

SLUICE GATES – CAST IRON

SUGGESTED SPECIFICATIONS

GENERAL

Cast iron sluice gates where shown in the plans and specifications and listed in the sluice gate schedule shall be as manufactured by Coldwell-Wilcox Technologies, LLC of Cincinnati, Ohio. Gates shall be cast iron, ductile iron, 2% nickel or NiResist, self-contained or conventional rising or non-rising stem type with surface mounted guide frames as called out by the specifications and site drawings. Cast iron is most common material of choice.

Equipment provided shall be cast, fabricated, machined, assembled and placed in proper operating condition per the drawings, specifications, engineering data, instructions and recommendations of the gate manufacturer unless otherwise noted by the engineer. Gates and operators shall be supplied with all parts and accessories as specified within the site specifications, drawings and as required for a complete installation.

GOVERNING STANDARDS

Except as modified or supplemented herein, all gates and operators shall conform to the applicable AWWA standards.

MANUFACTURER'S QUALIFICATIONS

Sluice gates shall be the latest standard product in regular production by a manufacturer whose products have proven reliable in similar service. A single manufacturer shall supply sluice gates.

MATERIALS

All materials will comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

- Frame, Leaf (Disc), Side Guides, Wall Thimbles, ASTM A126 Class B Cast Iron, Ductile Cast Iron, ASTM A536, Class B, Cast Iron ASTM A126 Class B with 2% Nickel, NiResist ASTM A436 Type 1 (15% Nickel) or NiResist ASTM A436 Type 2 (22% Nickel)
- Stem ASTM A276 Type 304(L) or 316(L) Stainless Steel
- Wedges ASTM B584 CA873 Bronze
- Seat ASTM B98 CA 655 Bronze
- Flushbottom Seal ASTM D2000 50-60 Durometer Neoprene
- Flushbottom Retainer ASTM A276 Type 304(L) or 316(L) Stainless Steel
- Thrust Nut ASTM B584 CA954 Bronze

- Stop Collars ASTM B584 CA954 Bronze or
ASTM A276 Type 304 or 316 Stainless Steel
- Stem Coupling ASTM B584 CA954 Bronze or
ASTM A276 Type 304 or 316 Stainless Steel
- Fasteners ASTM A276 Type 304 or 316 Stainless Steel
- Stem Guide Bearing ASTM B584 CA932/CA864 Bronze or UHMW
- Stem Guide Bracket Ductile Iron,
304(L) or 316(L) Stainless Steel or
A36 Steel
- Floorstands
Wall Brackets ASTM A126 Class B Cast Iron or A36 Steel
- Stem Cover Butyrate, Clear
- Handwheel ASTM A-126, Class B Cast Iron
- Handcrank A36 Steel
- Yoke A36 Steel

SUBMITTALS

Manufacturer's data and drawings shall be submitted for approval in accordance with site specifications and engineering drawings. Manufacturer's submittal shall include but not limited to gate material specification sheet, gate data summary sheet, calculation sheets, site plan drawings and paint/coating data sheets. Calculation sheets shall contain operator forces, tensile and buckling strength of stem, structural strength calculations and other calculations to verify that the design meets the specification requirements.

PERFORMANCE

Gates shall be designed and shop tested to the applicable AWWA governing standard. Design and operating heads shall be per the site schedule and/or specifications.

SLUICE GATES

Sluice gates shall be cast iron, fully bronze mounted and will have side wedges, top wedges and flushbottom seal or bottom wedges. Sluice Gates less than 24" wide shall have side wedges only. Flushbottom type seal shall have a neoprene seal flush across the invert and standard bottom shall have bronze seat face and wedges. CWT standard is flushbottom seal type with bronze seat and wedges optional.. All gate components will be designed to safely withstand the heads listed in the sluice gate schedule.

DISC OR SLIDE

Disc shall be cast iron, one-piece construction, with integrally cast vertical and horizontal ribs. The disc will have machined dovetailed grooves on the seating face into which bronze facings shall be

driven and machined to a 63 micro-inch finish. A tongue on each side extending the full length of the disc shall be machined on all sides with a 1/16 inch clearance maintained between the disc tongue and the gate guide groove. Wedge pads for side, top and bottom wedges, when required, will be cast integrally on the disc and machined to receive the adjustable bronze wedges. A heavily reinforced nut pocket shall be cast integrally on the vertical centerline and above the horizontal center and be such shape as to receive the square or rectangular bronze thrust nut with stem attached.

FRAME

Gate frame and guides shall be cast in one piece and shall be flat back (flange back) as designated in the gate schedule. The back of the frame shall be machined to a plane.

Guides shall be cast as an integral part of the frame or bolted and pinned to the frame and shall be sufficiently long to retain at least one-half of the vertical height of the disc when in the fully opened position. Guides shall be capable of safely withstanding the full thrust due to water pressure and wedging action. Guide grooves shall be accurately machined to provide free movement of the disc tongues and to insure proper engagement of the wedging devices.

WEDGES

Wedges shall be solid cast bronze and keyed to the cast iron pads to maintain adjustment by preventing undesirable rotation or lateral motion. They will be attached to the disc with 304 or 316 stainless steel studs, nuts, washers and adjusting screws with locking nuts. Silicon bronze studs, nuts and adjusting screws with locking nuts shall be used when specified.

SEAT FACINGS

All seat facings shall be malleable extruded bronze of a composition, which will resist dezincification and will increase in wearing ability with cold working. The extruded seat facings will be a special shape to fill and permanently lock in the machined dovetail grooves when impacted into place. Attaching pins and screws shall not be allowed. The installed seat facings shall be machined to a 63 micro-inch finish or better.

FLUSHBOTTOM SEAL

Gates so designated in the gate schedule shall be provided with a flush bottom seal. All gate parts shall be identical to those defined in other paragraphs of this specification except for the bottom of the slide and the seal assembly along the invert of the waterway opening. The flush bottom closure creates a smooth invert which does not impede flow. A heavy resilient neoprene strip flush across the invert width is epoxyed in a stainless steel retainer. The 3/4" minimum bottom thickness of the gate leaf (disc) effectively seals the invert when compressed against the 50-60 durometer neoprene flush bottom seal. The neoprene flushbottom seal replaces the standard bottom seat facings and wedging devices.

Top surface of the seal shall be flush with the invert of the gate opening. Full length of disc bottom edge shall be accurately machined to make contact with the seal when the disc is closed. The seal shall be replaceable without removal of gate disc.

WALL THIMBLE

Wall thimbles will be furnished as required by specification. Wall thimbles shall be of section "F", "E" or "MJ" (mechanical joint) and depth as indicated on the plans and listed in the gate schedule.

They will be cast iron, ductile, 2% nickel or NiResist one-piece construction, of adequate section to withstand all operational and reasonable installation stresses. Wall thimbles will be internally braced during concrete placement. A center ring or water stop will be cast around the periphery of the thimble. The front flange will be machined and have tapped holes for the sluice gate attaching studs and metal stamped vertical centerlines with the word "TOP" for correct alignment.

Large wall thimbles will be provided with holes in the invert to allow satisfactory concrete placement beneath the thimble.

STEM

Operating stem shall be of Type 304(L) or 316(L) stainless steel minimum 1-1/4 inches diameter and attached to the disc by bronze thrust nut and cast in place disc pocket. Stem shall be designed to transmit in compression at least 2-1/2 times the rated output of the operating mechanism with a 40-pound maximum effort on the crank or hand wheel.

Stems shall have a slenderness ration (L/R) of 200 or less. The threaded portion of the stem shall have machine cut 1/4" pitch by 1/4" lead left hand threads of the Acme type unless otherwise specified. Stainless steel or manganese bronze couplings threaded and keyed, or bored and pinned to the stems shall join stems of more than one section. All threaded and keyed couplings of the same size shall be interchangeable. Stems shall be provided with adjustable stop collars to prevent over travel on manually operated gates.

STEM GUIDES

Stem guides shall be bronze or UHMW bushed Ductile iron, 304/316 stainless steel or A36 steel. They shall be adjustable in two directions and will be spaced at sufficient intervals to adequately support the stem. Stem guide spacing shall not exceed 10 feet.

SELF-CONTAINED SLUICE GATES

Self-contained sluice gate shall have the standard extended side guides to allow the gate to fully open. A heavily designed "U" shape structural steel yoke shall be attached to the machined pads a top the side guides. A mounting plate shall be bolted to the yoke horizontal cross supports for manual or electric actuator mounting.

ADDITIONAL OPTIONAL SEALS (UNSEATING SIDE ONLY)

Neoprene "J" or "P" seal can be bolted to the cast frame for additional sealing capabilities on the unseating side. Hardware shall be Type 304 or 316 stainless steel. Bronze hardware is optional.

MANUAL OR ELECTRIC OPERATED GATES

HANDWHEEL (HORIZONTAL MOUNTED) TYPE: A hand wheel operator shall be provided with a 1:1 ratio. An acme threaded manganese bronze lift nut shall be provided to engage the operating stem. Anti-friction bearings shall be provided to properly support both opening and closing thrusts. The hand wheel shall operate the gate under the specified operating heads with not greater than a 40 pound rim pull approximately 36 inches above the operating floor. All components shall be totally enclosed in a cast iron weatherproof housing. Hand wheel operator shall be bench stand (yoke) mounted or floor stand mounted with or without a cast iron or fabricated A36 steel wall bracket.

HANDCRANK OR VERTICAL HANDWHEEL GEARBOX MOUNTED TYPE: A hand- crank or handwheel operated gearbox shall be provided with a gear ratio as needed to ensure 40 pounds or less rim pull at the handcrank or handwheel under the specified operating heads approximately 36 inches above the operating floor. An acme threaded manganese bronze lift nut shall be provided to engage the operating stem. Anti-friction bearings shall be provided to properly support both opening and closing thrusts. All components shall be totally enclosed in a cast iron weatherproof housing. Gearbox shall be bench stand (yoke) mounted or floor stand mounted with or without a cast iron or A36 steel fabricated wall bracket.

TEE WRENCH TYPE: A tee wrench operated 2" square nut stem mounted with a 1:1 ratio or a 2" square nut gearbox mounted with a gear ratio as needed to ensure 40 pounds or less rim pull at the tee wrench under the specified operating heads. A manganese bronze lift nut shall be provided to engage the operating non-rising stem. Anti-friction bearings shall be provided to properly support both opening and closing thrusts. All components shall be totally enclosed in a cast iron weatherproof housing. Tee wrench operator shall be bench stand mounted (yoke), floor box mounted or cast iron/A36 steel fabricated wall bracket mounted.

ELECTRIC ACTUATOR TYPE: Electric actuators shall be sized for the required breakout torque and average operating torque including a 1.33 minimum safety factor. Electric actuators shall be bench stand (yoke) or pedestal mounted. Actuators can be either open/close or modulating service and shall be designed for twelve inches (12") per minute disc travel (48 RPM actuator speed). Disc travel may vary from nine (9) to fifteen (15) inches per minute depending on design requirements. Electric motor actuator shall include, but not limited to, the motor, gearing unit, limit switches, torque switches, manganese bronze stem nut, declutch lever, compartment heater and hand wheel for manual operation at 40 pounds or less rim pull. As a minimum, the motor actuator shall be Nema 4 (weathertight) construction. Coldwell-Wilcox Technologies furnishes electric actuators manufactured by EIM, Limatorque, Auma, Rotork or equal.

A clear butyrate stem cover with closed, open, 1/4, 1/2 and 3/4 position indicator decals shall be supplied for each rising stem.

PAINTING

Steel components such as the cast frame, disc, hand wheel and operator bearing housing shall receive manufacturer's standard TNEMEC epoxy series N140-1255 pota-pox beige and TNEMEC series 69 pond 28BL finish prior to shipment. Total system shall be 12-16 mils DFT.

Tnemec coal tar epoxy series 46H-413 or Tnemec potable epoxy series N140 pota pox are available, as specifications require. Coal tar epoxy total system shall be 20-26 mils DFT. Tnemec potable epoxy total system shall be 12-16 mils DFT.

SHOP TESTING

Each gate shall be fully assembled and shop-inspected in the vertical position for proper seating. The disc shall be fully opened and closed in its guide system to ensure that it operates freely and seals per the AWWA standard.

INSTALLATION

Installation shall be in complete accordance with manufacturer's instructions and recommendations. Anchor bolts will be set in accordance with approved manufacturer's drawings.

START-UP AND TEST

Contractor shall make adjustments required to place system in proper operating condition. Contractor shall conduct functional field test of each slide gate in the presence of the Owner's Project Representative to demonstrate that each part and all components together function correctly.