricated with clean grease.
- 6.** Grout under the lift is required.
- 7.** After grout has set, tighten the anchor bolts uniformly. With the gate in the fully closed position, run stop nut down on the top of the projecting threaded stem until it makes contact with the top of the lift. A gap of 1/16" is advisable to allow for wear and extra travel to seat the gate correctly. Tighten the set screw through the stop nut to hold it in position.
- 8.** Turn lift crank or handwheel to open gate. The stem is now in tension and should be straight. Check stem to make certain it is straight. Then tighten all nuts on anchors on stem guides.
- 9.** See the electric operator manual for nut installation instructions and limit switch adjustment.

## Installation Of Tandem Stems

Weir gates usually have wide openings with relatively short gate heights. When the installation drawings show tandem lifts, install each lift in accordance with the preceding steps 1 through 5. After each lift has been installed and each stem is connected to the gate slide at the bottom and the lift at the top, proceed as follows.

1. Turn the input shaft of each lift in the direction to open the gate until each stem makes firm contact with the top of its connection on the gate slide.
2. Place a level on the top of the gate slide and move one stem or the other of the gate up or down until the slide is completely level.
3. A tandem interconnecting shaft is furnished to connect the two lifts and cause them to act in unison for raising or lowering the gate. Loosen the fasteners on one of the jaws of the flexible coupling and slide it towards the center of the shaft until the shaft can be connected between the two lifts. Complete the connection and retighten all fasteners.
4. Move the gate slide up and down by turning the input shaft of one lift. Check to make sure the gate is installed with its top level and it is moving freely.
5. Complete the installation of any stem guides, lubricate the stem, adjust stop nuts, and so forth as described in the preceding steps 1 through 9.

## Maintenance and Lubrication

1. Occasional adjustment, lubrication, and painting of gate components may be required. Frequency will depend upon how often the gate is used, its location, and operating conditions. Periodic inspection, cleaning and repainting are recommended as conditions at the site permit.

2. Maintenance of the threaded portion of the gate stem is critical and should be performed as often as required for long life and ease of operation. Thoroughly clean threaded portion of stem and regrease with lubricant similar to Lubriplate No. 630AAA or AA. When excess dried grease or other foreign material is carried into the threads of the lift nut, extremely hard operation will result. If serious binding occurs, the only way to correct it is to remove the threaded stem from the lift nut and clean the threaded interior. If this foreign material is not cleaned from the interior threads of the lift nut, heavy pulls on the hand crank or even seizure will result.

3. The lifts have been factory lubricated with a water resistant grease designed to stay pliable and not dry out over long periods and wide temperature ranges. Periodic pressure greasing of the lift is recommended, applied through the grease fittings. For best results the input shafts of the lift should be turned 3 or 4 times and grease applied to each fitting after each turn. This will insure adequate lubrication of all parts. If lift is equipped with dial indicator, care must be used to prevent grease from interfering with internal gearing of indicator. Grease with Conoco's "All Purpose Superlube," Texaco's "Multi-Fax Heavy Duty Number 2," or Shell Oil Company's "Alvania No. 1," or "Lubriplate No. 630AAA."

## Leakage

The most frequent cause of excess leakage through a newly installed gate is improper installation and or failure to make final adjustments to the gate before it is put into operation. When you encounter this problem, you should first verify that the installation instructions have been carefully followed and that final adjustments and greasing have been accomplished. If they haven't been, then follow through on step-by-step procedure of adjustments as outlined in the appropriate instructions.

Another important check is to make sure that gates have not been disassembled for installation. This is mentioned in several places throughout this manual, but we still find that gates are disassembled for easier handling, painting, etc. When it is absolutely necessary to partially disassemble a gate or remove the slide to facilitate installation, use extreme care in handling the parts, particularly the frame. Without the slide in place, the frame is very fragile. Fresno Valves & Castings can not be responsible for performance problems caused by rough handling and damage to gate parts.

As pointed out above and in our installation instructions, the amount of leakage through gates is highly dependent upon the quality of installation.

In the case of fabricated slide gates without rubber seals, there are no machined seating faces or wedging devices. These gates are recommended for seating heads only. Slides are somewhat flexible under maximum seating heads. This slight deflection is helpful as it causes the gate slide to seat against the frame and be fairly watertight under the maximum head. There is more leakage through this type of gate with only a few inches of water on the gate than

there is with maximum head.

As in gates with machined faces, fine particles in the water have an additional benefit of sealing the small space between faces after the gates have been closed for awhile. Rubber "J" seals can be provided to improve the watertightness of these models. The rubber seal is mounted on the back side of the gate frame or on the inside wall of the gate opening with the bulb of the seal making contact with the back of the slide. There is no standard leakage for fabricated slide gates. Fabricated gates with seals, properly installed and adjusted, can be expected to have leakage rates similar to AWWA standards for Heavy Duty Sluice Gates. This rate is 0.1 gallons per minute per foot of seating perimeter and 0.2 gallons per minute per foot of unseating perimeter. If the gate must be used or tested in unseating direction, the rubber seals may have to be adjusted tighter. This may cause some additional crank effort, if the gate is then used in a seating head.

## Maintenance Summary

1. General cleaning and inspection:  
*Frequency - As often as conditions require or permit, or every six months.*
2. Inspect stem threads and lift nut for wear:  
*Frequency - Initial inspection after 24 cycles, subsequent inspection after 48 cycles, operational inspection after each 100 cycles or every six months, whichever occurs first.*
3. Check stem, adding lubricant if needed:  
*Frequency - every 100 cycles or six months, whichever occurs first.*  
  
*Lubricant: Mixture of 24 fluid ounces of La-Co "Slic-Tite Paste" and one gallon of Fiske Bros. "Lubriplate No. 630 AAA or AA. (if unavailable, see equivalents listed on this page)*
4. Pressure greasing of lift through the grease fitting:  
*Frequency - every 100 cycles or six months, whichever occurs first.*  
  
*Lubricant: Fiske Bros. "Lubriplate No. 630 AAA (if unavailable, see equivalents listed on this page)*
5. Clean and grease seating faces and wedge surfaces.  
*Frequency - every six months.*

## Lubricants and Equivalents

### **Fiske Bros. "Lubriplate No. 630 AAA"**

La-Co Industries, Inc.  
270 N. Washtenaw Ave.  
Chicago, IL 60612  
(312) 826-1700

#### *Equivalents:*

Conoco's "All Purpose Superlube"  
Texaco's "Multi Fax Heavy Duty No. 2"  
Shell Oil Company's "Alvania No. 1"  
Mobil's "Mobilux EP2"  
Fiske Bros. "Lubriplate No. 630 AA"  
Exxon's "Ronex MP"

**Note: For water treatment plants, use a vegetable base lubricant such as Fiske Bros. "Lubriplate Super FML-2"**

### **La-Co "Slic-Tite Paste"**

#### *Equivalents:*

Dayton Pipe Thread Sealant Paste with Teflon - stock number 4X222 or 5X998 available at W.W. Grainger, Inc. stores in major cities.

## Troubleshooting

Fabricated gates depend upon water pressure with a slight deflection of the gate slide to seal. At best, leakage through gates without rubber seals will probably be several times that which occurs through sluice gates. Proper installation and cleaning of seating faces is still necessary to cause the gate to be as watertight as possible.

Excess leakage through fabricated gates may be caused by the following:

### 1. Warped Gate Frame

To determine if frame is warped, open the gate slide to its full up position. Use thin wire, string or straight edge to check the gate frame. Stretch the wire along each side. If there is significant ( $1/32$ " or more) variation in seating face, excess leakage will result in those locations where warpage has occurred. Also use the wire to stretch corner to corner of the opening. If the wires do not touch in the center, then one corner or the other has been pulled back considerably from the plane. To repair this faulty installation, it is necessary to loosen bolts, push the frame out as required and align it prior to tightening or regrouting.

### 2. Dirty Seating Faces

Excess leakage can also be caused by foreign material on the seating faces of the gate frame or on the gate slide. Check for drops of paint, cement runs on the seating faces or other construction grime. To correct, scrape off the foreign material from the perimeter of the seating faces on both slide and frame and reseal the gate.

### 3. Warped Slide, Over-closure

If leakage occurs primarily at the top near the stem, there is probably excess com-

pression in the stem which is pulling the gate slide from its frame. Check by turning the handwheel or crank of the lift in the direction to open the gate. When excess pressure on the stem is removed, the slide will spring back into position. Reset the top nut or adjust torque or limit switches as described in section entitled "Lift Installation and Adjustment of Stem Guides."

### 4. Warpage of the Top Frame Member

If leakage occurs primarily at the top, and the slide is not warped or being pushed out of position, then check to make sure that the top frame member has not been pulled back against the concrete. This is especially likely to occur on those gates that are wide enough to have expansion anchors in the top frame member. To correct misalignment, loosen the bolts into the cinch anchors and shim behind the top frame member, as necessary to push it away from the concrete headwall. Use a straight edge or thin wire stretched along the upper frame member to set the member straight. Double check for seal contact or close fit with the slide before regrouting the frame member. This space may also be packed with lead wool or epoxy grout.

### 5. Leakage Past J-Seals

If the J-seals are not making good contact with the slide, the gate will leak excessively. When the seals are properly adjusted, a  $.005$ " to  $.015$ " feeler gauge should not be admitted between the seal and the slide. If a feeler gauge is not available, use a piece of light gauge shipping band material. If the leakage is localized, dewater and open the gate as required to provide access to the seal retainer bolts. Loosen the seal retainer bolts around the area of the leak and pry or pull the seal toward the slide. On occasion,

## Troubleshooting (continued)

the seal retainer sticks to the seal. If this happens, all the retainer bars on a side need to be loosened and the retainer pried away from the seal before the adjustment can be made.

### 6. Leakage Across the Bottom of Flush Bottom Gates

If there is a sheet of water coming out of the bottom of the gate, then the gate is not completely closed. To completely close the gate, the stop nut or limit switch may need to be reset. When the gate is properly closed, the slide will be embedded about 1/16" into the flush bottom seal and neither a .005"-.015" feeler gauge nor a piece of light gauge shipping banding will be admitted between the flush bottom seal and the bottom of the slide. Use of a flash light or trouble light on the opposite side will also indicate whether or not good contact is being made.

### 7. Excessive Leakage at the Lower Corners on Flush Bottom Gates

This indicates that the gate is being overclosed. This pushes the J-seals away from the bottom seal, opening up gaps. To remedy this, turn the crank or handwheel in the open direction just enough to relieve some of the pressure on the bottom seal but not enough to have the bottom of the slide separate from the bottom seal. Slightly opening and slowly closing the gate while watching the leakage will also work. When the point of minimum leakage is found, the stop nut or limit switch should be reset accordingly.

Another possible cause of corner leakage is small gaps between the J-seals and the flush bottom seal even without the gate being overclosed. When the seals are dry,

these gaps should be filled with caulking, such as silicone to minimize leakage.

### 8. Stem Bends When Gate is Closed

#### *with hand operated lifts -*

1. Check to make sure that stem guide collars are properly located to hold the stem in alignment. Bolts on collars must be tightened so that the collar is not slipping on the guide bracket.
2. Check to make sure that stem guides are all located properly. If the spacing exceeds that shown on installation drawing, the stems may be deflecting before gates are closed tight.
3. If stem guides are correctly located and collars are tight, then the load being applied to the stem by the lift is in excess of that needed to close the gate, or the load recommended for a particular stem size. Reset the stop nut to prevent an excess load from being applied to the stem after the gate is actually closed.

#### *with electrically actuated lifts -*

1. Check the setting of the bottom torque switch and the limit switch. If the stem is being bent after the gate is completely closed, it indicates that both of these switches are set improperly. The limit switch should have caused the power to be cut off before the stem bends.
2. Reset these switches using the instructions prepared by the manufacturer of the electric actuated lift. Set first the limit switch to cut off the power when the gate is fully closed. Adjust the torque switch to apply less push to the stem so that it will not be bent, even if the gate encounters an obstruction during closure.

#### *with hydraulic cylinder lifts -*

1. Screw the stem further into the stem block or stem splice coupling so that the

piston “bottoms” out inside the cylinder when the gate is fully closed; or by means of pressure relief valve, adjust the maximum pressure to the top of the cylinder to prevent overloading the stem when the gate is closed. Be sure to tighten the set screw after adjustment.

seals. Loosen if necessary. Reposition or replace if rolled over, torn or wadded up.

### **9. Excess Force is Required on Handwheel or Crank**

Check first to make sure that the stem is lubricated as recommended.

If a simple application of lubricant does not appear to solve the problem, check for foreign material jammed in nut threads by either disassembly or working back and forth with generous application of penetrating oil and grease.

If the stem is properly greased and the lift nut does not appear to be dirty or binding, check to make sure that the stem, stem guides and lift are in proper alignment. On most installations, the stem will be installed in the vertical position. A carpenter’s level can be used to verify that it is in vertical plane in both directions. Check for binding through individual stem guides. Check the pedestal to make sure that it is vertical in both directions and the stem threads are straight through the lift nut.

In those locations where the stem is not installed vertically, such as up the face of a dam, alignment can be double checked by use of a thin wire stretched tightly between the top of the slide and the bottom of the lift. Realign by adjusting the stem guides and/or shimming under one side of the lift as required.

Check frame guide grooves. Remove any foreign material. Check tightness of rubber



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