

CAST IRON SLIDE GATES

General

The contractor shall furnish and install the following cast iron slide gate assemblies as listed on the "Gate Schedule" and detailed on the manufacturer's drawings. The cast iron slide gate assemblies shall include the gate, frame, wall thimble (if required), stem, stem guides, and lift. Cast iron slide gates and installation shall meet the requirements of AWWA C560 except as modified herein. The gate shall be manufactured by Hydro Gate or approved equal.

Materials of Construction

Materials used in construction of gates shall be of the type best suited for the application and shall conform to the following ASTM specifications.

MATERIAL COMBINATION NUMBER 1:

Regular service, normal water, and wastewater.

Frame, Slide, Wall Thimble, Pedestal, Gear Housing, Wall Brackets, and Stem Guide Brackets

Cast iron, ASTM A126, Class B

Wedges and Wedge Blocks

Bronze, ASTM B584, Alloy C862

Lift Nut and Stem Block

Bronze, ASTM B584, Alloy C865

Seating Faces

Bronze, ASTM B21, Alloy C48200

Stems and Stem Couplings

Stainless steel, ASTM A276, Type 304

Fasteners

Stainless steel, ASTM F593/F594, Alloy Group 1

Flush-Bottom Seal

Neoprene, ASTM D2000

Flush-Bottom Retainer

Stainless Steel, ASTM A276, Type 304

Slide

The gate slide shall be cast iron and shall be of one-piece construction. The slide shall be square or rectangular in shape with integrally cast vertical and horizontal reinforcing ribs. A heavy reinforcing rib along each side shall be provided to ensure rigidity between side wedges. The slide shall be designed to operate under maximum specified unbalanced head with the minimum safety factor of five. Guide tongues along each side of the slide shall be machined all over. A nut pocket shall be cast on the vertical centerline of the gate and shall be provided with a threaded block for attaching the stem to the slide. Pads for side wedges and top and bottom wedges, when required, shall be integrally cast on the slide and machined to receive the adjustable wedges.

Frame and Guides

The gate frame and guides shall be cast iron and shall be a one-piece integral casting. Guide grooves shall be machined on all contact faces. Overall clearances with slide tongue shall be not more than 1/8 in. Faces for mounting of wedging devices shall be fully machined. Guide grooves shall be of such length as to support at least one-half of the slide when it is in the full open position. Frames shall be self-contained (S/C) or not self-contained (NS/C) as listed in the "Gate Schedule." Frames with a spigot-back arrangement are not allowed. Round opening gates shall have a circular flange cast as part of the frame for mounting to a wall or pipe flange. All wall thimble-mounted gates shall have a square or rectangular flanged-back frame. The frame shall be fully machined and drilled to match the wall thimble. Gates mounted on pipe flanges shall be furnished with partial drilling per manufacturer's recommendations.

Yokes

Yokes of self-contained gates shall be cast iron or structural steel. They shall be designed to withstand the thrust of the manual lift when a 40 pound pull is placed on the handwheel or crank with a safety factor of 5 based on the ultimate strength of the material used. The yokes shall be bolted to machined pads on the gate frame.

Seating Faces

Corrosion-resistant seating faces shall be mounted around the perimeter of the slide and frame. They shall be impacted into dovetail slots and held in position without use of screws or other fasteners. After mounting, they shall be machined to a plane with a 63 micro-inch finish or better. When the slide is in the fully closed position and wedged in position against the frame, maximum clearance between seating faces shall not exceed 0.004 in.

Wedges

Each gate shall be provided with a sufficient number of wedges to provide a practical degree of water-tightness. Side wedging devices shall be designed to make full metal-to-metal contact with the overhung portion of the frame-mounted wedge block. Wedges shall be fully adjustable and keyed to prevent any lateral rotation. Side wedges shall be machined with angled faces and secured with a stud bolt to prevent any slippage during operation of the gate. Gate shall be designed with adjustable top and bottom wedges attached to the frame and slide. The top and bottom wedges shall be mounted in a machined slot and bolted to the slide to prevent lateral rotation. All contact faces of wedges and wedge blocks shall be precision-finished with 63 micro-inch finish or better.

Flush-Bottom Seal

Flush-bottom gates shall be provided with a frame-mounted flush-bottom seal. The solid bulb resilient rubber seal shall be firmly held in place using stainless steel retainers and corrosion-resistant fasteners. The full length of the bottom edge of the slide shall be machined for making uniform contact with the seal when it is mounted on the frame. The differential pressure on the rubber seal shall be variable by adjustment of wedges on the gate.

Wall Thimble

Wall thimble shall be a heavy, one-piece iron casting of an E, F or mechanical joint type configuration. A center ring or water stop shall be cast around the periphery of the thimble. The front face of the thimble shall be machined and holes drilled and tapped for attaching the gate with corrosion-resistant metal studs. The vertical

centerline shall be clearly marked at top and bottom to permit alignment of the front face in the vertical plane. Wall thimbles shall be internally braced during concrete placement to prevent warping. Square thimbles shall be provided with holes in the invert to allow satisfactory concrete placement beneath the thimble. Holes shall be on centers of 24 inches or less. A rubber gasket of uniform thickness or a mastic shall be used to form a seal between the front face of the thimble and the back of the gate frame. E-type or mechanical joint wall thimbles shall have the back flange drilled and machined as shown in the plans or specified in the "Gate Schedule."

Stem and Stem Splices

Stems shall be manufactured from stainless steel sized to withstand the axial compressive and tensile forces created during gate operation under the specified unbalanced heads and to transmit in compression at least two times the rated output of the lift with a 40-lb effort on the crank or handwheel, or 1.25 times the stall thrust of the electric actuator. Threading on stems shall be rolled with double-lead threads of the Acme type. Cut threads will not be allowed. The contact surfaces of the threads shall have a maximum 16 micro-inch finish. Stem couplings shall have internal threads for transmitting the full thrust of the stem and shall be held in place on the stem with a key, simultaneously engaging the coupling and both stems.

Stem Guides

Stem guides shall be fully adjustable, heavy duty castings, with 2 piece cast bronze removable collars. The stem guides shall be properly spaced to support the stem as a long column, with maximum spacing not to exceed an l/r of 200.

Lifts

Manual Lifts – The lifts shall be of the handwheel or enclosed gear type. Gears shall be steel with machine-cut teeth designed for smooth operation. The gearing and lift nut shall be mounted in a cast iron housing which, in turn, shall be supported by a cast iron or structural steel pedestal to place the input shaft approximately 36 in. above the floor. Lubrication fittings shall be provided in the gear housing to permit lubrication of all gears and bearings. A maximum effort of 40 lbs shall be required to operate the gate after it is unseated from its wedging devices. All rising stem gates shall be supplied with a clear plastic stem cover. Geared lifts shall be suitable for manual and portable motor operation. Lift nuts shall be high-strength bronze. Oil bath lubrication shall not be allowed.

Stem Covers – Rising stem gates shall be provided with clear plastic stem covers that will not discolor, crack or become opaque for at least 5 years after installation. The covers shall be capped, vented, and long enough to allow full travel of the gate.

Electric Powered Lifts – Motor operator shall be a 460-V, 3-phase, 60-Hz motor with precision reduction gearing enclosed in a weatherproof housing. The operator shall be designed to raise the gate at a rate of approximately 12 in./min. Integral controls shall include a control power transformer, reversing controller, torque and limit switches required for controls and remote indication, space heater to prevent condensation, open-stop-close push-buttons, and gate position indicator. Where applicable, the controls shall also include a local-off-remote selector switch. Motor reduction helical gear and pinion shall be of heat-treated alloy steel. Final reduction worm shall be of alloy steel and worm gear of machined high-tensile-strength bronze. All gearing shall be proportioned for 100% overload condition. Operator shall have a declutch lever and handwheel for manual operation.

Fasteners

All anchor bolts, studs, assembly bolts, cap screws, nuts, and adjusting screws shall be of ample section size to withstand the force created by operation of the gate under full heads of water specified and shall be stainless steel.

Installation

All parts shall be installed and adjusted by the contractor in a workmanlike manner. The manufacturer shall furnish necessary drawings and detailed installation, operation and maintenance instructions for all components. It shall be the contractor's responsibility to handle, store, and install all parts and adjust switches and controls in accordance with the manufacturer's detailed written recommendations. Stem threads shall be lubricated prior to operation of the gate.

Cleaning and Coating

Cleaning and coating shall be performed at the manufacturer's plant. Rust, mill scale, dirt and grease shall be removed by commercial blast cleaning (SSPC SP-10) method. Paint shall be manufacturer's standard or in accordance with paint specifications in the paint section.

Leakage

After installation and before the gates are put into operation, a leakage test shall be performed on all slide gates in accordance with AWWA C560. Excess leakage shall be reduced to this maximum by adjusting the gate and its wedges.