HYDRO GATE®

a MUELLER brand

OPERATING INSTRUCTIONS MANUAL

HG560 Cast Iron Slide Gate

TABLE OF CONTENTS	PAGE

⚠ WARNING:

1. Read and follow instructions carefully. Proper training and periodic review regarding the use of this equipment is essential to prevent possible serious injury and/or property damage. The instructions contained herein were developed for using this equipment on fittings manufactured by Henry Pratt Company, LLC. only, and may not be applicable for any other use.
2. DO NOT exceed the pressure ratings of any components or equipment. Exceeding the rated pressure may result in serious injury and/or property damage.
3. Safety goggles and other appropriate protective gear should be used. Failure to do so could result in serious injury.

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CAUTIONARY STATEMENT FOR INSTALLATION, OPERATION, & MAINTENANCE MANUAL

This manual describes the recommended procedures for installation, adjustment, operation and maintenance of Hydro Gate cast iron slide gates. When it is used in conjunction with installation drawings that have been supplied by Hydro Gate, 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 Hydro Gate.

PRECISE AND ACCURATE INSTALLATION IS CRITICAL TO SATISFACTORY OPERATION. HYDRO GATE 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 HYDRO GATE. HYDRO GATE 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.

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 Hydro Gate Cast Iron Slide Gates and their component parts.

The gate, lift, and accessories were accurately machined, assembled, adjusted, and inspected before leaving the Hydro Gate factory. For best results, read and follow the applicable parts of this Manual carefully, including thorough cleaning and lubrication of moving parts and final wedge adjustment. If the equipment will not be installed immediately, consult the long-term storage instructions following.

Installation

Do not disassemble the gate or lift for installation.

Warranty

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 – Hydro Gate does not recommend the stocking of spare parts. Replacement parts are readily available for worn or broken parts. Contact Hydro Gate or our representative in your area.

Special Tools – Special tools are not required to operate and/or maintain the equipment supplied by Hydro Gate on this project.

Price List – Prices for individual parts and/or assemblies may be obtained from Hydro Gate at the time that they are needed.

Disassembly – Hydro Gate 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. If you should need assistance, please contact Hydro Gate's Field Service Department at (303) 288-7873.

INSTALLATION

Safety Precautions & General Guidelines

Hydro Gate recommends that personnel responsible for installation review 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.

To help ensure your workers' safety, Hydro Gate 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 Cast Iron Slide Gates.

- Read and follow the installation instructions and drawings in this manual. **Do not** operate equipment before carefully reviewing the Installation, Operation, and Maintenance Manual.
- Carefully inspect the gates and accessories when received, before unloading. 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.
- Always use proper equipment when lifting or unloading heavy items.
- Store gates evenly on planks or timbers. **Do not** stack equipment too high for storage. Even the heaviest castings are subject to permanent warpage if unevenly blocked during storage. Always use heavy wood blocking between equipment. Refer to the storage instructions contained herein for details.
- Support full length of stems and protect threads during storage and handling.
- **DO NOT** disassemble the gates for installation.
- Adequately support and brace heavy items during placement of equipment and pouring of concrete. Do not allow excess concrete to overlap gate thimble or frame.
- **Do not** 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.
- 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** operate gates with excess concrete or other debris on them.
- **Do not** operate gate stems dry (without grease).
- **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 Operation and Maintenance Manual.
- Contact your Hydro Gate representative with any questions you may have regarding safety in installing, operating, and handling Hydro Gate products. Hydro Gate and its related companies have 100 years combined experience in the water control industry.

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, stem, and lift.

3. Studs furnished for attaching of the gate 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 1)**.

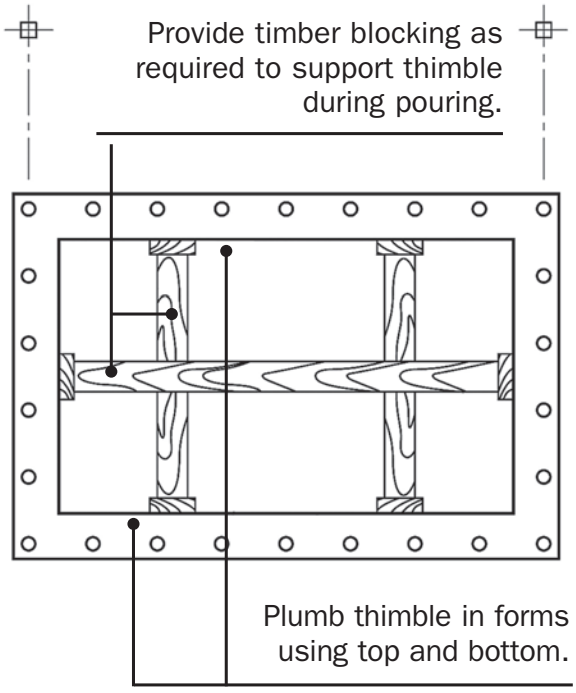
Installation

Use 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 1 – Front View of Thimble Showing Bracing



INSTALLATION OF GATE ON WALL THIMBLE

1. Thoroughly clean both mounting face of the slide gate and the wall thimble mounting flange with scrapers and wire brush so that no sand, concrete, dirt, or foreign material is present **(Figure 2)**.

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 the mounting stud bolts into the wall thimble

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. Apply two continuous ½ 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. Alternately, trowel a thin layer (1/2 inch thick) of mastic on the face of the thimble. Trowelable grades of asphalt roof cement, or polyurethane sealants (Sika-Flex 1-A or equivalents), work as well as mastic.

6. Although Hydro Gate 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 1/2 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. Install the gate over the mounting studs and thread on the flat washers and hex nuts. Tighten all stud nuts uniformly (see the torque table). It is not mandatory that nuts be tightened precisely to these values. Repeated tightening with a torque wrench will be required to squeeze mastic to a thin layer for metal-to-metal contact. Approximately 24 hours after the sealant has begun to set, re-tighten the stud nuts evenly again with a torque wrench.

8. 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.

Torque Table for Tightening Nuts or Hex Bolts

Capscrew Diameter (Inches)	Torque To Be Applied (lbs-ft)
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

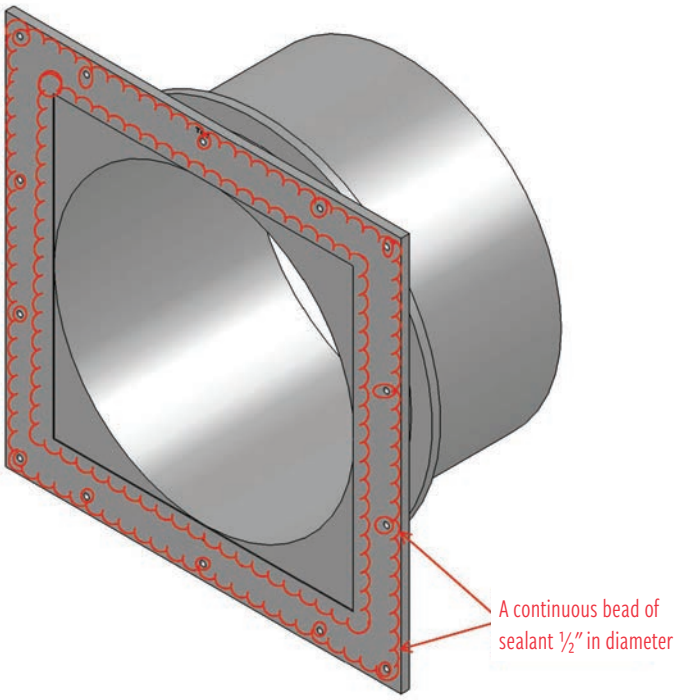
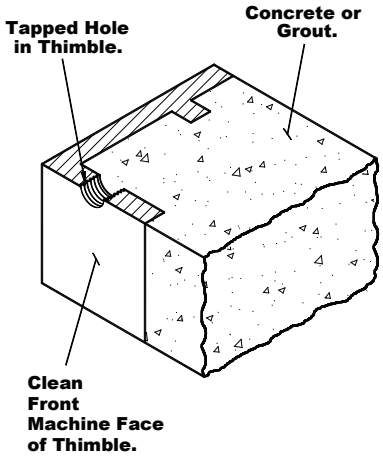


Figure 2 – Front Cross Section of Thimble Showing Machined Front Face



"F" Wall Thimble
Typical Thimble Installation

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 repeat installation procedure. This requires substantial demolition and risks damage to the structure and thimble.

2. The preferred correction involves mounting the gate on the thimble with shims between gate and thimble flanges to restore gate seat faces to a good contacting condition. The resulting gap between gate and thimble flange can be sealed with mastic (Sika Flex 1-A or similar).

There is a limit to how wide a gap the chosen mastic will seal. Consult the mastic supplier for gap limit 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 a 3-day cure. Hydro Gate recommends not exceeding 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), Hydro Gate 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 that the gate seat is contacting within .004 inch all around the opening.

D. Remove the gate, note positions of shims.

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 Hydro Gate's Engineering Department for suggestions. The axis of movement of the slide must be parallel to the axis of the stem within certain limits, depending on the gate size. Hydro Gate's Engineering Department can determine these limits for the specific installation and offer suggestions.

INSTALLATION OF FLUSH BOTTOM CLOSURE GATES

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 (Figure 3). The top surface of the rubber seal is installed at the same elevation as the invert of the gate opening. Refer to the Hydro Gate installation drawing.

1. 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.

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

INSTALLATION OF FLANGE BACK GATES ON CONCRETE WITHOUT A THIMBLE

1. Secure all anchor bolts in proper position in the forms or use adhesive epoxy system after pour. For proper size, length, projection and spacing, see Hydro Gate installation drawing.

Installation

An upper anchor is often required for supporting the upper gate frame.

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 4.** The anchor bolt projection shown on the installation drawing provides for the suggested thickness of the grout shown.

3. Pour concrete and strip 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.

Installation

To ensure the gate frame has not been distorted during this process, attempt to insert a .004-inch feeler gauge between the seating faces around the entire perimeter of the opening. If the gauge can be inserted between the faces, then adjust the anchor bolt nuts to eliminate the gap. Refer to the "Excessive Localized Leakage" section of this manual.

5. Carefully grout in the gate, using "Five Star" non-shrink grout, or equal.

6. After the grout has set, make certain there are no voids between the gate frame and the concrete. 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.

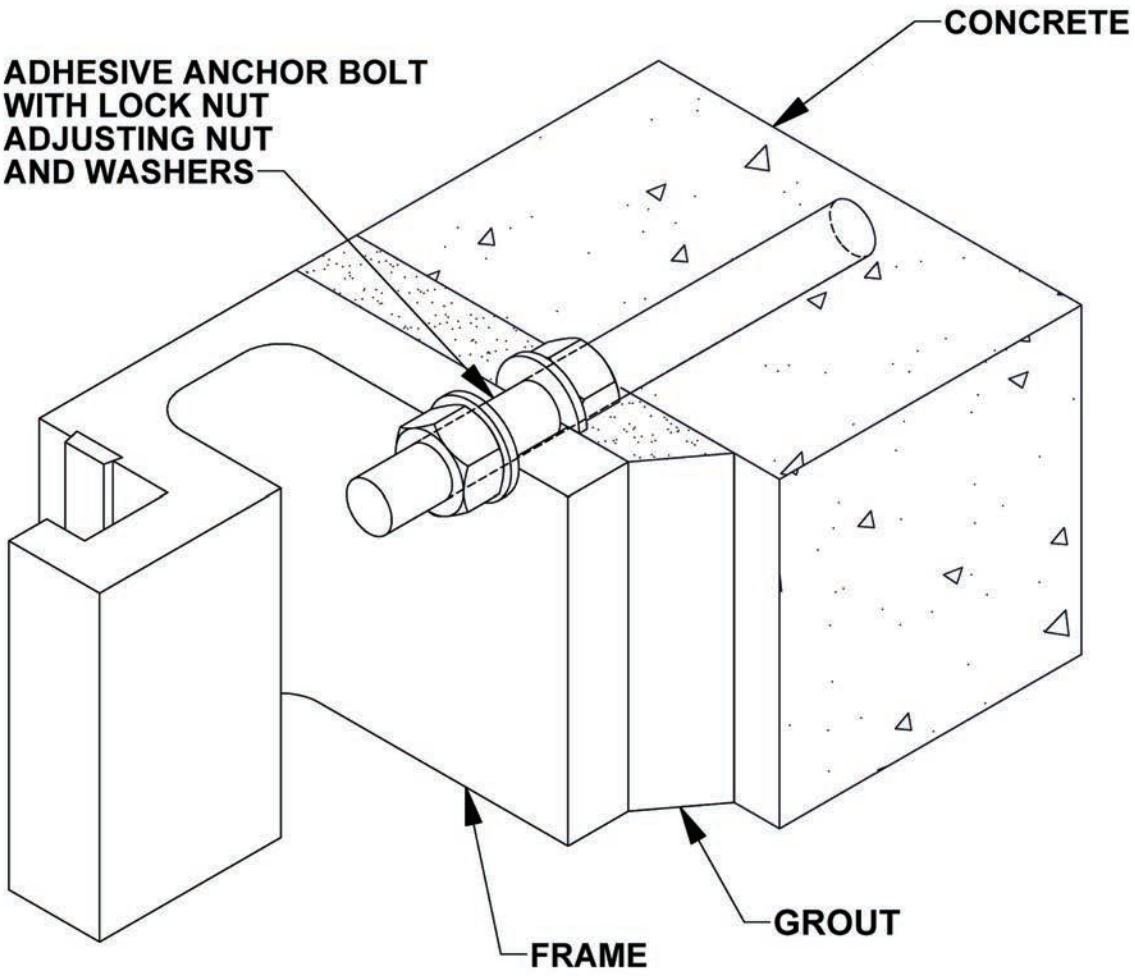
7. Lubricate all nuts and anchor bolts with anti-seize lubricant and tighten uniformly.

Installation

Do not force the gate to conform to any uneven surfaces.

8. To complete the gate assembly, install nuts on the anchor bolts located on the upper frame extension. Bring both the front and back nuts in firm contact with frame. Tighten both without distorting the frame.

Figure 4 – Top View of Anchor Bolt Mounting with Flanged Back Gate



GATE STEM AND GUIDES INSTALLATION

1. Install the anchors for the lift and stem guides as shown on the installation drawings. Check for proper alignment of the lift, stem guides, and gate. The lift stem and gate stem block must be in vertical alignment within 1/8 inch per each 10 feet of distance.

2. Provide opening with adequate clearance (cored holes should be ~1" larger than stem diameter) in the lift platform for the gate stem.

3. Install stem guide brackets on anchors, but do not tighten nuts; leaving them loose so the bracket can be moved for later alignment. Loosen all assembly bolts holding the collars to the bracket. Most stem guide collars are 2-piece construction.

4. When more than one gate is to be installed, stems may be of different diameters or lengths. Stems are marked and/or tagged for each installation. Separate the stems per individual gate installation.

Installation

Exercise care when handling and installing threaded stems; nicks or burrs will damage lift nut threads.

5. Insert the stem block into the gate slide pocket, as shown on the installation drawing.

Lower the bottom section of the stem into place through the hole of the gate slide and thread it all the way into the block and align the keyways **(Figure 6)**.

Installation

Immediately insert the key to lock the bottom section of the stem to the block. (The key is omitted on non-rising stem gates as the turning motion is between the block and the stem.)

6. Stems may be in more than one piece to facilitate shipment and installation. If two or more pieces are furnished for an installation, they must be installed in their proper order from bottom to top to place splices in correct location so that they will not interfere with the stem guides when the gate is opened or closed. Measure the stem section lengths and install.

7. Place all of the succeeding stem sections. Double-check the installation drawings to ensure that any one-piece stem guide collars are in place. Join together with splices as provided **(Figure 7)**.

Safety

Insert all bolts or keys in each stem splice immediately after sections are installed and aligned to prevent one section disconnecting from another when the gate is operated.

8. Immediately before lowering the lift over the threaded portion of the stem, remove any protective wrapping from the stem and thoroughly clean off all foreign material from the threads.
9. Lubricate stem threads with recommended lubricants as noted in the “Lift and Stem Maintenance” section of this manual. Do not leave lubricated stem exposed to contamination before completing the installation.

Figure 6 – Stem Block and Key

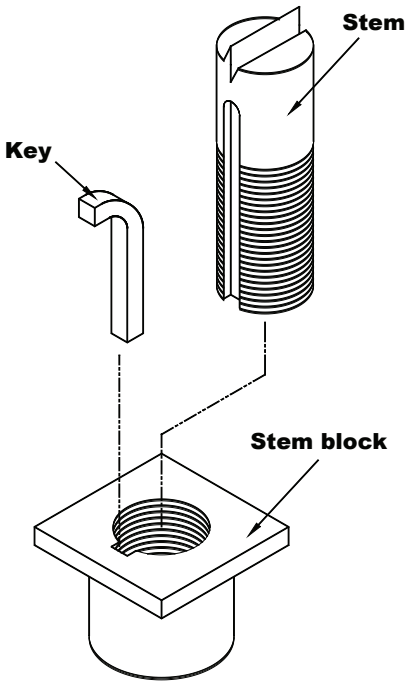
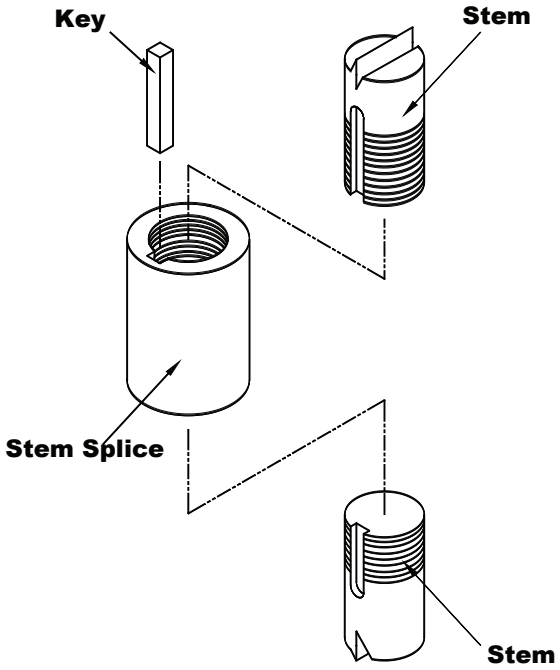


Figure 7 – Stem with Splice



LIFT INSTALLATION AND ADJUSTMENT OF STEM GUIDES

1. Clean the interior threads of the lift nut.

Installation

Foreign material in the nut threads may cause damage and make the gate harder to operate. Each threaded nut should be carefully swabbed out even if it appears to be clean.

2. Clean the threaded section of the stem, removing all foreign material, and lubricate with recommended lubricant as described in the "Lift and Stem Maintenance" section of this Manual.

Warranty

Operation of the gate assembly without proper lubrication of the stem will damage the lift nut threading and void the equipment warranty.

3. Raise the lift and lower it over the previously installed and lubricated threaded stem section. When starting threaded stem into the 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 threaded into the lift nut freely. Hold the lift to prevent its rotation. Turn the handwheel or crank to lower the pedestal onto its anchor bolts.

Installation

If the lift or gearbox requires assembly, make sure to review the manufacturer's literature regarding bearing and lift nut placement. Hydro Gate cannot be held responsible for an improperly installed lift nut.

Installation

When all parts are cleaned, the threaded lift nut will turn onto the threaded stem with very little effort.

4. The gate is shipped with a steel clip or clips attached to the frame at the top corner of the slide **(Figure 8)**, which held the slide closed during shipment. The clip(s) should now be removed and discarded.

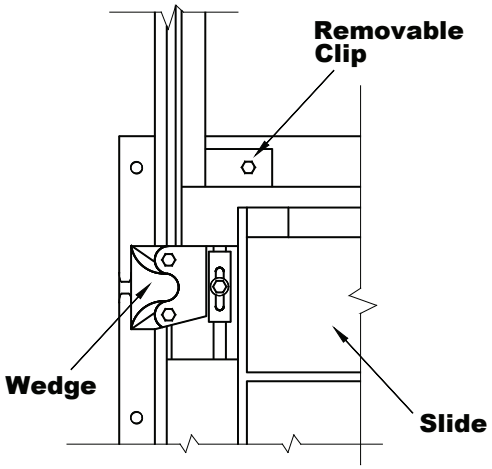


Figure 8

Installation

Do not attempt to operate gate without removing shipping clips.

5. Using shims, double nuts on anchors, or other leveling devices under the lift, align the centerline of the lift nut until parallel with the stem centerline. Vertical alignment of gate stem and the gate slide stem block must be within 1/8 inch per 10 feet of distance. Tighten nuts on the anchors uniformly.

6. The crank should turn freely for two or three turns in each direction until the clearance between the top or bottom of the stem block in the gate slide is taken up. If any binding occurs during operation of the lift with the slight vertical movement of the gate slide, the 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 be certain all threads on the stem and in lift nut are clean.

7. Place stem guide collars around the stem above each bracket. Place the bolts through the projection of the bracket and the ends of the collars. Do not tighten the bolts.

8. Grout under the lift (if required). After the grout has set, tighten the anchor bolts uniformly.

Installation

Before opening the gate, clean all grout, stones or other foreign material from the top of the gate (or bottom in the case of a downward opening gate) and recheck the projection of the anchors or studs across the top of the gate opening. Excess bolt projection will damage the top corrosion-resistant metal seating face on the slide when it is opened.

9. Turn the lift crank or handwheel to open the gate, until the gate slide is pulled from its wedges. The stem is now in tension. Check the stem to be certain it is straight. Tighten the nuts on the anchors through the stem guide brackets, center the stem guide collars around the stem, and tighten the assembly bolts holding the collars in position on the brackets.

10. Move the gate to its fully opened position and check the position of the stems. If the stem is being deflected by the collars, a stem alignment problem exists and must be corrected, indicating the gate may not be plumb. Reposition the lift and stem guides as necessary or consult Hydro Gate for ways to correct or compensate for this condition.

11. Lower the gate to fully closed position and check the wedges and the seating faces as described below. Run the stop nut down on top of the projecting threaded stem until it contacts the top of the lift nut or stem cover flange. Back the nut up until 1/8-inch gap appears between the lift and the stop nut to allow complete gate closure as sliding and bearing surfaces wear in.

12. Tighten the setscrews through the stop nut to hold it in place (See Figure 13 or 14). Install the stem cover, decal, indicator, etc., as required. Stem cover and decal installation detailed on the stem cover submittal drawing.

CLEANING AND FINAL ADJUSTMENT OF GATE

1. Move the slide to the fully opened position.

2. Clean all dirt, grit, paint or other foreign material off of the gate seating faces and wedging surfaces on both the slide and frame. Ensure this step is completed prior to any adjustments being made to the cast iron slide gate.

3. Grease the seating faces and wedge surfaces with water-resistant grease such as the following:

- Schaeffer's 238 Ultra Supreme
- Conoco's All Purpose Superlube
- Texaco's Multi-Fak Heavy Duty No. 2
- Shell Oil Company's Alvania No. 1
- Lubriplate No. 630 AAA
- BP Energrease LS 2

Safety

Schaeffer's 195 Food Grade has a vegetable base and is recommended for use on gates in potable water treatment plants.

4. Close the gate completely and check for proper wedge adjustment per the "Wedge Adjustment" section of this manual.

WEDGE ADJUSTMENT

All wedging devices were adjusted for proper metal to metal contact before shipping. Vibration during shipment or normal handling during installation may cause some loosening or changing of these settings.

After installation with the slide in the fully closed position, use a .004-inch feeler gauge to check clearance between the seating faces. For best results, make this check from the backside of the slide.

If a .004-inch feeler gauge is admitted between the seating faces along the top near the stem, excess compression on the stem may be causing a slight deflection of the slide. To relieve and correct this problem, turn the crank or handwheel in the direction to open the gate until it turns freely. Re-check the clearance with a feeler gauge. If the wedge settings have been changed during installation or if it is necessary to readjust all wedging devices, a suggested order of adjustment is shown in **Figure 9**. The number of wedges may vary, but the pattern of adjustment should be similar.

TOP AND BOTTOM WEDGE ADJUSTMENT

1. Loosen adjusting screw "H" and then loosen cap screws "F" a fraction of a turn until tapping lightly can move the wedge block **(Figures 10 and 11)**.

Installation

Do not loosen adjusting screws too much as leakage or damage to the wedges can occur when the wedge is readjusted and tightened.

2. Tighten adjusting screw "H" until the gap in the seat face closes (The torque on the adjusting screw is variable, but should not normally exceed values in the torque table for fasteners).

3. Tighten the cap screw "F".

4. Tighten the lock nut "G".

5. Open the gate approximately 1 inch and retighten capscrew F.

Figure 9 – Gate Wedge Adjustment Sequence

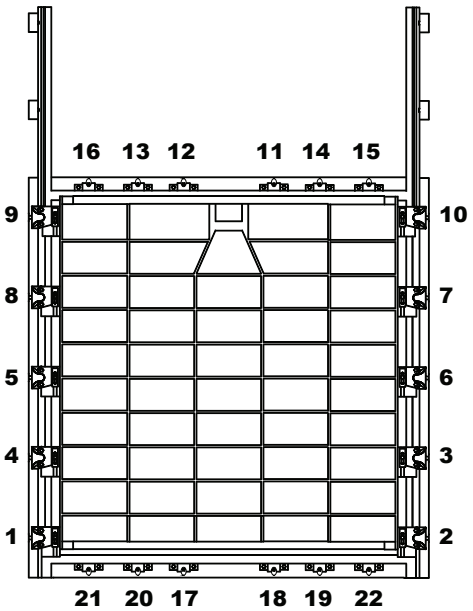


Figure 10 – Top Wedge Adjustment

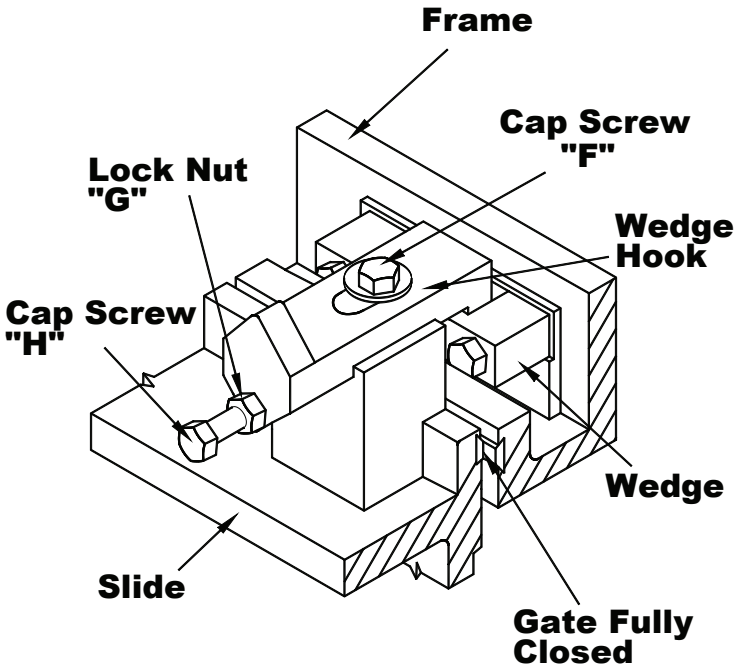
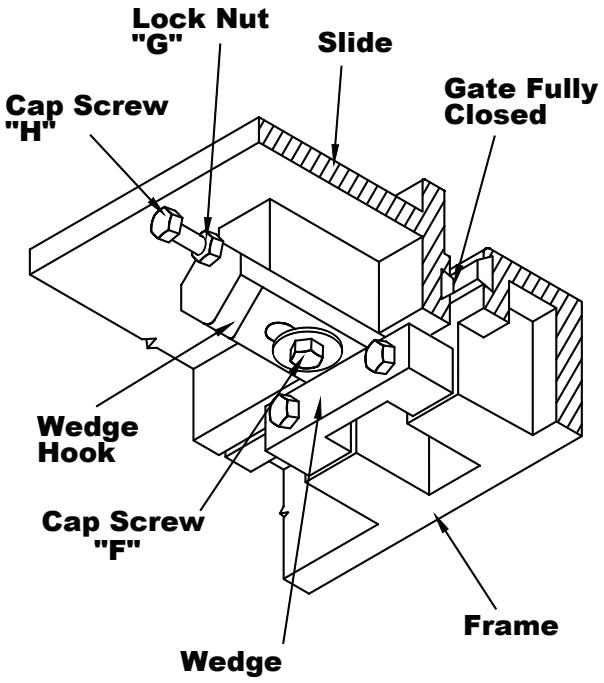


Figure 11 – Bottom Wedge Adjustment



SIDE WEDGE ADJUSTMENT

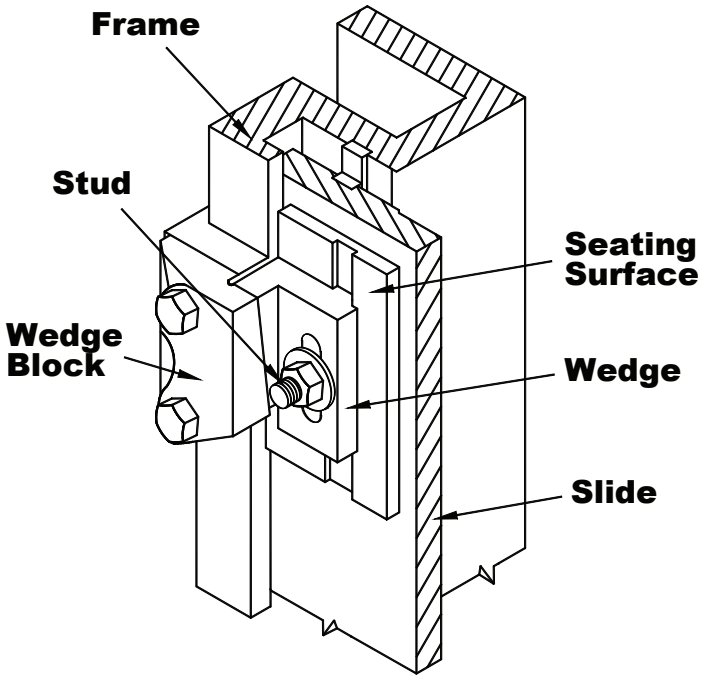
1. Loosen the nut on the stud through the wedge until tapping lightly can move wedge **(Figure 12)**.

2. Be certain that the bolts holding the wedge block to the frame are tight. See the Torque Table on page 6.

3. With a punch or discarded bolt, drive the wedge down until firm contact is made with the overhang portion of the wedge block and the seating faces are pushed together. Do not over-drive any wedge, because it may cause premature engagement when closing. Check all wedge faces for uniform and simultaneous contact during closing.

4. Tighten the nut on the stud through the wedge. (See Torque Table on page 6 for proper tightening.)

Figure 12 – Side Wedge Adjustment



FLUSH BOTTOM CLOSURE ADJUSTMENT

All flush bottom devices were factory adjusted for proper contact before shipment. Shipment and normal handling may have caused loosening or changing of the settings. Use the following procedures to readjust.

1. On those gates having flush bottom closure, move the gate slide to its fully closed position by applying force on the handwheel or the crank of the lift. Uniform contact between the bottom lip of the gate slide and the top surface of the rubber seal must be made for the full width of the gate opening. Check for proper contact with a .004-inch thickness feeler gauge.

2. If full closure is not being made, open the gate a fraction of an inch to relieve pressure on all of the wedges. Loosen all of the nuts on the studs through the side wedges and top wedges (if used), as explained the “Top and Bottom Wedge Adjustment” and “Side Wedge Adjustment” sections of this manual.

3. Re-close the gate until uniform contact is made between the bottom of the gate slide and the rubber seal. A slight deformation of the seal is required for the full width of the gate. Re-check contact surface with 0.004 in feeler gauge.

4. Adjust and retighten all wedges, as explained in the “Side Wedge Adjustment” and “Top and Bottom Wedge Adjustment” sections of this manual.

5. Grout or fill the bottom recess around the flush bottom closure as required.

MANUAL LIFTS, PARTS, AND ASSEMBLIES

Typical assemblies of manual lifts are included for reference (see figures 13 and 14). These lifts may be either yoke-mounted or pedestal-mounted. All Hydro Gate's lifts have housings that can be removed from the pedestal, leaving the lift nut in place supporting the gate weight. If inspection or service of the gears and bearings is necessary, unbolt the lift from the pedestal or yoke and pull the housing off. The nut and retaining ring should stay in place.

Hydro Gate's lifts may be arranged in tandem. These lifts are connected with an interconnecting shaft, sometimes called a tandem shaft. See the gate installation drawing for more information.

The assembly of tandem lifts requires the following:

1. Correct placement of "left hand" and "right hand" stems. Refer to installation drawing for correct stem placement.

2. That the stems and lifts are synchronized so that the gate lifts and closes evenly (both stems must reach closed position simultaneously). Synchronization is accomplished with the interconnecting shaft coupling (assemble the coupling, per the installation drawing, when the gate and stems are even and level). Adjust coupling as necessary.

INSTALLATION OF HYDRAULIC OPERATING CYLINDER, STEMS AND STEM GUIDES TO GATE

The preferred method of installing and adjusting the operating cylinder to the gate is through the use of the hydraulic power system. Manual adjustment of the cylinder rod is not recommended.

1. Ensure the gate slide is in the fully closed position. See appropriate sections for wedge and seat face check, and adjustments.

2. Locate the stem block and clean the internal threads. Also, clean the threads on the cylinder rod or stem extensions where the nut will attach. Prior to final assembly thread the parts together to verify ease of assembly. Clean and file the threads as necessary.

3. Bolt the cylinder to the operating platform as required. Prepare to connect cylinder rod to stem extensions as required per the installation drawings.

4. When more than one gate is to be installed, stems may be of different diameters or lengths. Stems are marked and/or tagged for each installation. Separate the stems per individual gate installation.

Installation Note

Exercise care when handling and installing threaded stems; nicks or burrs will damage lift nut threads.

5. Stems may be in more than one piece to facilitate shipment and installation. If two or more pieces are furnished for an installation, they must be installed in their proper order from bottom to top to place splices in correct location so that they will not interfere with the stem guides when the gate is opened or closed. Measure the stem section lengths and install.

6. Attach the upper most stem section to the cylinder rod. Join together with splices as provided **(Figure 7)**.

Safety Note

Insert all bolts or keys in each stem splice immediately after sections are installed and aligned to prevent one section disconnecting from another when the gate is operated.

7. Lubricate stem threads with recommended lubricants. Do not leave lubricated stem exposed to contamination before completing the installation.

8. Place the anchor bolts for the stem guides as shown on the installation drawings. Check for proper alignment of the cylinder rod extension, stem guides, and gate. The cylinder rod extension and gate stem block must be in vertical alignment within 1/8 inch per each 10 feet of distance.

9. Install stem guide brackets on anchors, but do not tighten nuts; leaving them loose so the bracket can be moved for later alignment. Loosen all assembly bolts holding the collars to the bracket. After each collar is installed, re-bolt it to its bracket, but do not tighten.

10. Connect the hydraulic lines to the appropriate port on the cylinder. Refer to the operation and maintenance manual for the hydraulic system.

Installation Note

Take care to not leave the cylinder ports uncovered during installation as contaminants can enter the hydraulic system causing premature failure.

11. Supply hydraulic fluid to extend the cylinder rod and stem assembly toward the gate slide stem block pocket. If the cylinder rod does not align with the center of the stem block pocket it will be necessary to make adjustments to the cylinder mounting.

12. Place the stem block/nut in the gate slide stem block pocket. Refer to the installation drawing provided to confirm the correct location.

13. Carefully extend the rod and stem assembly into the block pocket and rotate the stem block/nut to engage the threads.

14. The stem block/nut will have multiple holes in its circumference. A straight piece of rod can be used to rotate the nut.

Installation Note

The cylinder must be fully extended, at the same time the gate must be completely closed. Care must be taken not to over close the gate which creates distortion across the top of the gate slide.

MANUAL LIFTS, PARTS, AND ASSEMBLIES

15. Alternately extend the cylinder rod and rotate the nut until the cylinder rod is fully extended. Verify that the cylinder rod or stem extension thread fully engages the stem nut, and the nut is in contact with the bottom of the block pocket.

16. Tighten the screws that lock the stem block/nut to the matching rod and stem assembly.

17. Bleed the hydraulic lines to remove trapped air. Refer to the operation and maintenance manual for the hydraulic system.

18. Cycle the gate several times to verify proper function.

19. Re-check with feeler gauge across the top of gate opening. Verify that the cylinder is not over-closing the gate, causing the slide to bend open at the stem block pocket. Back up the stem block slightly on the rod to alleviate this problem.

OPERATION

General Operation Information

Cast Iron Slide gates are used to control flow of or retain a volume of water, effluent, or other fluids. Typical applications include industrial water treatment facilities, municipal water treatment facilities, irrigation, dams, flood control, and many other applications that require accurate control of liquid flow.

The simplicity of a Cast Iron Slide Gates makes it a popular choice when designing flow controls. Regardless of the type of actuation used to operate the slide gate, from a simple manual hand crank to a fully integrated electric motor, basic operation consists of travel between an open or closed position An open gate allows flow and a closed one does not.

Depending on size, most Cast Iron Slide 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.

Cast Iron Slide Gate Operation Procedures

The following sections cover the general operating procedures associated with two manual-operation systems (handwheel and handcrank) and an electrical-operation system. Read and follow the operating procedures for the applicable system. If you have any questions concerning safe operation of this Hydro Gate Cast Iron Slide Gates, contact Hydro Gate immediately.

HB SERIES ACTUATOR (MANUAL HANDWHEEL OR TEE WRENCH)

Opening – To open this Cast Iron Slide 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.

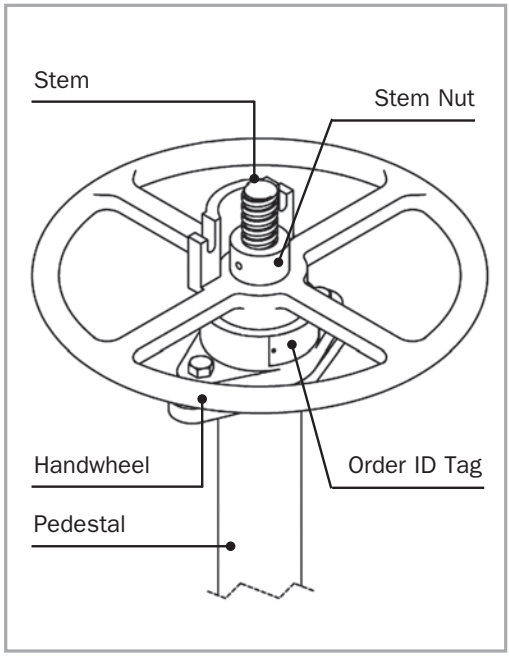
Operation

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

Closing – To close this Cast Iron Slide 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 Hydro Gate **before** any adjustments are made.

Operation

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 Cast Iron Slide 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.

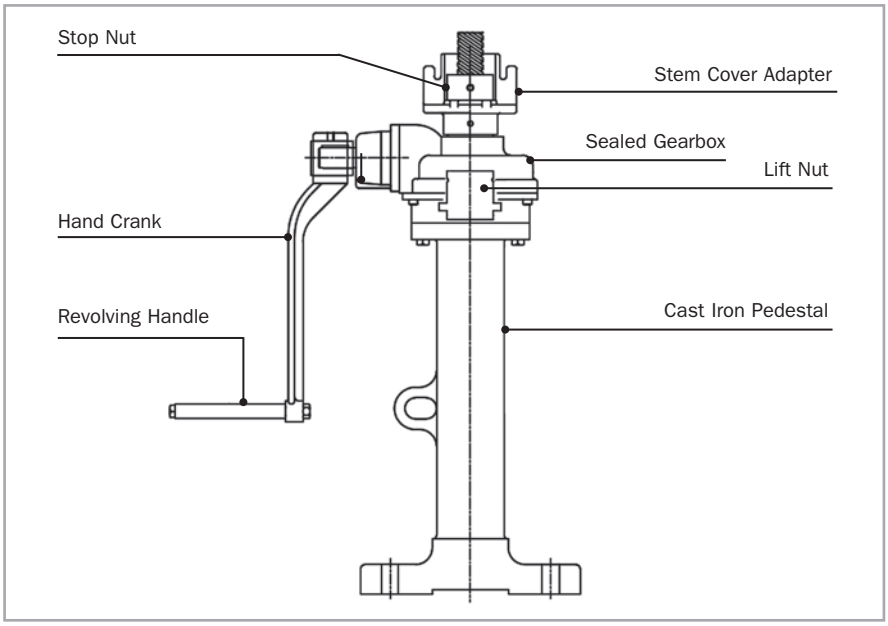
Operation

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

Closing – To close this Cast Iron Slide 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 Hydro Gate **before** any adjustments are made.

Operation

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

Hydro Gate's standard paint system on Cast Iron Slide 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, wedges, and wedge blocks 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.

Hydro Gate 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 that 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 in 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. 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 the “Wedge Adjustment” section of this manual.

Maintenance and Lubrication

Occasional adjustment and lubrication of Hydro Gate Cast Iron Slide Gate components will be required. The frequency will depend upon how often the gate is used, location, and operating conditions. Periodic inspection, adjusting, and cleaning 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

Maintenance of the threaded operating portion of the gate stem is critical and should be performed as frequently as the operating environment requires. 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 the "Wedge Adjustment" section of this manual.

Maintenance

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 listed on the maintenance schedule:

- Initial inspection at time of installation and again at the date of commissioning.
- 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. Using a threaded stop nut as an example of the original thread, verify the amount of wear on the lift nut and stem.
- 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.

Excess dried grease or other foreign material being carried into the threads of the lift nut will result in extremely difficult operation. 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 Schaeffer's 238 Ultra Supreme.

An equivalent lubricant can be made from 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.

An equal alternate for La Co's "Slic-Tite" is "ANTI-SEIZE 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:

- Texaco's "Multifak EP 2"
- Sta-Lube "Sta-Lube" No. 3121
- Shell Gadus Grease (formerly known as Alvania grease)
- Mobil's "Mobilux EP2"
- Mobil's "Ronex MP"
- Fiske Brothers' "Lubriplate No. 630 AA"

Recommended for potable water service is a vegetable-based lubricant such as Schaeffer's 195 Food Grade.

Lifts may be furnished with a stem lubricator Zerk Fitting which is located in the "stem cover adapter" to facilitate lubrication of stem threads with pressure greasing equipment. To be effective, lubricant should be injected while the stem is moving through the lift.

Manual crank lifts have sealed thrust bearing that do not require lubrication.

Exercise of infrequently operated lifts and gates is recommended. A semi-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. Replacement or spare nuts can be ordered from Hydro Gate. Spare parts are usually not needed or recommended, since they are readily available on short notice from Hydro Gate. 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.

Maintenance Schedule and Lubrication Summary

Activity	Frequency	Lubricant
General Cleaning and Inspection	Every 6 months, more frequently as conditions and use require.	N/A
Stem Thread and Lift Nut Wear Inspection	Every 6 months, more frequently as conditions and use require.	N/A
Stem Thread Lubrication and Cleaning Inspection	Every 6 months, more frequently as conditions and use require.	Schaeffer's 238 Ultra Supreme*
Clean and Grease Seating Faces and Wedge Surfaces	Annually or whenever the gate is dewatered. Exercise gate, at east partially, every 6 months if dewatering is not possible.	Schaeffer's 238 Ultra Supreme*
		*See text for equivalent lubricants.

Notes

- ***Inspect crank lift and/or electric actuator for the collection of moisture beneath the stem cover housing. Unthread the stem cover housing and examine the space surrounding the stem. A convenient method of removing the moisture is by utilizing a Squeeze Bulb, Siphon or Baster.***

- For potable water treatment plants use a vegetable-based lubricant such as Schaeffer’s 195 Food Grade.

Lubrication Equivalents

The recommended stem thread lubricant is Schaeffer's 238 Ultra Supreme.

Hydro Gate considers any of the following greases/lubricants to be acceptable equivalents when combined with a pipe thread sealant:

A. Fiske Brothers “Lubriplate” No. 630 AAA or AA
B. Sta-Lube “Sta-Lube” No. 3121
C. Texaco “Multifak EP 2”
D. Shell Gadus Grease
E. Mobil “Mobilux EP2”
F. Mobil “Ronex MP”

Hydro Gate recommends the following pipe thread sealants with Teflon:

A. La-Co Slic-Tite Paste
B. ANTI-SEIZE Pipe Thread Sealant with Teflon
C. Loctite 561 Pipe Thread Sealant with PTFE
D. Any other commercially available pipe thread sealants containing Teflon

For water treatment plants, Hydro Gate recommends using a vegetable-based lubricant such as Schaeffer's 195 Food Grade. The following lubrications are considered acceptable equivalents:

A. Lubriplate Super FML-2.
B. Rocol Foodlube Multi-Paste (European product)
C. Petro-Canada Purity-FG
D. Loctite 561 Pipe Thread Sealant with PFTE

Leakage

The most frequent cause of excess leakage through a newly installed Hydro Gate Cast Iron Slide 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 Hydro Gate's 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 sections of this manual.

An important note: ensure the Cast Iron Slide 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.

Installation

When the Cast Iron Slide Gate is disassembled for installation, all of the fine adjustments that were made by Hydro Gate 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 Cast Iron Slide Gate is highly dependent upon the quality of installation. The gate seat, or frame, is somewhat flexible and is easily pulled out of plane if incorrectly installed, resulting in leakage. The amount and location of leakage depends upon the deflection of the castings by improper tightening of the nuts on the anchors.

To minimize leakage through Cast Iron Slide Gates and meet or exceed the AWWA C560 Cast Iron Slide Gate Standards, 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.

The American Water Works Association's (AWWA's) leakage rate for Cast Iron Slide Gates is 0.1 gallon per minute per foot of seating perimeter for seating heads and 0.2 gallons per minute per foot of perimeter for unseating heads up to unseating head of 20 ft. Unseating heads above 20 ft. require the allowable leakage to be calculated. Maximum allowable leakage for unseating heads above 20 ft. (gallons per minute per foot of seating perimeter) = .10 + 0.005 x (unseating head in feet).

Troubleshooting Tips for Hydro Gate Cast Iron Slide Gates

Symptom	Cause	Remedy
Excessive Leakage under Slide on Flush Bottom Closure	Gate not completely closed or bottom seal out of adjustment or debris under seal or damage of seal. Some or all the wedges are too tight and the slide is being stopped short of its fully closed position. Warped Casting / Thimble	Remove foreign material. Check seal for permanent damage and possible replacement. Check for any mistightened wedges with a .004 inch feeler gauges. Tight wedges will not permit insertion of the gauge. If only one or two wedges are the problem, then readjust them. It may be necessary to completely loosen and readjust the entire gate per the instructions in the manual.
Excessive Leakage along the sides and/or the top of the Slide with Flush Bottom Closure	Debris Multiple wedges improperly adjusted. Warped Casting / Thimble	Check the location where the leakage is occurring and adjust the side and top wedges as described under the **Wedge Adjustment** section of the manual.
Excessive Leakage at One Particular Location	Debris A (one) wedge improperly adjusted Warped Casting / Thimble	Check between the tapered face of 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. Follow the procedures under the **Clean and Adjust Gate section** of this manual.
Excessive Leakage along Top; Stem Block Pocket Located at or Near Top of Slide	Gate overclosed	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.

Symptom	Cause	Remedy
Excessive Localized Leakage; Gate Installed on Concrete, Wedges Tight	Overtightened 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 Sikaflex 1-A. Be careful so that the gate is installed flat the second time. Review the proper installation and adjustment instructions in this manual. entire gate per the instructions in the manual.
	Dirty Seating Face	Check for drops of paint, cement runs onto seating faces, or other construction grime. To correct, scrape off the foreign material from the perimeter of the seating faces on both the slide and frame and reseat the gate.
Cast Iron Slide Gates Installed on Wall Thimble - Excessive Leakage	Improper installation Thimble improper seal between the gate back and the thimble face. Improper contact between the gate and the thimble. One or more spots without mastic, or too little mastic	• Check for thimble warp • Clean foreign material • Reapply continuous bead of mastic

Troubleshooting Tips for Hydro Gate Cast Iron Slide Gates

Symptom	Cause	Remedy
Stem Bends	Improper stem guide placement or excessive force on operator	• Check stem guide spacing and alignment • Contact Hydro Gate for new stem
Excess Force Is Required on Handwheel or Crank	Dry and/or misaligned stem or Seating face damage	Lubricated Stem or Contact Hydro Gate with documentation
Noise during operation	The stem threads may be dry and/or the stem guides may be misaligned causing excessive rubbing as stem passes through.	Check thread surface and remove any burrs or damaged areas. Clean and coat with an extreme pressure grease and check stem guides for correct alignment.
Excessive effort to Operate	Dry Stem threads or foreign materialis carried into the threads of the lift	Remove the treaded of the lift nut, clean the interior and lubricate

Long-Term Storage Instructions for Cast Iron Slide Gates, Lifts, Stems, and Accessories

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. Store the lift assemblies either upright with plastic plugs/caps in place to keep dirt out of the nut threads or leave in original shipping cartons. Do not store the lifts directly on the ground.

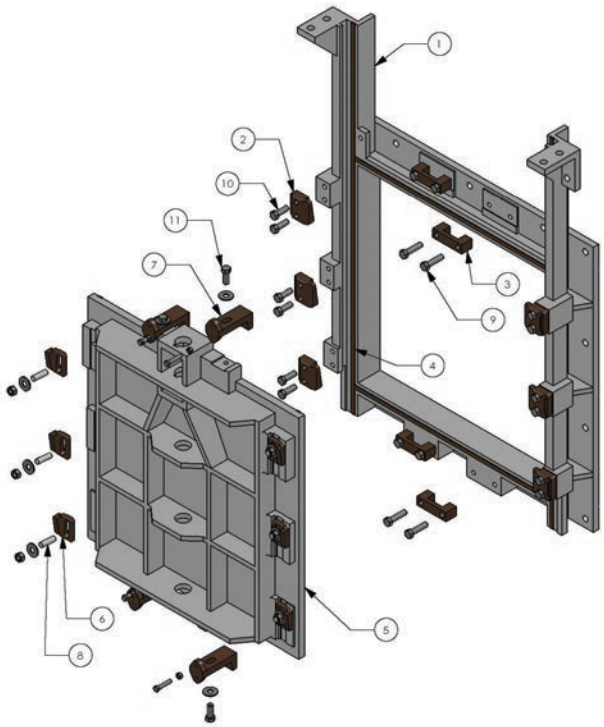
7. Stems and stem covers should be stored horizontally on timbers spaced 4 to 8 feet apart. Protective sleeves should be left on all stem threads and stem covers.

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

9. Bronze stem blocks, wedges, lift nuts, and stainless steel accessories are targets for theft and resale as scrap. Report all shortages at once and note same on shipping papers. Hydro Gate cannot be held responsible for theft and loss of equipment stored on the job site.

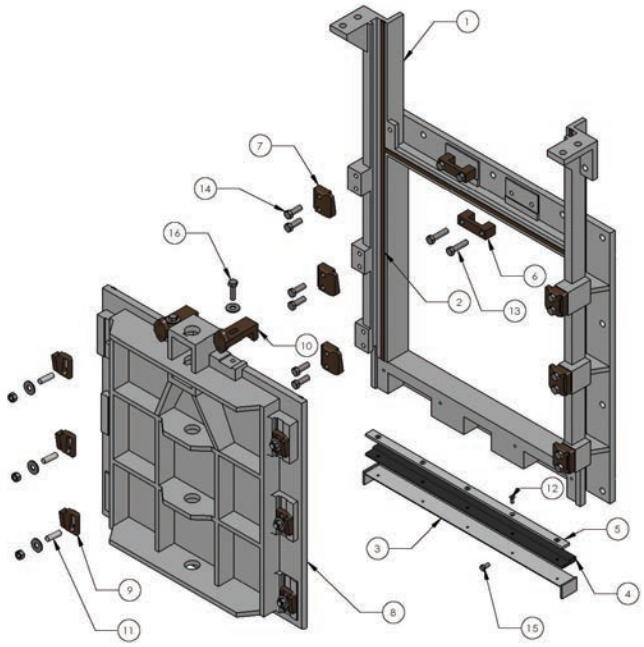
10. Inside dry storage is the best for all equipment. Covering equipment stored outside with tarpaulins is recommended to minimize degradation of paint from rain and sunlight, until finish paint is applied. Uncovered outdoor storage may result in staining of painted surfaces from rain and sunlight. Hydro Gate is not liable for any damage caused by improper storage.

Exploded View Series 560 Standard Bottom Configuration



Item No.	Standard Bottom Configuration Part List
1	Frame
2	Side Wedge Block
3	Top & Bottom Wedge
4	Dovetail Bronze Seating Faces (Frames 7 Slide)
5	Standard Bottom Slide
6	Side Wedge
7	Top & Bottom Wedge Hook
8	Side Wedge Faster Set
9	Top & Bottom Wedge Fasteners
10	Side Wedge Block Fasteners
11	Top & Bottom Wedge Hook Fastener Set

Exploded View Series 560 Flush Bottom Configuration



Item No.	Universal Bottom Configuration Part List
1	Frame
2	Dovertail Bronze Seating Faces (On Frame And Slide)
3	Flush Bottom Angle
4	Flush Bottom Resilient Seal
5	Seal Retainer
6	Top Wedge
7	Side Wedge Block
8	Universal Bottom Slide
9	Side Wedge
10	Top Wedge Hook
11	Side Wedge Fastener Set
12	Flush Bottom Seal Retainer Fasteners
13	Top Wedge Fasteners
14	Side Wedge Block Fasteners
15	Flush Bottom Angle Fasteners
16	Top Wedge Hook Fastener Set

Item No.	Description	QTY.
1	Lift Nut	1
2	Ball Trust Bearing	2
3	Keeper	1
4	ID Tag	1
5	Zerk Fitting	1
6	Pedestal	1
7	Screw, Hex Head 5/8-11 x 2 1/2	2
8	Washer, Flat 5/8	2
9	Washer, Lock 5/8	2
10	Nut, Hex 5/8-11	2
11	Ø 18, Ø 24 Or Ø 30 Handweel	1
12	Nut, Hex 1/2-13 x 1 1/2	1
13	Screw, Square Head 1/2-13 x 1 1/2	1
14	Stop Nut	1
15	Screw, Square Head 3/8-16 x 3/8	2
16	Stemcover	1
17	Cap, Stemcover	1
18	Washer, Flat 3/8	2
19	Nut, Hex 3/8-16	2
20	U Bolt 3/8	1

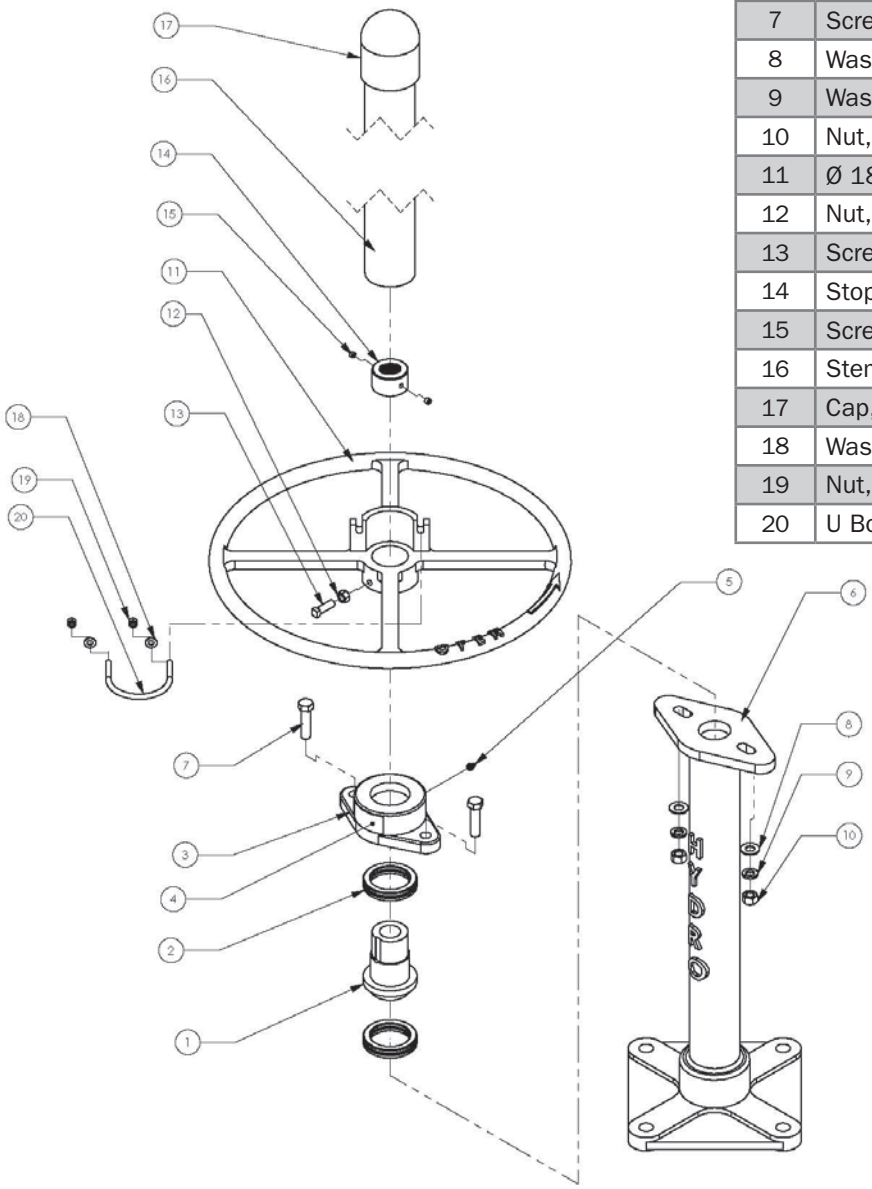


Figure 13

Item No.	Description	QTY.
1	Lift Nut	1
2	Thrust Washer/Race	4
3	Thrust Bearing	2
4	O-Ring	1
5	O-Ring	1
6	Spigot Ring	1
7	IB Gearbox	1
8	ID Tag	1
9	Pedestal	1
10		4
11		4
12	AWWA 2" Square Crank Adapter	1
13	Set Screw, 3/8-16 x 3/8	4
14	Ø 30" or Ø 24" Handwheel	1
15	Set Screw, Square Head	1
16	Arm Crank 15" Radius 2" AWWA Nut	1
17	Set Screw, Square Head	1
18	Stem Cover Adapter with Zerk	1
19	Stop Nut	1
20	Stem Cover	1
21	Cap, Stem Cover	1
22	Ø 3/8 U-Bolt	1
23	Washer, 3/8"Ø	2
24		2

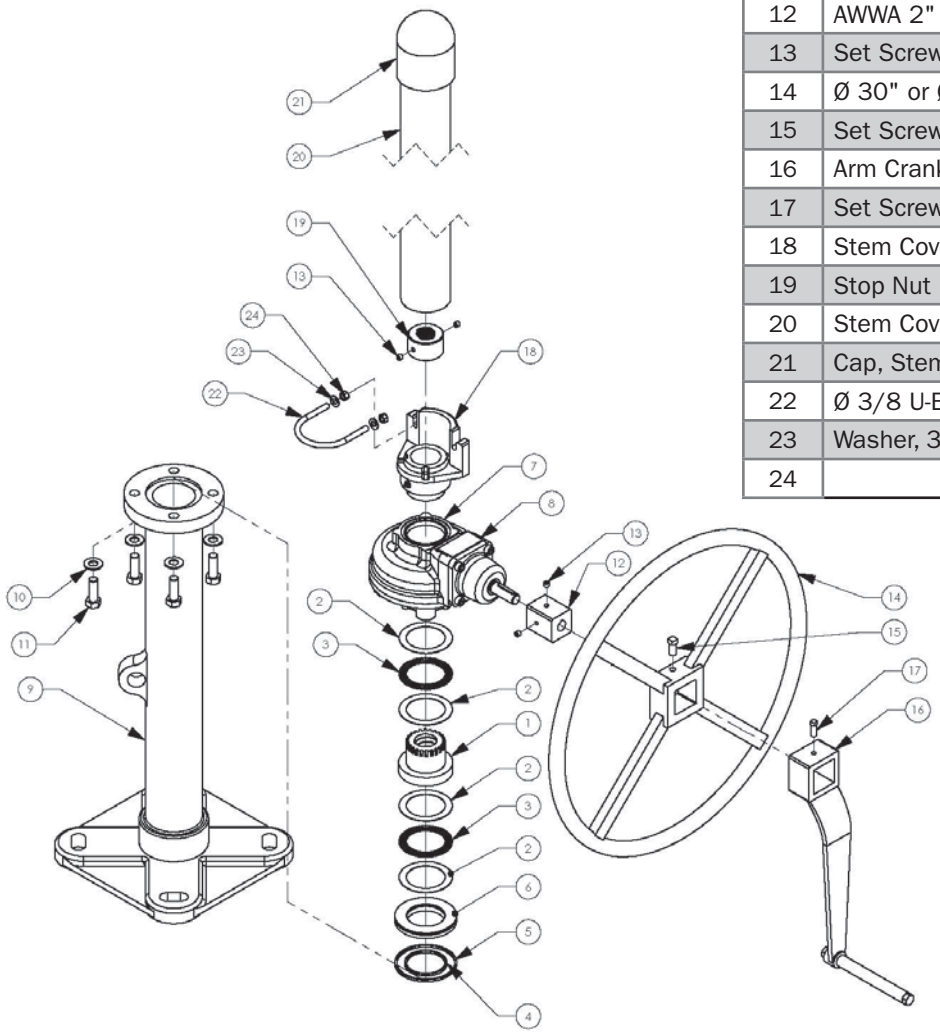


Figure 14

SPARE PARTS

Warnings

- Check size of parts before attempting to store them

- Spare parts should be stored in clean, dry and protected warehouse until ready for installation.

HOW TO ORDER REPLACEMENT OR SPARE PARTS

Parts may be ordered from your local Hydro Gate Representative or direct from Hydro Gate.

Please have the following information:

1. Hydro Gate sales information found on the blue anodized tag located on the gate or pedestal. The item and/or tag number must be relayed to Hydro Gate

2. Description of replacement Part(s)

Spare Parts List	Recommended Quantity
Stop Nut	1
Stop Collar	4
Lift Nuts	2
Stem Cover	1
Thrust Bearing for Gate lift	1

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