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1.0 GENERAL

1.1 REFERENCES

- .1 Provide heavy duty slide gates in accordance with the following standards (latest revision) except where specified otherwise.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM A36/A36M Specification for Carbon Structural Steel.
 - .2 ASTM A123/A123M Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A126 Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - .4 ASTM A276 Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
 - .5 ASTM A582/A582M Specification for Free-Machining Stainless Steel Bars
 - .6 ASTM B21/B21M Specification for Naval Brass Rod, Bar and Shapes.
 - .7 ASTM B584 Specification for Copper Alloy Sand Castings for General Applications.
 - .8 ASTM F593 Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - .9 ASTM F594 Specification for Stainless Steel Nuts.
- .3 American Water Works Association (AWWA)
 - .1 AWWA C560 Cast-Iron Sluice Gates.
 - .2 AWWA C561 Stainless Steel Sluice Gates.
 - .3 AWWA C540 Power-Actuating Devices for Valves and Sluice Gates.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 31-GP-3 Corrosion Preventive Compound, Cold Application, Hard Film.
 - .2 CAN/CGSB-1.181 Ready-Mixed Organic Zinc-Rich Coating.
- .5 Canadian Standards Association (CSA)
 - .1 CSA-G40.21 Structural Quality Steel.
 - .2 CAN/CSA-G164 Hot-Dip Galvanizing of Irregularly Shaped Articles.

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- .6 Structural Steel Painting Council (SSPC)
 - .1 SSPC-SP10 Near White Metal Blast Cleaning.

1.2 SUBMITTALS

- .1 Provide the following submittals.
- .2 Shop drawings and product data at least 30 days prior to fabrication of the products. Indicate on the shop drawings dimensions and elevations; materials including specifications; details required to fabricate, locate, and install the slide gates, including all related fittings and embedded parts; and coatings including specifications.
- .3 Manufacturer's written instructions for unloading, handling, storing, and installing gates and for repairing damaged coatings prior to performing the work.
- .4 A manufacturer's certificate prior to commencing the testing of the slide gates certifying that the installation of the gates and lifts have been performed according to its recommendations.
- .5 Manufacturer's supplied documentation for operation and maintenance.

1.3 QUALITY CONTROL

- .1 Provide the services of the slide gate and lift manufacturer's representative to supervise the installation, testing, and commissioning.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Inspect each shipment and timely replace any damaged materials.
- .2 Unload, handle, and store materials in accordance with the manufacturer's written instructions. Do not damage the gates, lifts, or shop-applied coating. Do not store slide gate components in direct contact with the ground.
- .3 Store lifts in original crates and packaging until installation.

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2.0 PRODUCTS

2.1 MATERIALS

- .1 Provide materials in accordance with the following.
- .2 Heavy duty slide gates:
 - .1 Heavy duty slide gates with rising gate stems in accordance with AWWA [C560] [C561] and having components fabricated from the following materials:

Component	Material	Specification
[Frame and slide	Cast iron	ASTM A126, Class B
Seating face	Naval bronze	ASTM B21/B21M, Alloy 482
Stems	Stainless steel	ASTM A276 Type 304 ASTM A582, Type 303
Wedges	Manganese bronze	ASTM B584, Alloy 865
Stem Block	Manganese bronze	ASTM B584, Alloy 865
Fasteners: • studs and anchors • bolts • nuts and washers	• Stainless steel • Stainless steel • Stainless steel	• ASTM A276 Type 304 or ASTM A582 Type 303 • ASTM A320, F593 • ASTM AF594
Stop nut	Bronze	ASTM A584 Alloy 865
Lift nut	Bronze	ASTM A584 Alloy C865
Adjustable stem guides with stem collar and bronze bushing, and wall brackets	Cast iron	ASTM A126, Class B
Lift pedestal	Galvanized steel	CSA-G40.21, CAN/CSA-G164 ASTM A36, A123]

- .2 Gate stems: Minimum diameter of [] mm. Stem guides spaced to limit the slenderness ratio (l/r) of the stem to less than 200.
- .3 Stem covers: Galvanized steel or aluminum covers fitted with clear, acrylic window with measuring scales in metric and imperial graduations.
- .4 Wall thimbles: [300 mm long] Type [F or E] cast-iron thimbles in accordance with ASTM A126, Class B.
- .5 Hardware: Screws, bolts, and nuts with threads in accordance with the American National Standards Institute (ANSI) Unified Standard.
- .6 Bottom seal: [Standard] [Flush] bottom configuration.

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.3 Manual Lifts:

- .1 Geared operators enclosed in a weatherproof cast iron housing equipped with lubrication fittings and mechanical seals, stop nut, lift nut, crank, lift pedestal, and stem cover.
- .2 Operator designed to permit gate operation with a maximum pull force of [111 N] [177 N]. Incorporate an output shaft that permits gate operation using a portable drive unit.

.4 Electric Lifts:

- .1 Electric lifts include actuators complete with electrical controls, gearboxes, stop nuts, lift nuts, lift pedestals, stem covers, and steel plate vandal guards and safety locking chains.
- .2 All metal gearing. Gear ratios and motor speeds set to provide a gate travel speed of 300 mm/min, and to provide at least 15 minutes of continuous operation.
- .3 Design to operate under ambient temperatures in the range of [-30°C and +70°C], and relative humidity in the range of [40% to 100%].
- .4 Design electrical components to operate under a [230V, 3 phase, 60 hz] power supply.
- .5 Design controls to be compatible with and to permit future connection with control systems located in the control building and for remote operation as specified in the Contract Documents.
- .6 Actuators:
 - .1 Controls integral with actuator including reversing starter, control transformer, and local controls, suitably housed to prevent breathing and condensation build up.
 - .2 Single stage worm gear totally enclosed in an oil-filled gear case, fitted with fill and drain plugs, suitable for operation at any angle. Gearcase can be opened for inspection or disassembled without releasing the stem thrust or taking the gate out of service.
 - .3 Circuitry that turns the motor in the correct direction irrespective of the supply polarity connected to the power terminal.
 - .4 Electronic torque sensing circuitry that utilizes a sense winding in the motor stator to measure torque via solid-state circuitry with temperature compensation.
 - .5 Instantaneous reversal protection whereby an automatic time delay circuit limits the current surges when the actuator is signalled to instantaneously reverse its direction.
 - .6 Anti-hammer protection whereby electronic torque limitation switches off the actuator when a preset load is reached due to an obstruction or end of travel.

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- .7 Bi-metal thermostat embodied in the motor or transformer windings to prevent overheating due to excessive use.
- .8 Jammed motor protection whereby a logic circuit protects the motor from overheating by de-energizing the motor if the gate does not move after developing maximum torque.
- .9 [4] [7] contacts which can be used to indicate any position of the gate, with each contact selectable as normally open or normally closed. Alternatively, any of the contacts can be used to signal one of the following:
 - Gate opening or closing
 - Gate moving (continuous or pulsing)
 - Motor tripped on torque in mid-travel
 - Motor stalled
 - Actuator being operated manually
 - []
- .10 Local digital position indicator with an LCD back-lit display from fully open to fully closed in 1% increments.
- .11 Magnetic pulse counter to accurately measure and control the stroke of the actuator without using geared switches.
- .12 Infra-red system that allows non-intrusive on-Site commissioning and reconfiguring without having to remove the covers. Position setting range that is adjustable from 0.5 to 100,000 turns with resolution to 15° of actuator output.
- .13 Interrupter timer circuit to allow Site adjustment of operating speed. Timer that is configurable in the range of 1 second to 99 seconds.
- .14 Actuator capable of producing at least 1.5 times the required operating torque as specified in AWWA C540, Class 150B.
- .15 Actuator with [O-ring seal, watertight to CSA 4, 4X and submersible to IP68]. Inner watertight and dustproof O-ring between the terminal compartment and the internal electrical elements.
- .16 Provision for electrical or mechanical disconnection of the motor without having to drain the lubricant from the actuator gearcase.
- .17 Thrust base that is lubricated for life and is detachable to allow actuator removal without disturbing the gate position.
- .18 Handwheel that is mechanically independent of the motor drive for emergency operation. Shaft extension to permit gate operation with a portable drill unit.

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.5 Current Position Transmitters

- .1 Internally fed 4-20 mA analog output signal proportional to gate position, selectable for a minimum signal corresponding to the fully closed position with automatic zero and span setting.
- .2 Do not use potentiometers to derive gate position for indication output or internal feedback circuits.

2.2 SHOP FABRICATION OF GATES

.1 Shop fabricate gates in accordance with the following

.2 Gate frame and guides:

- .1 One piece cast gate frame, guide, and flange back.
- .2 Back of frame machined and drilled to match thimble.
- .3 Guides at least 1.5 times the vertical height of the gate.

.3 Gate slide:

- .1 One piece cast slide with horizontal and vertical ribs, pads for attaching wedging devices, a stem block pocket, and a reinforced section around the perimeter for mounting the seating faces.
- .2 Pads machined and drilled for mounting of wedging devices, with a groove cut in each pad to receive the mounting tongue wedge.

.4 Seating faces:

- .1 Dovetail slot machined securely mounted around the waterway opening of the frame, full height of the guides, and perimeter of the slide.
- .2 Dovetail seating faces in position without using screws or other fasteners.
- .3 Machined seating faces such that with the slide fully closed and wedged in the frame, the clearance between seating faces is limited to a maximum of 102 microns.

.5 Wedging devices:

- .1 Sufficient number, designed to wedge the seating faces of the slide against those on the frame and keep the leakage rate below allowable limits.
- .2 Adjustable with positive means of locking.
- .3 Comprised of individual parts that can be removed and replaced without complete disassembly of the gate or guide.

.6 Gate stem blocks:

- .1 Stem block fully drilled and threaded to attach the slide to the stem, and equipped with a positive means of locking it to the stem.

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- .7 Flush bottom seals:
 - .1 Solid, square-cornered, resilient rubber seals that extend beyond the bottom edges of the slide, and can be replaced without removal of the slide. Make the top surface of the seal flush with the invert of the gate opening.
 - .2 Bottom edge of the slide machined to provide even contact with the seal. Securely fasten the seal to the bottom cross member of the frame using a stop plate with retainer bar.

2.3 SHOP APPLIED COATINGS

- .1 Provide shop applied coatings in accordance with the following.
- .2 Machine finished surfaces: Corrosion preventive compound conforming to CAN/CGSB 31-GP-3.
- .3 Exposed cast-iron surfaces except for the gear operator housing, prepared, primed, and painted as follows:
 - .1 Surface preparation: [Near white metal in accordance with SSPC-SP10].
 - .2 Coating: [3 coats, Amerlock 400 high-solids epoxy paint as manufactured by PPG Protective & Marine Coating. Dry film thickness of 150 to 200 µm per coat. Colour: black.]
- .4 Galvanizing: Minimum zinc coating of 610 g/m².
- .5 Manual gear operator housing: 2 finish coats of blue machine exterior enamel paint.
- .6 Actuator: []

3.0 EXECUTION

3.1 INSTALLATION AND ASSEMBLY OF SLIDE GATES

- .1 Assemble and install the slide gate components in accordance with the manufacturer's written instructions, at the locations, of the sizes, and at the elevations specified. Provide the services of the manufacturer's representative to supervise the installation, testing, and commissioning of the slide gates.
- .2 Locate and install the wall thimbles and gate frames including anchor bolts in their correct orientation, alignment, and plumb position.
- .3 Rigidly support the gate thimble, anchor bolts, and other parts so that they are not displaced during concrete placement.
- .4 Place a bead of mastic between the gate frame and the wall thimble to provide a watertight joint.
- .5 Accurately align the stem and operator with the gate, and install in a plumb position.

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- .6 After installation, clean, lubricate, and otherwise service the slide gate components in accordance with the manufacturer's written instructions.

3.2 INSTALLATION OF THE ELECTRICAL LIFTS

- .1 Install the electrical lift components in accordance with the manufacturer's written instructions, at the locations specified. Provide the services of the manufacturer's representative to supervise the installation, setting, adjusting, testing, and commissioning of the lifts.
- .2 Configure all actuator controls, settings, indicators, and displays as required, and provide a fully operational installation.

3.3 START-UP AND TESTING

- .1 The Minister will inspect start-up of the gates only after the Contractor has advised the Minister, in writing, that the installations are operable.
- .2 Dry test each slide gate by raising and lowering it with the lift at least 3 cycles throughout its full range of operation after each change or adjustment. Make any required changes or adjustments until the operation of the slide gates, lifts, and all appurtenant components are satisfactory to the Minister.
- .3 Dry test each slide gate by raising and lowering it at least 1 cycle throughout its full range of operation using a portable drill unit. Make any required changes or adjustments until the operation of the slide gates, lifts, and all appurtenant components are satisfactory to the Minister.
- .4 Wet test each gate by []. Measure actual leakage and compare with the allowable leakage limits defined in AWWA C501. Adjust gates as required until the actual leakage rate is below the allowable limits.

3.4 REPAIR OF DAMAGED COATINGS

- .1 Prepare damaged paint surfaces and re-coat with paint in accordance with the paint manufacturer's written instructions.
- .2 Repair damaged galvanized surfaces with a zinc-rich paint that is in accordance with CAN/CGSB-1.181.
- .3 Power tool clean galvanized surfaces to be repaired to a bright metal surface. Apply multiple coats of zinc-rich paint in accordance with the manufacturer's written instructions to obtain a minimum dry film thickness of 50 microns or greater where required by the paint manufacturer.

END OF SECTION