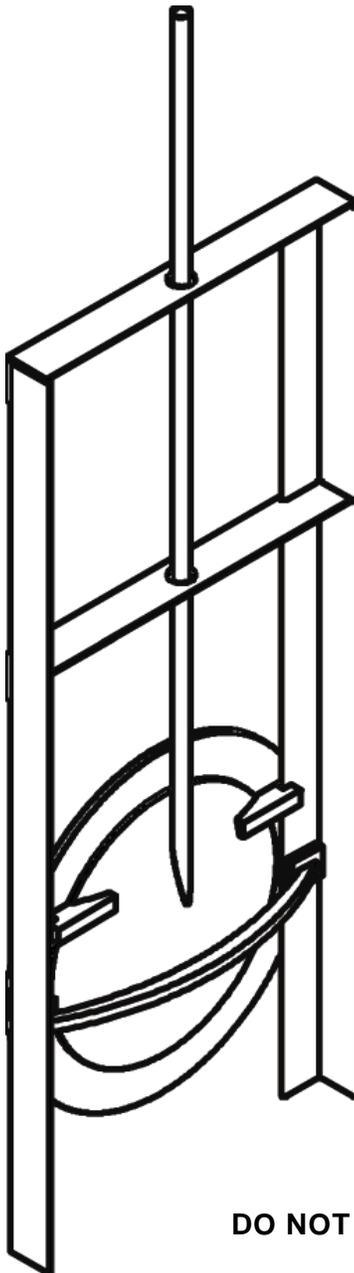




# *Installation, Operation, & Maintenance Manual*

## Light and Medium Duty Sluice Gates

Models 1001C and 101C Light Duty  
Model 20-10C Medium Duty



**DO NOT DISASSEMBLE GATE FOR INSTALLATION**



## TABLE OF CONTENTS

|   |      |
|---|------|
| Foreword .....  | 4    |
| Environmental Conditions .....                                | 5    |
| Things To Do and Not Do .....                                 | 5-6  |
| Installation Instructions .....                               | 6-7  |
| Installation by Attaching to Pipe .....                       | 6    |
| Installation of Flat Back .....                               | 6    |
| Installation on Corrugated Pipe .....                         | 6    |
| Installation to Concrete Pipe with Taper Setting Collar ..... | 7    |
| Operation .....   | 7    |
| Actuators .....   | 7    |
| Maintenance .....   | 8-11 |
| Troubleshooting .....   | 11   |

## FOREWORD

The purpose of this Installation, Operation, and Maintenance Manual is to provide information on the correct procedures for installation, adjustment, operation and maintenance of Fresno Valves' Light and Medium Duty Sluice Gates and their component parts.

Gate Models covered by this Manual follow:

- **Model 1001C and Model 101C Light Duty, round opening, flat and spigot back.**
- **Model 20-10C Medium Duty, round opening, flat and spigot back**

### **Installation Note**

These gate models can be easily warped during installation by rough handling and storage. Follow the installation instruction carefully for optimum gate performance. Do not disassemble gate for installation.

The gate, lift and accessories were accurately machined, assembled, adjusted and inspected before leaving the Fresno Valves factory. For best results, read and follow the applicable parts of this Manual carefully. These gate models have only one wedge per side. It is possible for the wedges to shift during shipment or for the gate to open slightly, causing the seating faces to open.

### **Warranty Note**

Installation and/or operation of the gate lift and stem without proper lubrication will void the equipment warranty. Thorough cleaning of the stem, seating faces, and wedging surfaces is required before gate operation. Details are described in the appropriate sections of this manual.

### **Notes**

**Spare Parts** - Fresno Valves does not recommend the stocking of spare parts. Replacement parts are readily available for worn or broken parts. Contact Fresno Valves or our representative in your area.

**Special Tools** - Special tools are not required to operate and/or maintain the equipment supplied by Fresno Valves on this project.

**Price List** - Prices for individual parts and/or assemblies may be obtained from the Fresno Valves at the time that they are needed.

**Disassembly** - Fresno Valves does not recommend the disassembly/reassembly of any of the equipment.

# LIGHT AND MEDIUM DUTY SLUICE GATES

## ENVIRONMENTAL CONDITIONS

Certain environmental conditions can be hazardous to water control gates. Exercise caution when environmental conditions may cause design loads to be exceeded.

### Ice Buildup

Icing can add tremendous loads to the opening and closing forces encountered by the gate operator and stem. If the handwheel or handcrank is forced to operate beyond the design limits of the gearbox or stem, damage can occur. De-ice gates before operation.

### Large Debris

Logs, rocks, or other large debris may be in the opening as a gate is closed. Damage to the slide, seating faces, or stem can occur. Remove large debris before operation.

### Installation Debris

Excess concrete or grout from gate installation can damage gate seating and sealing faces and stem. Ensure that seating faces, seals, wedges, and stem are free of concrete and grout before operation. Remove all concrete and grout from gate before operation.

### Mud

Gates in certain applications may become buried in mud, especially with infrequently operated gates. The force required to open a buried gate can exceed the design loads. Remove as much mud as possible before operating the gate.

Environmental conditions and frequency of operation determine how often maintenance should be performed. Proper maintenance will add many years of service to the life of this Fresno Valves & Castings, Inc. product.

## Things To Do and Not To Do During Installation of This Gate

To properly install this gate, Fresno Valves recommends that personnel study these instructions and installation drawings and flow the installation directions carefully. This gate is precision machined, shop adjusted, quality checked, and designed for low leakage. Attention must be given to proper storage, careful handling, and accurate location of embedded items for this gate to operate as designed.

Some DO'S and DON'TS to ensure proper gate installation.

- ✓ DO - Read and follow the Installation instructions and drawings in this Manual.
- ✓ DO - Carefully inspect the gates and accessories when received, before unloading trucks or cars. Report **ALL** shortages or suspected damage by marking the Bill of Lading and Receiving Reports at this time. Latent shortages must be reported in writing within 30 days of shipment.
- ✓ DO - Store gates evenly on planks or timbers. Even the heaviest castings are subject to permanent warpage if unevenly blocked during storage.
- ✓ DO - Support full length of stems and protect threads 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 guarantees these units only to the extent the manufacturer guarantees them to Fresno Valves. Refer to the manufacturer's storage instructions.
- ✓ DO - Request your hydraulic or electrical subcontractor become familiar 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 stated in our order acknowledgement. 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 representative with questions regarding this gate. Fresno Valves and its related companies have 100 years combined experience in the water control industry.
- ✓ DON'T - Stack gates without heavy wood blocking between gates.
- ✓ DON'T - Disassemble the gates for installation.

- ✓ DON'T - Allow excess concrete to overlap gate thimble or frame.
- ✓ DON'T - Tighten nuts for studs or anchors unevenly, or try to pull a gate frame tightly against an uneven wall surface. This, in most cases, will cause excessive leakage.
- ✓ DON'T - Operate gates with concrete and debris on them.
- ✓ DON'T - Operate gate stems dry (without grease).

## INSTALLATION INSTRUCTIONS FOR MODELS 101C AND 20-10C

**Caution - These models are easily warped during installation. These instructions must be carefully followed for correct gate installation.**

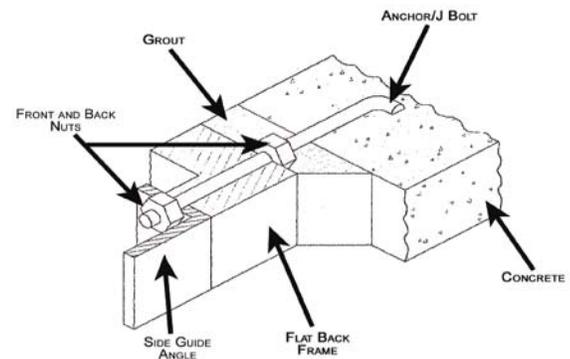
This gate was accurately machined, assembled and inspected before it left the factory. Wedges and wedge blocks were adjusted to make proper metal-to-metal contact. The space between the seating face was adjusted to less than four thousandths (0.004) of an inch. Since only one wedge per side is used on these models and they are relatively light, the seating faces may open up in shipment. If these installation instructions are carefully followed, the gate will operate properly.

### Instructions for installing gate attached to pipe

1. Set assembled gate with attached pipe in desired position.
2. The attached pipe may be connected to other pipe by means of band couplers or a concrete head wall may be poured around the attached pipe section. CAUTION: Deflection or distortion of the attached pipe section from its original shape will cause warping of the gate seat. Excess leakage will result. Bracing of the pipe section to maintain its original shape may be necessary. After bracing, check the seating faces to make sure that the seat casting has not been distorted.
3. After adjacent backfill has been consolidated or concrete head wall has been poured, remove all interior bracing.
4. With the gate in the fully closed position and before placing in operation, check to see that the slide and seat make proper contact around the full circumference of the seating surfaces.

### Instructions for installation of flat back gates (See Figure A)

1. Secure anchor bolts in position in the forms. For proper size, length, projection and spacing, see drawing or tables.
2. Pour Concrete.
3. Two nuts are provided with each anchor. Place one nut on each anchor bolt and run it down to the end of the threaded section. Align anchors by bending if required. Place completely assembled gate into position on the anchors. Place second or front nut on each anchor.
4. Align gate in final desired position by bringing both nuts on all anchor bolts in light, uniform contact with the gate.
5. Check seating faces with feeler gauge. If gate seating faces show an excess opening at any point, adjust back and front nuts to bring the face of the seat casting into proper contact with the seating face on the slide by slight warping of the seat casting. Tighten front nuts uniformly.
6. Carefully grout gate in place.
7. After grout is set, check gate seating faces. Check for voids behind the gate seat. Regrout if necessary.



**Figure A**

### Installing Gate on Corrugated Pipe

#### General Installation Instructions

The end of the corrugated pipe should have angular (circular) corrugations for best results. Spiral (helical) corrugations may be used; however, take special care to seal the pipe end to the spigot. The gate (spigot) can be attached to the steel pipe with radial bolts through the spigot ring and pipe wall. This is the preferred method.

Sealing the pipe end to the spigot can be accomplished by caulking or grouting the space between the spigot and pipe wall. Mastec such as Sikaflex-1A (polyurethane) can be used; however, large gaps cannot be filled if head pressure is fairly high.

#### Procedure A - Radial Bolts and Plastic Sealant

1. Apply caulking or sealant in spigot (Figure B)
2. Align assembled gate over pipe end and push firmly to compress the sealant.
3. Drill through the spigot ring holes and through the pipe wall. Install and tighten all bolts.

## Installation Note

Do not over-tighten bolts. Damage or distortion of the gate seat can occur.

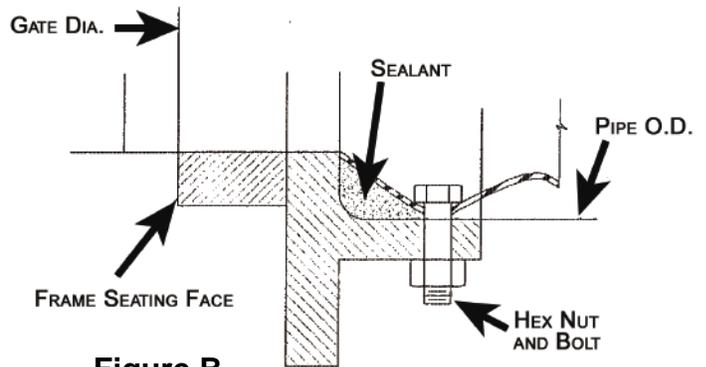
4. Check seating face alignment and clearance. Open and re-close gate. Seating faces should match at the top and bottom. Seats and wedges should make firm contact. If not, loosen the bolts or capscrews holding the wedge to the frame and slide or drive the wedge block up or down as required.

## Installation Note

Slightly loosen wedge bolts, just enough to allow wedge block to be moved. Loosening too much will result in damage or improperly adjusted gate.

Check seating face contact or clearance with a .004-inch feeler gauge. If gaps of significantly more than .004 inch exist, the seat was distorted during installation. Correct this situation by either remounting or loosening bolts and moving the seat into contact with the cover (slide).

5. Apply generous bead of caulking completely around the exterior joint between pipe and gate spigot.



## Attaching Gate to Concrete Pipe with Taper Setting Collar (figure C)

The light gauge taper setting collar is used as a "form" for placing grout and as a means of locating a gate in the end of concrete pipe.

1. Place gate on pipe or opening inserting the taper collar until a snug fit is obtained or gate is stopped by the structure or pipe.
2. Align gate in a vertical and horizontal plane and place rich grout around gate, making a heavy band sealing and attaching the cast iron frame ring to the pipe. Grout is normally lapped over the frame flange and smoothed in place with laying mitts or gloves.

**NOTE: If desired, anchor bolts or reinforcing rod can be attached in the anchor bolt holes and placed in the grout band for added strength.**

3. After band has dried, check for cracks and repair as needed. Open gate and pack grout in void between collar and pipe.
4. Check gate for grout on seats or in slide grooves and clean as required

## OPERATION

### General Operation Information

Light and Medium Duty Sluice Gates are used to control flow of or retain a volume of water, effluent, or other fluids. Typical applications include irrigation, flood control, low-head reservoirs, drainage systems, and many other applications that require accurate control of liquid flow.

The simplicity of a sluice gate makes it a popular choice when designing flow controls. From the basic hand-cranked manual model to the microprocessor-controlled, fully integrated electric sluice gate, actuation consists of the basic open or closed operation. An open gate allows flow and a closed one does not.

Depending on size, most sluice gates can operate without error in diverse conditions. Some extenuating circumstances may include large amounts of ice or other solids that will obstruct the travel path of the gate. In most cases, when the obstruction is removed, normal operation can be resumed without adjustment to the gate.

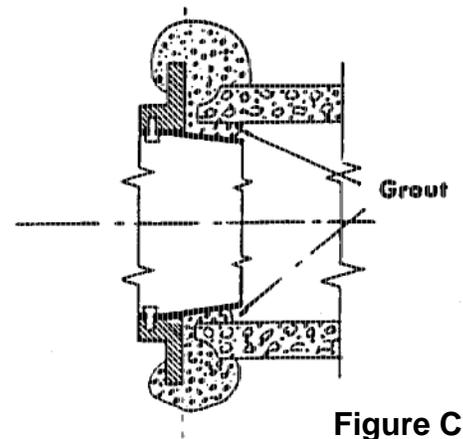
### Sluice Gate Operation Procedures

The following sections cover the general operating procedures associated with two manual-operation systems (handwheel and handcrank) Read and follow the operating procedures for the applicable system. If you have any questions concerning safe operation of this Fresno Valves Light and Medium Duty Sluice Gate, contact Fresno Valves immediately.

## ACTUATORS

### HB Series Actuator (Manual Handwheel)

**Opening** - To open this sluice gate observe the direction of rotation noted on the handwheel. Turn in the direction of opening. If the gate has been closed for an extended period the gate may be difficult to "unseat." If, after several turns of the wheel, the rotation becomes increasingly difficult, stop rotation when a moderate pressure is achieved. Allow the pressure in the stem to unseat the gate (a "POP" sound typically signals



the gate has begun to travel. Continue to turn the hand wheel until the desired gate position has been achieved. Observe the relative position of the top of the stem in relation to the Mylar decal on the stem cover (if equipped.) When the top of the stem is equal to the OPEN or 100% indicator the gate is considered to be FULL open and should not be opened further.

#### **Operation Note**

Do not over-open the gate. Serious damage to the gate stem and sealing surfaces can result.

**Closing** - To close this sluice gate turn the handwheel in the direction opposite of the Open indicator until the stopnut on the stem has moderately seated on the top of the lift. When the top of the stem is equal in height to the bottom/zero height indicator, the gate is considered to be FULL CLOSED and should not be closed further. Should the gate or stop nut require adjustment, refer to the appropriate section of the Installation, Operation, and Maintenance Manual or call Fresno Valves before any adjustments are made.

#### **Operation Note**

Do not attempt to adjust the position of the stopnut to achieve additional closing stem travel. Serious damage to the gate stem and sealing surfaces can result.

#### **CPS Series Actuator (Manual Handcrank)**

**Opening** - To open this sluice gate observe the direction of rotation noted on the lift housing. Crank in the direction of opening. If the gate has been closed for an extended period the gate may be difficult to "unseat." If, after several turns of the handcrank, the rotation becomes increasingly difficult stop rotation when a moderate pressure is achieved. Allow the pressure in the stem to unseat the gate (a "POP" sound typically signals the gate has begun to travel. Continue to turn the handcrank until the desired gate position has been achieved.

#### **Operation Note**

Do not over-open the gate. Serious damage to the gate stem and sealing surfaces can result.

**Closing** - To close this sluice gate turn the crank in the direction opposite of the Open indicator until the stopnut on the stem has moderately seated on the top of the lift. After the gate has been closed as noted on the indicator, the gate is considered to be FULL CLOSED. Then reverse the rotation of the crank and relieve the pressure on the stem and lift. Should the gate or actuator require adjustment, refer to the appropriate section of the Installation, Operation, and Maintenance Manual or call Fresno Valves before any adjustments are made.

#### **Operation Note**

Do not attempt to adjust the position of the stopnut to achieve additional closing stem travel. Serious damage to the gate stem and sealing surfaces can result.

## **MAINTENANCE**

### **Field Cleaning and Painting**

Fresno Valves' standard paint system on Light and Medium Duty Sluice Gates is commercial grade blast and Hi-build epoxy paint. It does not require top coating. Should blast cleaning be needed to condition the gate for top coating, the gate should be fully closed and any exposed metallic seating faces protected from blast and paint. Before painting, blow all grit off gate, particularly in and around the seating faces. Do not remove any wedges or disassemble the gate except as described in the next paragraph.

Fresno Valves does not usually recommend removing the slide from the frame to apply finish/top coats because of the risk of damage to the seating faces during handling. If sufficient reasons exist for removal of the slide, (e.g., badly deteriorated paint on an old gate or a complete change of paint system that is incompatible with the existing paint) then completely disassemble and thoroughly blast clean all surfaces to obtain a quality recoated product.

When disassembling the gate or gates, keep parts segregated and match-marked so parts are not mixed gate-to-gate because interchangeability between gate parts is not always certain. Protect all seating surfaces on the slide and frame with duct or masking tape. Use special care when handling the slide and frame to avoid damage to the seating faces.

Blast clean and paint the frame and slide as required by the specifications or the paint manufacturer's recommendations. Do not paint the contact faces of the wedges or metal seat. Remove masking tape or other material used to protect machined faces. Clean all faces thoroughly and relubricate if applicable. Reinsert slides in the proper frame.

With the gate in the fully closed position, recheck maximum clearance between the seating faces with .004-inch thickness feeler gauge. Readjust wedges, if required, per the instructions in this Manual.

### **Maintenance and Lubrication**

Occasional adjustment, lubrication, and painting of Fresno Valves sluice gate components will be required. The frequency will depend upon how often the gate is used, location, and operating conditions. Periodic inspection, adjusting, cleaning, and repainting are recommended as conditions at the site permit.

When excess leakage through the gate seating surfaces occurs or when the gate has been in the closed or opened position for long periods of time without movement, the seating faces and wedging surfaces should be cleaned and greased and the wedges should be readjusted per the instructions in this Manual.

### **Lift and Stem Maintenance**

Lifts have been lubricated at the factory with a water-resistant grease designed to stay pliable and not dry out over long periods. Periodic pressure greasing of ball bearing type lifts is recommended. For best results, turn the hand wheel or input shaft of geared lifts three or four times and apply grease through each fitting to insure adequate lubrication at all interior parts. Greases such as Conoco's "All Purpose Superlube", Texaco's "Multi-Fax Heavy Duty No. 2", or Shell Oil Company's "Alvania No. 1" have been found entirely satisfactory. Maintenance of the threaded operating portion of the gate stem is critical and should be performed as frequently as the operating environment requires. Clean and grease the gate stem threads as required to maintain maximum operating efficiency.

### **Maintenance Note**

Failure to maintain stem thread lubrication causes operating difficulties and premature failure of the lift nut and stem threads.

Recommended inspection frequency and procedures are as follows:

- Initial inspection - after 25 cycles of gate operation.
- Subsequent inspection - after 50 cycles of gate operation.
- Operational inspection - after each 100 cycles of gate operation or six months, whichever occurs first.

A "cycle" of gate operation is operation of the gate slide from closed to open to closed position. At each inspection, verify the following items:

- Inspect the stem threads and lift nut threads for wear and verify the trueness and dimension of the thread form.
- Check the amount of lubricant remaining and add if necessary.
- Relubricate if necessary - threads should be cleaned and relubricated with fresh lubricant.

More severe conditions or operating modes require a slightly different schedule of inspection and service. For example: Modulating gates with electric motor operators may make position changes several times a day but seldom go full stroke. There is a portion of the stem that gets a lot of use. These stems should be inspected at least weekly. The lubricant on the stem threads should be monitored closely. As the lubricant is depleted and becomes contaminated, it should be cleaned away and replenished.

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 thread interior. If this foreign material is not cleaned from the interior threads of the lift nut, heavy pulls on the handcrank or seizure will result.

Stem threads may be cleaned with solvent, rags, and brushes. Run the gate open. While in the process of opening (running the stem out above the lift nut), clean off the old grease. Inspect the threads for roughness. If the threads are rough, they may be filed and polished. Be careful to keep filings and grit out of the lift nut. Rough stem threads accelerate the wear of the lift nut threads.

Relubricate the stem threads by brushing or smearing grease onto/into the threads as the gate is closing (the stem is going into the lift). This puts fresh lubricant into the lift nut and carries out the old contaminated grease. It is recommended that the contaminated grease be cleaned from the stem as it exits underneath the lift where the stem is accessible from below. Of course, replenish grease on the underside stem.

The recommended stem thread lubricant is a mixture of "La Co Slic-Tite Paste" and Fiske Bros. "Lubriplate No. 630 AAA" in the ratio of 24 ounces of paste per gallon of grease. "Slic-Tite Paste" is a pipe dope with Teflon fibers and is available from most plumbing supply stores or from:

La Co Industries, Inc.  
1201 Pratt Blvd.  
Elk Grove Village, IL 60007  
(708) 956-7600

An equal alternate for La Co's "Slic-Tite" is "Dayton Pipe Thread Sealant Paste with Teflon", Stock Nos. 4X222 or 5X998, which is available at W. W. Grainger Inc. stores in major cities nationwide.

Equivalent lubricants to Fiske Brothers' "Lubriplate 630AAA" include:

Conoco's "All Purpose Superlube"  
Texaco's "Multi-Fax Heavy Duty No. 2"

Shell Oil Company's "Alvania No. 1"  
Mobil's "Mobilux EP2"  
Exxon's "Ronex MP"  
Fiske Brothers' "Lubriplate No. 630 AA"

A recommended lubricant for potable water service is a vegetable-based lubricant, "Lubriplate Super FML-2".

Lifts may be furnished with optional "stem lubricator fanges" to facilitate lubrication of stem threads with pressure greasing equipment. The fanges are located either under the lift housing or incorporated into the aluminum stem cover housing. To be effective, lubricant should be injected while the stem is moving through the lift.

Manual lifts have zerk-type fittings for relubrication of the bearings and gears. These fittings do not lubricate the stem threads (except for the optional lubricator fange or the lubricator in the stem cover adapter). Recommended greases for the lift bearings and gears are any of the above lubricants without the Teflon paste.

Recommended service and maintenance of the electric motor lifts is covered in the respective manufacturer's maintenance manual.

Exercise of infrequently operated lifts and gates is recommended. An annual exercise will ensure the gate is operable when needed and the lubrication condition will be maintained.

Removal of the stem nuts for thread inspection of frequently modulated gates is recommended. This avoids "surprise" when the nut threads have worn so thin they strip out and drop the gate. Replacement or spare nuts can be ordered from Fresno Valves. Spare parts are usually not needed or recommended, because they are readily made on short notice by Fresno Valves. In those cases where equipment operation or downtime is critical and the gate is operated extremely often, a spare lift nut may be wise to have on hand.

Most electric operator nuts can be removed from either the top or the bottom of the operator without total disassembly of the operator. See the electric motor operator maintenance manual.

#### **Maintenance Note**

Whenever the nut is removed and reinstalled in an electric operator, the position limit switches will need readjustment. This is also true of lift assemblies that consist of an electric actuator attached to a gearbox lift.

#### **Leakage**

The most frequent cause of excess leakage through a newly installed Fresno Valves Light and Medium Duty Sluice Gate is improper installation and/or failure to make final adjustments before the gate is put into operation. When you encounter this problem, first verify that Fresno Valves' installation instructions have been carefully followed and that final adjustment and greasing have been accomplished. If not, then complete the applicable step-by-step procedures of adjusting and greasing as outlined in the appropriate provided instructions.

Another important check is to ensure the sluice gates were not disassembled for installation. The cover of this Installation, Operation, and Maintenance Manual states "DO NOT DISASSEMBLE GATE FOR INSTALLATION". This is repeated in the text of this manual at several critical locations. Occasionally, we still find that gates are disassembled for easier handling, painting, etc.

#### **Installation Note**

When the sluice gate is disassembled for installation, all of the fine adjustments that were made by Fresno Valves are lost. It is then necessary for you to clean all of the contact faces, reinstall the slide, and adjust all wedging devices in strict accordance with our instructions.

As pointed out above and in our installation instructions, the amount of leakage through the sluice gate is highly dependent upon the quality of installation. On cast iron sluice gates, the gate seat, or frame is somewhat flexible and is easily pulled out of line if incorrectly installed, resulting in leakage. The amount of leakage depends upon the deflection of the castings by improper tightening of the nuts on the anchors.

To minimize leakage through sluice gates, installation must be precise. Our instructions not only call for careful installation of gates, but also emphasize the importance of final cleaning and lubrication of seating faces and wedge contact surfaces before operating the gate. We also recommend a water-resistant grease be applied to all surfaces, which allows proper seating of the gate in the last turn or two of the hand crank.

#### **Example**

When the slide is moved downward by as little as 1/64 of an inch, the wedges cause it to move toward the seating surface by .002 inch. This almost negligible horizontal movement can cause a considerable difference in the amount of leakage.

### Lift Nut Lubrication and Wear Checking

This Fresno Valves Manual contains lubrication recommendations for gate stems and lift nuts. Lift nut replacement is recommended when 50% of nut thread has worn away. Lift nut threads are likely to strip out when approximately 75% of the lift nut thread has worn away. Stripping of lift nut threads renders the gate inoperable and can cause damage to the gate if it falls shut from an open position.

Stainless steel stem threads usually experience no significant wear or damage except when run dry (no lubricant) in which case, the stem gets very hot and the nut material embeds into the stem threads.

Frequently operated gates should be routinely checked for nut wear by one of two methods;

- (1) direct observation of nut threads
- (2) indirectly observing free play or free rotation of lift nut

The direct method requires disassembly/removal of the lift nut and degreasing of the nut threads so that thread thickness can be measured or directly compared to the original thickness. This method is accurate and error-proof.

The indirect method is quick and does not require removal of the nut; only removal of excess grease so that the top of the lift nut can be observed. This method can give a false indication if reasonable care is not taken in performing the check. Some tools such as a machinist dial indicator with a magnetic base is helpful in doing the test. The test determines how much the lift nut revolves before the stem begins to move or the amount of "free play."

### Nut Free Play Procedure

1. Close the gate tightly so no weight is hanging on the stem. If the gate is an inverted gate (downward opening), block the gate so that no weight is hanging on the stem.
2. Clean grease from the top of the nut sufficiently to see the nut and make a reference mark on it.
3. Attach a dial indicator or other device to detect the beginning of upward movement of the stem.
4. Work the handwheel to feel when the gate is closed and there is a slight compression in the stem.
5. With slight compression in the stem, make a reference mark on the top of the nut to align with a mark on the stationary housing. Establish a zero point on the dial indicator for vertical stem movement.
6. Slowly turn the handwheel in the opening direction until the stem just begins to rise vertically. Note the amount of nut rotation in terms of degrees or fraction of a revolution.
7. Repeat steps 5 and 6 a few times until consistent results are obtained. Fresno Valves' standard stem threading is rolled modified stub Acme, double lead (2 start thread). Free play for new nuts is 6-7°. 50% wear condition has 50-55° free play (approximately 1/8 revolution). This is the point where replacement is recommended. 75% wear has 70-75° free play (approximately 1/5 revolution) and is the point where stripping failure is imminent.

## Troubleshooting Tips for Fresno Valves Sluice Gates

### Leakage All around the Gate

Excess leakage all around the gate can indicate one or more problems. Ensure the gate is completely closed, if not close the gate completely. The head pressure may exceed the gate's rating. If so reduce the head or install a gate of correct rating. The wedge faces may be improperly adjusted, if so readjust them according to the instructions in this Manual. Excessive leakage can also be caused by dirty seating faces. In this case clean the seats or exercise the gate against head to scrape and flush dirt.

### Excessive Leakage at One Particular Location

Excess leakage occurring at one particular location indicates one wedge is improperly adjusted. Check between the tapered face of the wedge and the wedge block with .004-inch thickness gauge. If the gauge passes between these surfaces, readjust that wedge. Even if the gauge cannot be passed between the tapered wedge faces, loosen the nut on the stud through the wedge and adjust the wedge tighter.

If you are unable to correct the leakage by readjusting the wedge, it may be caused by foreign material between the gate seating faces. Open the gate an inch or two. If a large piece of foreign material is found, flush it out. If the leakage persists, foreign material such as paint or grit may be on the seating faces. To correct this problem, dewater the gate completely, clean all seating faces and wedge surfaces, and grease the faces.

### Excessive Leakage along Top; Stem Block Pocket Located at or Near Top of Slide

Leakage is occurring at the center top of the gate only. With this slide configuration, it is possible to push down on the stem so hard that the stem block is pulling the gate slide from its seating faces at the top. Turn the handwheel, gear crank, or power actuated lift to relieve the compression on the stem and the excess force on the top of the slide. If the slide was being deflected, the excess leakage will diminish or stop when the compression in the stem is relieved.

### Maintenance Note

Do not raise the slide from its wedges. Actuate the lift only enough to allow the stem to relax.

To prevent the slide from deflecting at the stem block, readjust the stop nut on manually operated lifts, or the torque and limit switches on electrically actuated lifts.

### **Excessive Localized Leakage; Gate Installed on Concrete, Wedges Tight**

This indicates the frame was warped from true if at plane by over-tightening of anchor bolts. Loosen the bolts in the area of the leak. The frame will usually spring back. Check the seating face with a .004-inch gauge. Check the wedge adjustment. Shim as required between the gate frame and wall. Retighten the bolts. Caulk or regrout to seal off the crack or gap between the frame and wall.

If the warp is severe, it may save time to completely remove the gate and reinstall the gate on new grout, or a bead of epoxy or sealant such as Sika flex 1-A. Be careful so that the gate is installed true if at the second time. Review the proper installation and adjustment instructions in this Manual.

### **Stem Bends when Gate Is Closed Hand-Operated Lifts**

1. Ensure the stem guide collars are properly located to hold the stem in alignment. The bolts on the collars must be tightened so the collar is not slipping on the guide bracket.
2. Ensure the stem guides are all located properly. If the spacing exceeds that shown on Fresno Valves' installation drawings, the stems may be deflecting before the gates are closed tight.
3. If stem guides are correctly located and collars are tight, then the load 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 closed.

### **Electrically Actuated Lifts**

Check settings of bottom torque switch and limit switch. Stem bending during gate closure indicates both switches are set improperly. The limit switch should cut off power before the stem bends.

Reset limit switches using instructions prepared by the manufacturer of the electrically actuated lift. First, set 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.

### **Hydraulic Cylinder Lifts**

Screw the stem further into the stem block or stem splice coupling so the piston "bottoms" out inside the cylinder when the gate is fully closed; or with the pressure relief valve, adjust maximum pressure to the top of the cylinder to prevent overloading the stem when gate is closed. Tighten the setscrew after adjustment.

### **Excess Force Is Required on Handwheel or Crank**

1. Ensure the stem is lubricated as recommended.
2. If application of lubricant does not solve the problem, check for foreign material in the nut threads either by disassembly or working back and forth with application of penetrating oil and grease.
3. If properly greased and lift nut is not binding, ensure the stem, stem guides, and lift are aligned. A carpenter's level can verify it is in plane in both directions. Check for binding through individual stem guides. Ensure pedestal is vertical in both directions and the stem threads straight through the lift nut.
4. In locations where the stem is not installed vertically, alignment can be checked by using a thin wire stretched between the slide top and the lift bottom. Realign by adjusting stem guides and/or shimming less than one side of the lift.
5. Check condition of the seating faces. A rough or galled seat can cause additional friction load. Depending on severity, the faces may be filed or sanded smooth. Some sealability may be sacrificed.
6. Debris is stuck in the gate opening. Clean and remove all debris or try to flush debris by cautiously opening and closing the gate.
7. Excess head pressure can also be the problem. Check head limitations of gate and either reduce head or install a gate of the proper rating.

### **Handwheel Turns but Gate or Stem Does Not Move**

If this occurs the lift nut threads are probably worn out. Replace the lift nut and perform routine maintenance and lubrication. Check that the stem has not separated or disconnected from the gate as a result of excessive force. Replace the stem and any broken parts.