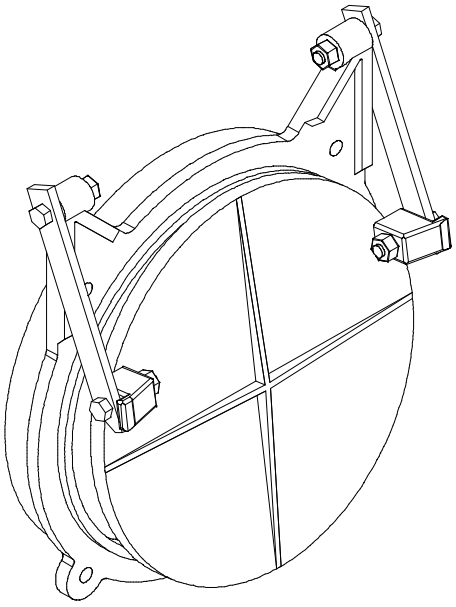
Installation, Operation, & Maintenance Manual



Flap Gates

F1700

Model 10C, 20C, 50C

DO NOT DISASSEMBLE GATE FOR INSTALLATION

CONTENTS

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. If the flap and hinge assembly is forced to operate beyond the design limits of the gate, 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 flap, seating faces, or hinge can occur. ***Remove large debris before operation.***

Installation Debris

Excess concrete or grout from gate installation can damage gate seating and sealing faces. Ensure that seating faces and seals 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 product.

CAUTIONARY STATEMENT FOR INSTALLATION, OPERATION, & MAINTENANCE MANUAL

This manual describes the recommended procedures for installation, adjustment, operation and maintenance of Fresno Valves gates. When it is used in conjunction with installation drawings that have been supplied by Fresno Valves, 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 the handling, storing, and installation of a specific project, contact Fresno Valve's headquarters.

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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 Flap Gates and their component parts.

The gate was 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, including thorough cleaning and lubrication of moving parts and final flap adjustment. If the equipment will not be installed immediately, consult the long-term storage instructions following.

Installation Note
Do not disassemble the gate for installation.

Warranty Note
Installation and/or operation of the gate without proper lubrication will void the equipment warranty. Thorough cleaning of the seating faces 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 Fresno Valves at the time that they are needed.

Disassembly – Fresno Valves does not recommend the disassembly/reassembly of any of the equipment on this project.

Emergencies – Emergency/shutdown procedures do not differ from normal operating procedures for this project. If you should need assistance, please contact Fresno Valves' Field Service Department at (559) 834-2511.

INSTALLATION

Safety Precautions

To help ensure your workers' safety, Fresno Valves recommends the personnel responsible for installation, operation, and maintenance of the gates for this project read and study the instructions and precautions in the Installation, Operation, and Maintenance Manual, and follow all directions carefully. The following are major items associated with safe installation, operation, and maintenance of this flap gate.

- **Do not** operate equipment before carefully reviewing the Installation, Operation, and Maintenance Manual.
- Always use proper equipment when lifting or unloading heavy items.
- **Do not** stack equipment too high for storage. Always use heavy wood blocking between equipment. Refer to the storage instructions contained herein for details.
- Adequately support and brace heavy items during placement of equipment.
- Wear proper personal protective equipment (PPE) and clothing when working on or around gates, (e.g., hard hats, heavy boots, safety glasses, and breathing apparatus, if necessary).
- **Never** place bodily obstructions in the path of moving parts. When operating gates and accessories, stand clear of all moving parts. Serious injury can result from contact with moving parts.
- Use caution when performing operations and maintenance. Watch for loose or damaged parts. Stop all functions until any damage has been corrected.
- **Do not** use any mechanical devices other than the factory-supplied equipment to operate the gates for this project.
- **Do not** attempt operational procedures other than set forth in the Installation, Operation and Maintenance Manual.
- Contact your Fresno Valves representative with any questions you may have regarding safety in installing, operating, and handling Fresno Valves products.

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 follow 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 – Accurately locate and brace embedded items during placement of concrete.
- ✓ 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.

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 with a plastic caulking material that has a triangular cross section (TC-40 available from Fresno Valves). The pipe end may also be sealed by caulking or grouting the space between the spigot and pipe wall. Mastic such as Sikaflex-1A (polyurethane) can be used; however, large gaps cannot be filled if head pressure is fairly high.

Radial Bolts and Plastic Sealant

1. Lay ring of plastic sealing cord in spigot **(Figure 1).**

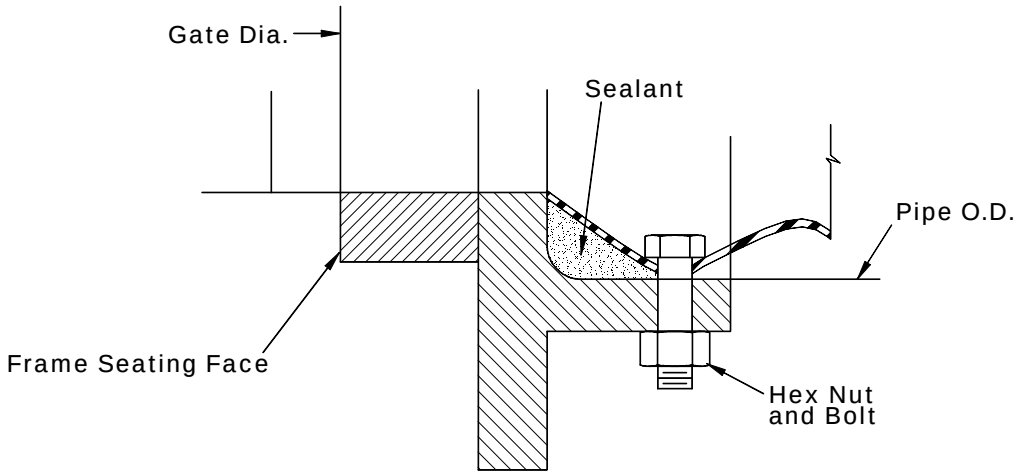
2. Align assembled gate over pipe end and push firmly to compress the sealant.

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.

Figure 1 – View of Radial Bolts and Plastic Sealant



Installing Gate Attached to Pipe

1. Set assembled gate with attached pipe into proper position.

2. The gate with attached pipe may be connected to other pipe by means of band couplers or welding, or concrete headwalls may be poured around the attached pipe section.

Installation Note
Deflection or distortion of the attached pipe section from its original shape may cause warping of the gate seat and leakage. Proper bracing of the attached pipe section to maintain its original shape may be necessary.

3. After adjacent backfill has consolidated or concrete headwall has been placed, remove any interior bracing.

Installation of Flat Back Gate, Concrete Poured before Gate Is in Place

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

2. Two nuts and washers are provided per bolt. Grout space must be left for adjustment of the back nut on the anchor bolt as shown in **Figure 2.** The anchor bolt projection shown on the installation drawing provides for the suggested thickness of the grout.

3. Pour concrete and strip the forms.

4. Coat threads with anti-seize lubricant. Place one nut on each anchor bolt and adjust them to establish a true flat and vertical plane. Starting with the nuts on the corner anchors, taut string lines (horizontal) and plumb lines (vertical) to bring all nuts around the opening to a flat vertical plane. Place the completely assembled gate into position on the anchor bolts, straightening them as required. Install a second nut and washer on each anchor bolt. Bring the front nuts into light uniform contact with the gate frame, aligning the gate as required. Check for firm contact at the back of the nut, then uniformly tighten all of the front nuts around the opening.

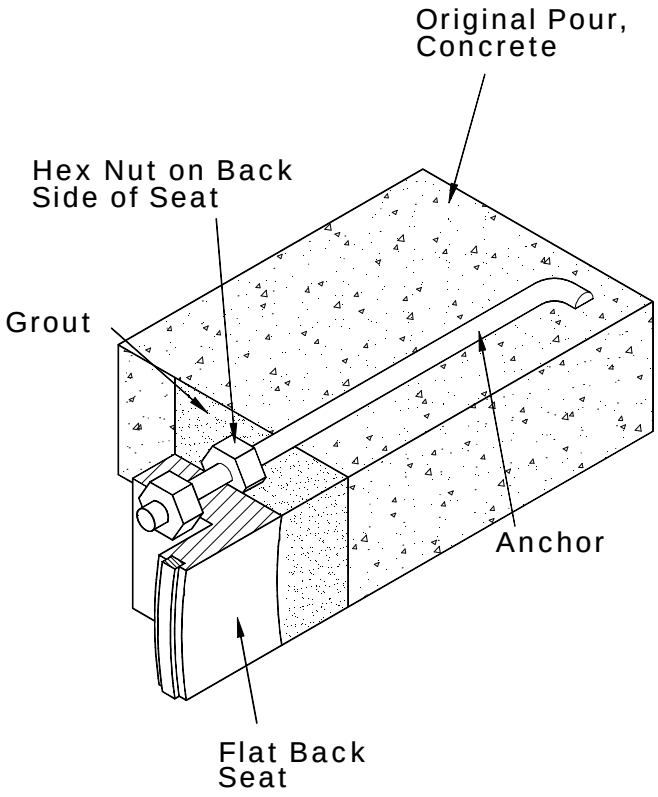
5. Carefully grout in the gate, using 5-star grout, or equal.

6. After the grout has set, ensure no voids exist between the gate frame and the concrete. Because of 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.

7. Lubricate all nuts and anchor bolts with anti-seize lubricant and tighten uniformly.

Installation Note
Do not warp the gate to conform to any uneven surfaces.

Figure 2 – View of Anchor Bolt and Flat Back Gate



Wall Thimble Installation

1. Place the wall thimble in the correct position in the forms and block it in this position. The top centerline of the thimble is stamped on its machined face. The bottom centerline is also marked.

2. Plumb the front face of the thimble using the marks indicating top and bottom centerline. This face should be plumbed with respect to final location of the gate.

3. Studs furnished for attaching of the gate may be may be used in the attachment of the thimble to the forms. If these studs are not used, threaded holes in the thimble must be plugged to prevent concrete from entering them.

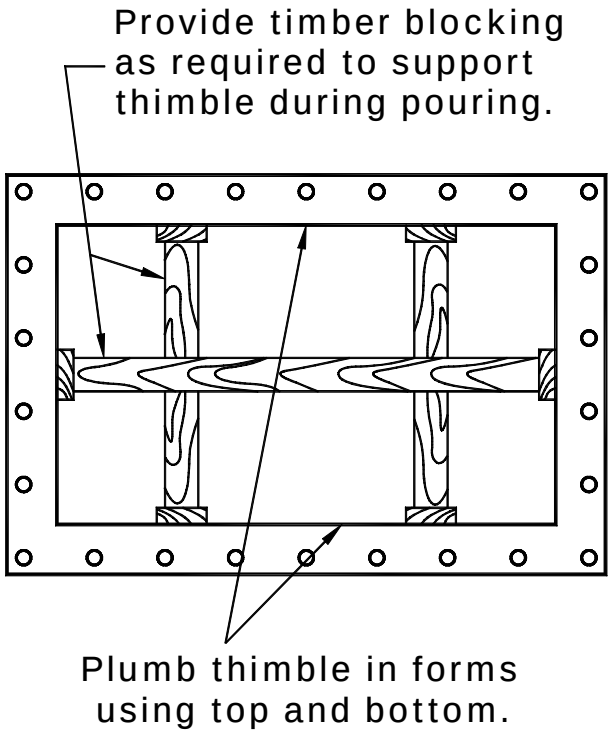
4. Use timbers or other bracing material on the inside opening of the thimble while concrete is being poured **(Figure 3).**

Installation Note
Use extreme care in placing of these supports to prevent warping of the thimble.

5. Pour concrete, being careful not to tilt the thimble from its original position in the forms.

6. Remove forms and bracing.

Figure 3 – Front View of Thimble Showing Bracing



Installation of Gate on Wall Thimble or Flange

1. Clean machined face with scrapers and wire brush so that no sand, concrete, dirt, or foreign material is present **(Figure 4).**

2. Check flatness and plumb of thimble face to verify that it did not move or shift during concrete pour. Flatness must be within 1/64 inch of true flat plane. The thimble should be plumb within 1/8 inch. Use good quality plumb level, or plumb lines, at each vertical side. Both sides should be plumb or parallel to each other within 1/32 inch over the total height.

3. After verifying thimble flatness and alignment, install thimble stud bolts.

4. Check the installation drawings for use of anchor bolts to stabilize the upper frame guides or extensions. If shown on the installation drawing, install a nut on these anchors and run on as far as possible before installing the gate.

5. Trowel a thin layer (1/16 inch to 1/8 inch thick) of mastic on the face of the thimble or two 1/2-inch diameter beads of mastic from a caulking gun; one bead midway between the inner edge of the face (opening) and the row of studs and the other bead just outside the row of studs. Place a circular bead around each stud. These beads should be of size and placement so they will flow out and substantially cover or wet the flange joint. Trowelable grades of asphalt roof cement, or polyurethane sealants (Sika-Flex 1-A or equivalents), work well as mastic.

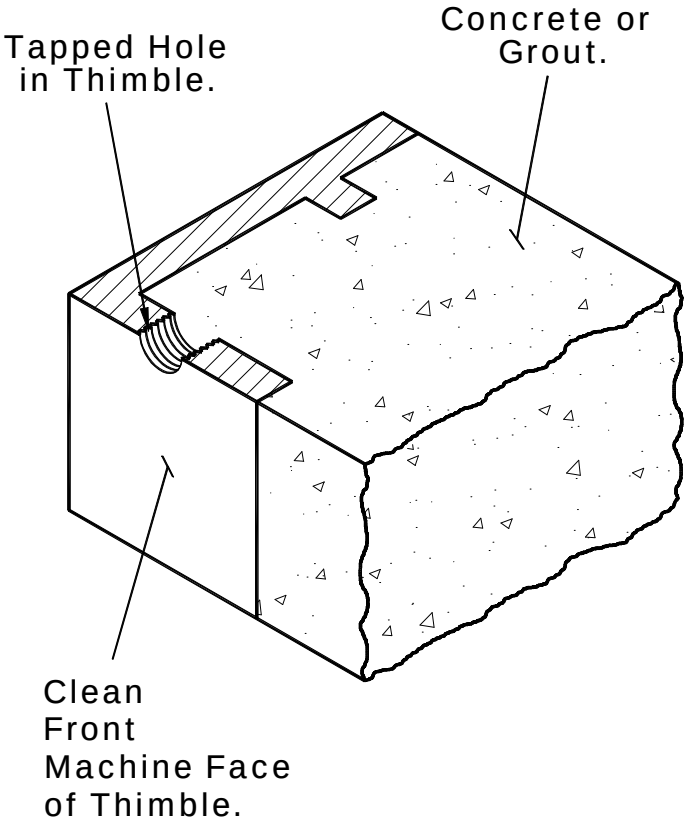
6. Although Fresno Valves does not recommend using rubber gaskets in place of mastic, they may be used at the discretion of the owner or consulting engineer. They should be no more than 1/8 inch thick and the thimble must be flat within the 1/32 inch total maximum warping allowed. Use of thicker gaskets may result in a spongy foundation for the gate or blowout under high unseating heads.

7. Tighten all stud nuts uniformly. The torque table in this Manual is only a guide. It is not mandatory that nuts be tightened precisely to these values. The basic rule is wrench tighten with the common available wrench length.

8. Repeated tightening will be required to squeeze mastic to a thin layer for metal-to-metal contact. Refer to tightening sequence diagram. Repeat tightening until all bolts are holding torque.

9. Use caution when mounting gates on nonmachined steel structures, round flanges, or existing thimbles. The rules of flatness discussed above apply. Severe distortion of the gate and subsequent excessive leakage results when torque-tightening gate mounted on uneven/non-flat surfaces. Do not torque tighten a gate to an uneven non-flat surface.

Figure 4 – View of Thimble Showing Machined Front Face



"F" Wall Thimble
Typical Thimble Installation

Torque Table for Tightening Nuts or Hex Bolts Used for Assembly

Capscrew Diameter (Inches)	Torque Specifications (Pound Feet)
3/8	20
1/2	45
5/8	75
3/4	125
7/8	200
1	300
1 1/8	450
1 1/4	500
1 1/2	600

Correcting and Compensating for a Warped Thimble

If the vertical faces are out of parallel more than 1/32 inch, the thimble is warped or twisted excessively and the gate may exhibit sealing problems. Warping can be corrected in one of the following ways:

1. Remove thimble from concrete and try again. This requires substantial demolition and risks damage to the structure and thimble.

2. The preferred corrective action involves mounting the gate on the thimble with shims between the gate and thimble flanges to restore the gate seat faces to a good contact. The resulting gap between gate and thimble flange can be sealed with mastic such as polyurethane seal (e.g., Sika Flex 1-A).

   There are limits to gap widths the mastic will seal. Consult the supplier for limits and cure times. Sika Flex 1-A with Sika Flex primer claims to bridge and seal up to 1/2-inch gaps. Sika Flex 1-A requires a 1-week cure for water immersion; Sika Flex-2C NS/S1 requires 3 days. Fresno Valves recommends not exceeding a 1/4-inch gap with polyurethane considering uncertainties such as water pressure.

   When the twist or warp exceeds 1/4 inch or operating heads are high (more than 20 feet of water), Fresno Valves recommends that the gap be filled with injectable epoxy to both form a watertight joint and provide a solid mounting for the gate. This work is best performed by an Adhesive and Sealing Contractor who can dam up the gap and inject the material.

The recommended steps to shim a gate frame are as follows:

   A. Dry mount the gate (i.e. without mastic.) If the gate has been wet-mounted with mastic, remove the gate and clean off all mastic, then dry-mount the gate. Do not tighten stud bolts.

   B. Determine where and what thickness shims are needed between the frame and thimble, which will produce gate seat contact that excludes a .004-inch feeler gage.

      Shims may be stainless steel washers placed on stud bolts between the gate and thimble flange or "C"-shaped shims cut from stainless shim stock. Place the "C" straddling the stud bolts.

   C. Tighten all stud nuts, then verify gate seat is contacting within .004 inch all around the opening.

   D. Remove the gate, keeping track of what shims go where.

   E. Apply a thick layer of mastic on the thimble or gate flange sufficient to seal the gap resulting from the shimming action or prepare for epoxy injection by Adhesive/Sealing Contractor.

3. If the thimble face is flat but is out of plumb, or racked, consult Fresno Valves' Engineering Department for suggestions. Fresno Valves' Engineering Department can determine these limits for the specific installation and offer suggestions.

OPERATION

General Operation Information

Flap gates are used to control flow of a volume of water, effluent, or other fluids. Typical applications include flood control, farm levees, sewer outfalls, industrial waste lines, water and sewage treatment plants, tidal drainage, irrigation systems, pump discharge control, and many other applications that require accurate control of liquid flow.

Flap gates are designed to operate automatically. They open with minimum head on the back side of the flap and close when the water on the front side of the flap is of greater depth than that on the back side.

The hinged flap acts as a natural skimmer to cause timber, logs, or trash to catch between the flap and the seat at low flow. If gates are to operate properly, accumulated trash must be periodically removed from around the hinge assemblies and between seating faces. This includes blocking of the flap in the open position by an authorized person.

MAINTENANCE

Field Cleaning and Painting

Fresno Valves' standard paint system on Flap 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.

Fresno Valves does not usually recommend removing the gate 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 gate, (e.g., badly deteriorated paint 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 that parts are not mixed gate-to-gate because interchangeability between gate parts is not always certain. Protect all seating surfaces on the gate and frame with duct or masking tape. Use special care in handling the gate to avoid damage to the seating faces.

Blast clean and paint the gate as required by the specifications or the paint manufacturer's recommendations. Do not paint the contact faces of the seat. Remove masking tape or other material used to protect machined faces. Clean all faces thoroughly and relubricate.

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

Lubrication

Pivot Points

Lubrication of pivot points on Fresno Valves Flap Gates is usually not necessary. The construction of the hinge assembly permits only a few degrees of rotation at the bottom pivot points. The gate cover rotates about the upper pivot points through an arc of 90 degrees or less. With this limited rotation, lubrication of bushings is usually not needed nor normally recommended by Fresno Valves. When lubrication of flap gate pivot points is desired, a permanently lubricated bushing is installed at the factory or zerk-type grease fittings are installed by Fresno Valves. On those gates supplied with grease fittings, periodic lubrication of pivot points should be performed as required.

Seating Faces

Periodically clean the gate seating faces and apply a light film of water-resistant lubricant to the seating faces. Lubricants such as Lubriplate's No. 630AA or 630AAA, Texaco's Multi-Fak Heavy Duty No. 2, or Shell Oil Company's Alvania No. 1 have been found satisfactory for this purpose.

Maintenance Schedule and Lubrication Summary
Flap Gates

Activity	Frequency	Lubricant
General Cleaning and Inspection	As often as conditions require or permit, or every 6 months.	N/A
Pressure Greasing of Pivot Points (When Applicable)	When general cleaning is performed.	*****Fiske Bros. Lubriplate No. 630 AAA
Clean and Grease Seating Faces	When general cleaning is performed.	*****Fiske Bros. Lubriplate No. 630 AAA
		*****Equivalent lubricants to Fiske Bros. Lubriplate No. 630 AAA include the following: Conoco's All Purpose Superlube Texaco's Multi Fak Heavy Duty No. 2 Shell Oil Company's Alvania No. 1 Mobil's Mobilux EP2 Exxon's Ronex MP
Notes For potable water treatment plants use a vegetable-based lubricant such as Lubriplate Super FML-2.		

Troubleshooting Tips for Fresno Valves Flap Gates

Excess Leakage through Seating Faces, Flat Back Gate Installed on Concrete Wall

If excess leakage is occurring through seating faces at one or more locations around the perimeter of the gate, this indicates that the gate seat, or ring, has been warped out of position during installation. Loosen nuts on anchor bolts at locations where leakage is occurring. The seat will probably spring back into position. Check with .004-inch feeler gauge between seating faces. If the gate seat didn't spring back to match with the seating faces on the flap, it will be necessary to remove the grout from in back of the gate until the back nuts on anchors can be turned. Using a wrench of these back nuts, move the gate seat out until it contacts the flap. Check with the .004-inch feeler gauge until it is excluded between seating faces at those locations where leakage was occurring.

It is then necessary to seal between the back of the gate and the face of the concrete. This is done by regrouting, or if the space is small, it can be sealed with lead wool. The lead wool is pushed into the opening between the back of the gate and the face of the grout with a putty knife or other thin-bladed tool.

Excess Leakage through Seating Faces, Gate Installed on Thimble

This indicates the faces between the back of the gate and the face of the thimble may not have been properly sealed. Foreign material on the face of the thimble results from excess paint dribbles, or cement and fine sand from pours of concrete, or other obstructions, and will hold the gate seat from making proper contact with the thimble. Leakage will occur between the back of the gate and the face of the thimble. To correct, loosen nuts on all studs, pull the gate away from the thimble, or remove the gate in its entirety. Clean the contact faces thoroughly, apply mastic, and reinstall the gate.

Long-Term Storage Instructions for Flap Gates

1. Gate assemblies must be stored horizontally and flat, with the backside (flange side) down. The storage area must be flat, graded, comprised of compacted soil, concrete, or asphalt. Storage on uneven surfaces can cause permanent distortion of the gate, creating installation problems.

2. Place timber, minimum 4-inch x 4-inch, to provide substantially complete perimeter support under the gate frame assembly. Longitudinal timbers, spaced a maximum of 4 feet, may also be used.

3. Stacking of gates is permissible. The stacked height should not exceed 3/4 of the bottom gate's width or height. Stack gates of different sizes in a pyramid fashion. Do not stack large gates on top of smaller gates.

4. Stacked gates should be separated with timber. The separating timbers should form a flat and level base for the gate above.

5. Wall thimbles may be stored similar to above with machined flange face up or down. Substantial level blocking is essential. Uneven support of gate assemblies and thimbles causes the gate or thimble to warp and voids the manufacturer's warranty.

6. Miscellaneous accessories and hardware should be stored off the ground.

7. Inside dry storage is the best for all equipment. Covering equipment stored outside with tarpaulins is recommended to minimize degradation of paint from rain and sunlight, until finish paint is applied. Uncovered outdoor storage may result in staining of painted surfaces from rain and sunlight.