HYDRO GATE®

a MUELLER brand

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Cast Iron Flap Gates

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⚠ CAUTION:

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

Precise and accurate installation is critical to satisfactory operation. We assume no liability, expressed or implied, for interpretation of the contents of this manual. If you have any questions concerning the interpretation of the contents of this manual or installation procedures in general, you should contact the Hydro Gate facility in Colorado. We expressly disclaim 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.

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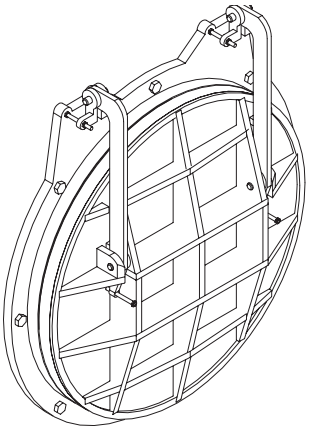
OVERVIEW



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 Medium and Heavy Duty Flap Gates and their component parts.

The gate was accurately machined, assembled, adjusted, and inspected before leaving the Hydro Gate Corporation 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

We do not recommend the stocking of spare parts. Replacement parts are readily available for worn or broken parts. Contact us or a Hydro Gate 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 a Hydro Gate representative at the time that they are needed.

Disassembly

We do 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 the Hydro Gate Field Service Department at 1.800.423.1323

INSTALLATION

Safety Precautions

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 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 Hydro Gate representative with any questions you may have regarding safety in installing, operating, and handling Hydro Gate products.

THINGS TO DO AND NOT TO DO DURING INSTALLATION OF THIS GATE

To properly install this gate, Hydro Gate 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 DO NOTS to ensure proper gate installation.

1. DO – Read and follow the Installation instructions and drawings in this Manual.

2. 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.

3. DO – Store gates evenly on planks or timbers. Even the heaviest castings are subject to permanent warpage if unevenly blocked during storage.

4. DO – Accurately locate and brace embedded items during placement of concrete.

5. DO – Contact your Hydro Gate representative with questions regarding this gate. Hydro Gate and its related companies have 100 years combined experience in the water control industry.

6. DO NOT – Stack gates without heavy wood blocking between gates.

7. DO NOT – Disassemble the gates for installation.

8. DO NOT – Allow excess concrete to overlap gate thimble or frame.

9. 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.

10. DO NOT – Operate gates with concrete and debris on them.

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 Hydro Gate 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 1. 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 seat, aligning the gate as required. Check for firm contact at the back of the nut, and then uniformly tighten all of the front nuts around the opening.

5. A flap gate seat can be easily distorted. Prior to applying the grout, attempt to insert a .004" feeler gauge between the seat face on the frame and the seat face in the cover. Adjust the seat to make continuous contact with cover by tightening /loosening the anchor bolt back up nut hex nut against the anchor bolt top hex nut.

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

7. After the grout has set, ensure no voids exist between the gate seat 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.

8. 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.

Mounting the Gate on Concrete Surface with Adhesive Type Stud Anchors

1. Use only adhesive-type or epoxy-grouted studs. Mechanical wedge studs are not recommended and gate performance cannot be guaranteed with wedge-type studs. We usually furnish the all-thread studs but does not furnish the adhesive capsules or cartridges.

IMPORTANT: Adhesive such as Hiti HY200 or HIT-RE 500-SD are not supplied by us due to its stringent storage requirements and limited shelf lifetime.

2. Accurately layout positions of studs or use the gate as a template.

3. Drill holes to diameter and depth required for size studs used. If rebar is encountered during drilling causing an impossible completion of hole, consult the owner's site engineer for instructions on how to proceed; cutting of rebar may not be permitted. In some cases, a new hole (or holes) may be field drilled in the gate frame to compensate for out of position studs. Consult the Hydro Gate engineering department for advice and limitations.

4. Blow and brush all holes clean according to adhesive system instructions and place studs with adhesive. Maintain proper projection and alignment and allow sufficient cure time, particularly in cold weather.

⚠ CAUTION: Because of the dynamic/reversing load on the gates involving unseating or seating loads and the use of front and back nuts for alignment, wedge studs are not satisfactory since they require tension in them at all times to "grip" the concrete. The loss of "tension" in the wedge stud may cause them to fail.

5. Two nuts are provided for each stud bolt (Fig. A). These are for precise plumbing and alignment with a nut on both sides of the gate flange.

6. Check the placement and plumbness of pattern of stud bolts. Fit check the gate onto stud bolts. Perform minor bending adjustment to studs, as needed.

7. Clean stud bolt threads. Apply anti-galling compound (anti-seize) and run one nut on each stud up to or near the concrete.

8. Establish a plumb/vertical plane with back nuts starting with the two upper corner stud bolt back nuts. Leave room for grout and some in/out adjustment from the wall. With plumb line or builder's level and straight edge, bring all other nuts to a vertical plane established by upper corner nuts.

9. Being sure flange of gate is clean, place the assembled gate over/on the stud bolts. Run the front nuts on stud bolts until they touch the gate flange.

10. Take note of how well the gate frame fits the previously established flat vertical plane of back nuts on studs. Some variation of the free-hanging gate flatness is normal (1/8" in small/medium sized gates; 1/4" in large gates).

11. Tighten the front nuts on side studs until frame contacts back nuts. Tighten the frame flange between the two nuts.

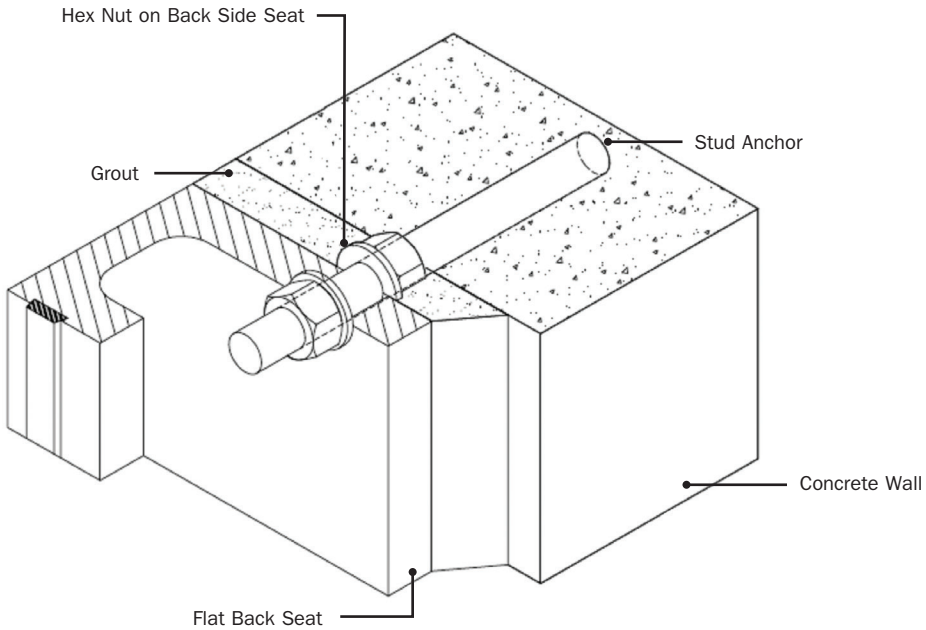
12. Note that the gate slide should be in tight contact with seals at horizontal frame members. Some curvature or non-flatness of frame member may be required for good seal contact with the slide. Tighten front and back nuts up to the flange while observing that no gap between the slide and horizontal frame seal exists or develops.

13. Grouting of gate frames is not recommended until after the lift and stem has been installed and gate has been cycled open/close to ensure smooth operation.

14. After operation has been verified, carefully pack the space between the gate and the wall around the opening with "non-shrink" grout. Alternatively, the space may be formed and slurry grouted with concrete. Grouting behind the frame guide (legs) extensions is not necessary.

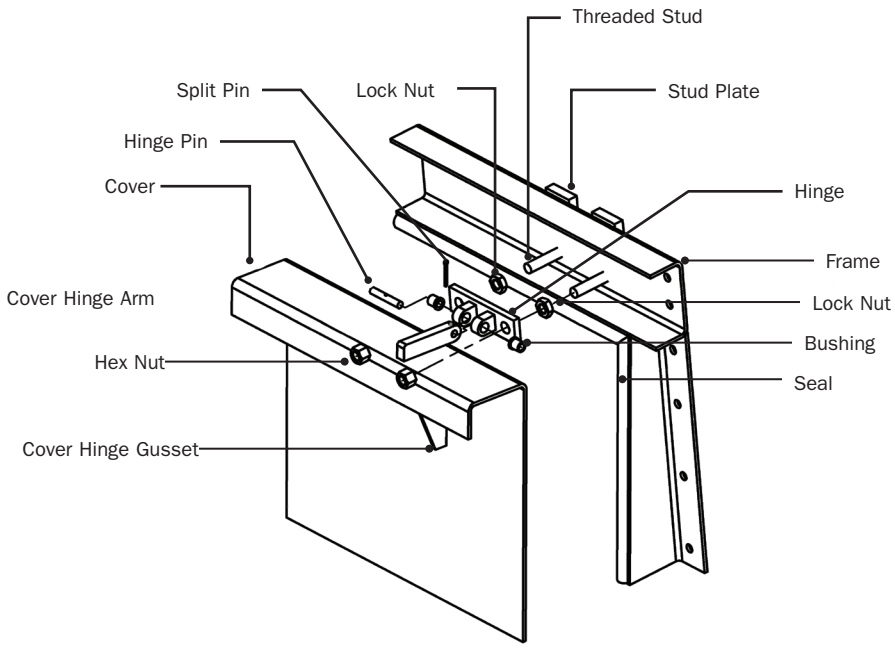
15. Be sure the frame extension stud bolts are in place and front and back nuts are tight and hold the frame stable.

FIG 1. VIEW OF ANCHOR BOLT AND FLAT BACK GATE



1.

FIG 2. ADJUSTABLE TOP PIVOT POINT AND LINK ASSEMBLY



2.

INSTALLATION OF GATE ON PIPE FLANGE

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

2. Check flatness and plumb of pipe flange 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 pipe flange should be plumb within 1/32 inch. Use good quality plumb level, or plumb lines.

3. After verifying pipe flange flatness and alignment, install the pipe flange bolts.

4. Trowel a thin layer (1/16 inch to 1/8 inch thick) of mastic on the face of the pipe flange or two 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. Trowelable grades of polyurethane sealants (Sika-Flex 1-A or equivalents), work well as mastic.

5. 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 1/16 inch thick and the pipe flange 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 seating heads.

6. Tighten all stud nuts uniformly. See the torque table shown below. 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.

7. 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

CAPSCREW DIAMETER	TORQUE SPECIFICATIONS (LBS-FT)
5/8"	90
¾"	128
1"	285
1 ¼"	500
Use “Anti-Seize” Lubricant on All Threads.	

ADJUSTMENT OF TOP PIVOT POINTS

For slight misalignment during installation or to make the flap easier or harder to open, adjust the hinge assembly as shown in Figure 2 as follows:

1. To move pivot points toward the gate seat, loosen back lock nuts "A" and move them back to desired location.

2. Tighten lock nuts "B" to move pivot lug back to the desired location. Move both lugs back approximately the same amount. Lift or pry flap up to make sure that the top pivot points are operating freely. If binding does occur, adjust lock nuts on studs until the flap pivots freely. Tighten all lock nuts firmly.

3. Loosen lock nut "C" on adjusting screw "D" in the bottom end of each link. Move set screw "D" in or out to align seating face on flap with the face on the gate seat. Tighten lock nut "C".

4. To move the hinge assembly out from the gate seat, reverse the above procedure by first moving lock nuts "B" out to the desired location, force pivot lugs out by moving lock nuts "A" in the reverse direction and complete adjustment per No. 2 and 3 above.

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

Hydro Gate's 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.

Hydro Gate does not usually recommend removing the cover from the seat 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 cover, (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" thickness feeler gauge. Readjust, if required, per the instructions in this Manual.

Lubrication

Pivot Points

Lubrication of pivot points on Hydro Gate 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 Hydro Gate. 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 Hydro Gate. When equipped with grease fittings, periodic lubrication of pivot points should be performed as required.

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

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.	**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"
Clean Seating by scrapping, removing built up debris on the contact surfaces	When general cleaning is performed.	
Notes: For potable water treatment plants use a vegetable-based lubricant. See previous page.		

TROUBLESHOOTING TIPS FOR HYDRO GATE 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" 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 on these back nuts, move the gate seat out until it contacts the flap. Check with the .004" 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 polyurethane sealant or epoxy.

Excess Leakage through Seating Faces, Gate Installed on Pipe Flange

This indicates the faces between the back of the gate and the face of the pipe flange may not have been properly sealed. Foreign material on the face of the pipe flange 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 pipe flange. Leakage will occur between the back of the gate and the face of the pipe flange. To correct, loosen nuts on all studs, pull the gate away from the pipe flange, 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" x 4", to provide substantially complete perimeter support under the gate frame assembly. Longitudinal timbers, spaced a maximum of 4', may also be used.

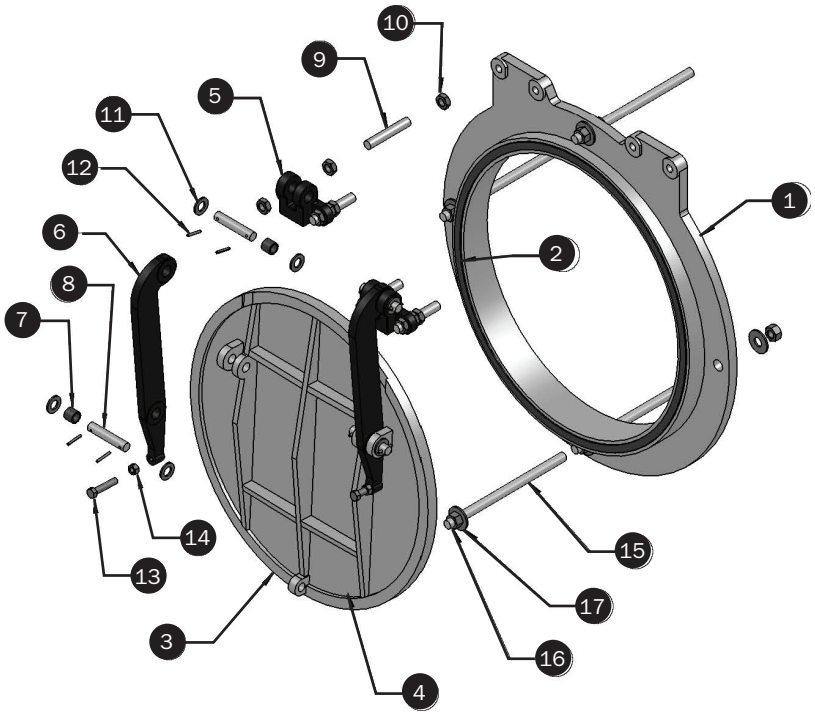
3. Stacking of gates smaller than 72" is permissible. DO NOT stack more than three (3) gates on top of each other. Stack gates of different sizes in a pyramid fashion. DO NOT stack large gates on top of smaller gates.

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

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

6. 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.

Heavy Duty Flap Gate 50C Exploded



PARTS LIST

ID	DESCRIPTION
1	Cast Iron Seat
2	Bronze Seating Face (SEAT)
3	Cast Iron Cover
4	Bronze Seating Face (COVER)
5	Ductile Iron Lug
6	Ductile Iron Link
7	Bronze Link Bushing
8	Stainless Steel Link Pin
9	Lug Adjusting Stud
10	Lug Adjusting Jam Nut
11	Link Pin Washer
12	Cotter Pin
13	Link Adjusting Bolt
14	Link Adjusting Nut
15	Anchor Bolt
16	Anchor Bolt Nut
17	Anchor Bolt Washer

WATER CONTROL GATE GUARANTEE

We warrant each of our Hydro Gate products to be free from defects in material and workmanship for a period of eighteen (18) months from the date of shipment for all goods, provided that such product was both: (1) under normal use and service and used for the purposes and under the conditions for which such product is intended; and (2) installed and maintained according to our instructions and applicable local codes.

Our obligations under this warranty are conditioned upon prompt written notice of the defect from the purchaser. If any our Hydro Gate product is proven to have failed to conform to the above stated warranty, then we, at our sole option, shall refund, repair, or replace the defective Hydro Gate product (F.O.B. the point of manufacture). We shall have the right to inspect the Hydro Gate product for which a claim is made under this warranty. If we request such an inspection, then the purchaser must return the Hydro Gate product to us, transportation prepaid.

This warranty does not cover failure of any Hydro Gate product caused by external forces such as, but not limited to, acts of God or the elements, civil insurrection, vandalism, vehicular or other impact, application of excessive torque to the operating mechanism, presence of foreign matter, or frost heave. The Purchaser shall assume all responsibility and expense for removal, reinstallation, and shipping charges in connection with this warranty.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING SPECIFICALLY, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTIES OF NON-INFRINGEMENT OF THIRD PARTY RIGHTS. IN NO EVENT SHALL WE BE RESPONSIBLE OR LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE. FURTHER, WE HEREBY LIMIT OUR TOTAL LIABILITY TO THE VALUE OF THE HYDRO GATE PRODUCT SOLD.

Notes

Notes

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