# SECTION 35 20 16.25

# FABRICATED SLIDE GATES AND STOP LOGS

## PART 1 GENERAL

### 1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. American Society for Testing and Materials (ASTM):
      a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
      b. A193, Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
      c. A240, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
      d. A276, Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
   2. American Water Works Association (AWWA):
      a. C513, Open Channel, Fabricated Metal Gates and Open Channel Fabricated Metal Gates.
      b. C540, Power-Actuating Devices for Valves and Slide Gates.
   1. 2010 National Building Code of Canada, with 2011 Manitoba Amendments (NBC).

### 1.2 DEFINITIONS

A. Submersible: The ability to exclude water when submerged under a 6 meter head of fresh water for 24 hours and still maintain electrical integrity.

B. Slenderness Ratio: The ratio of the maximum unsupported stem length to the stem cross-section radius of gyration.

C. Self-Contained: The arrangement of the gate operator, supported by the gate frame, such that operating thrust loads are not applied external to the assembly.

### 1.3 SUBMITTALS

A. Shop Drawings:
   1. Make, model, weight, and horsepower of each equipment assembly.
   2. Manufacturer’s catalog information, descriptive literature, specifications, identification of materials of construction, and cross-sectional details of gate operator and gate.
   3. Detailed structural, and mechanical, drawings showing the equipment fabrications and interface with other items. Include dimensions, size, and

locations of connections to other work, and weights of associated equipment associated therewith.

4. Calculations: Gate operator and stem calculations for each gate and service condition. Gate opening and closing thrust forces that will be transmitted to the support structure with operator at extreme positions and load.
5. Performance Test Procedures.

B. Information Submittals:
1. Manufacturer's Certificate of Compliance.
2. Special shipping, storage and protection, and handling instructions.
3. Manufacturer's written/printed installation instructions.
4. Routine maintenance requirements prior to plant startup.
5. Manufacturer's Certificate of Proper Installation in accordance with Section 01 43 33, Manufacturers' Field Services.
6. Operation and maintenance manual.
7. Service records for maintenance performed during construction.
8. Submit written certification from professional engineer licensed in the Province of Manitoba stating that support systems, anchorage, and equipment have been designed according to requirements of the NBC for post-disaster structures at time of shop drawing submittals.

## 1.4 EXTRA MATERIALS

A. Furnish, tag, and box for shipment and storage the following spare parts and special tools:

| Item | | Quantity |
|---|---|---|
| Stem collars for all gate stems | | One of each different size |
| Bronze lift nuts | | One of each different size |
| Special tools required to maintain or dismantle | | One complete set |

B. Delivery: In accordance with Section 01 61 00, Common Product Requirements.

# PART 2 PRODUCTS

## 2.1 SUPPLEMENTS

A. See supplements to this section for additional product information.

## 2.2 MATERIALS

A. Stainless Steel:
1. Plate, Sheet, and Strip: ASTM A240, Type 316L
2. Bars and Shapes: ASTM A276, Type 316L

## 2.3 PERFORMANCE REQUIREMENTS

A. Leakage shall not exceed 1.24 liter per minute per meter of gate periphery under either seating or unseating head conditions. No leakage is allowed between the gate face and the face of concrete surface.

B. Design equipment, anchorage, and support systems for vertical and lateral loading in accordance with NBC.

## 2.4 SLIDE GATES

A. Rising stem type, with assembly styles designated as follows:
   1. Style A: Upward acting type for wall surface mounting on the concrete structures.
   2. Style B: Upward acting type for mounting in channels with concrete embedded frame and invert.
   3. Style C: Downward acting weir gate type with P-type invert seal for wall surface mounting on the concrete structures.
   4. Style D: Downward acting weir gate type with invert "P" seal for embedded side frame mounting in concrete structures.

B. Guide Frames:
   1. 316L stainless steel
   2. Vertical Guides: Design for maximum rigidity, and extend in one continuous piece from the gate invert to form posts for support of gate operators of self-contained gates. When guides extended above the operating floor, they shall be sufficiently strong so that no further reinforcements are required.
      a. Thickness: 6mm minimum.
      b. Incorporate a replaceable UHMW polyethylene bearing strip in a retainer slot on the downstream side (unseating head side) of the gate.
   3. Frame Invert: For flush bottom gate, furnish a neoprene insert to function as a seating surface for the gate disc.
      a. Thickness: 6mm minimum.
      b. Join vertical guide frames and invert with factory welded corners.
   4. Size guided slot to provide a minimum disc engagement of 25 mm on each side.

C. Disc:
   1. Disc Plate (Sliding Member): One-piece 316L stainless steel with minimum thickness of 6mm. Reinforce as required so that the disc will not deflect more than 1/360 of the gate span, when the upstream liquid depth (seating head side) is as shown on the schedule and the downstream liquid depth is less than 13 mm.
   2. Reinforce gate disc with one-piece 316L stainless steel angles or channels welded to the disc plate. Bolted reinforcements will not be permitted.
   3. Where required on the Drawings, furnish V-notch or rectangular weir cutouts in the disc plate. Cutout dimensions and location to match details shown on the Drawings.

D. Operator Support Yoke:
1. For self-contained gate operators, attached to the vertical extensions of the guide frames.
2. Constructed from at least two 316L stainless steel angles, or two other suitable shapes, and bolt in place to provide a rigid assembly.
3. Maximum Deflection: Not to exceed 6 mm under full operator applied loading.

E. Stems:
1. 25 mm minimum diameter, ASTM A276, Type 316 stainless steel.
2. Threads: Acme type with RMS surface roughness of 160 micron or less on the flanks for manually operated gates and 81 micron or less on the flanks for electrically operated gates. Extend threaded portion of stem 50 mm above operator when gate is in CLOSED position.
3. Ratio of the unsupported stem length to the radius of gyration, both in inches, shall not exceed 200.
4. Stems to withstand in compression, without damage, the thrust equal to at least 2-1/2 times the rated output of the hoisting mechanism, with an 18 kilogram effort applied to the handwheel or crank.
5. Equip operating stems with cast iron, bushed stem guides, mounted on cast iron brackets; adjustable in two directions and spaced so that the L/r ratio does not exceed 200
6. Adjustable stop collar for the CLOSED position.
7. Connect the stems to the disc plate with a yoke, bolted to the stem and welded to the disc.
8. Slide gates having a width greater than twice the height or width greater than 2.1 meters shall have dual stems. For downward opening weir type gates, locate stems near outside edges of gate.

F. Stem Covers:
1. Transparent plastic, vented pipe stem cover and cap.
2. Provide with OPEN/CLOSED designators with 25 mm graduations on clear mylar pressure sensitive, adhesive tape, suitable for outdoor application.

G. Manufacturers:
1. Aquanox
2. Orbinox
3. Dynamic
4. Rodney Hunt
5. Waterman
6. Hydro Gate

H. No "or-equal" or substitute products will be considered.

## 2.5 GATE OPERATORS

A. Dual-Stem Gate Operators:
1. Enclosed, geared floor or bench stands.

2. Interconnect so operators will work as a unit from single point with crank lever or interconnecting electric operator.
3. Interconnecting Shafts:
   a. Stainless steel with flexible couplings at ends.
   b. Diameter sufficient to prevent sagging.
   c. Include flanged coupling to allow precision weir leveling.

B. Type 1, Handwheel-Operated Bench Stands:
1. Sealed, ball thrust, roller or needle bearing type and equipped with bronze lift nut, internally threaded with Acme threads.
2. Furnish mechanical seals at housing penetrations.
3. Handwheel and Baseplate: Cast iron or cast aluminum.
4. Manual Crank Effort: Not to exceed 18 kilograms.

C. Type 2, Crank-Operated Bench Stands:
1. Weatherproof housings, mounted on cast aluminum or cast iron base to the top horizontal member of the slide gate frame as described under paragraph Operator Support Yoke.
2. Solid Bronze Lift Nut: Integrally threaded with Acme threads.
3. Ball Thrust or Tapered Roller Bearings:
   a. Locate above and below operating nut flange to support opening and closing thrusts.
   b. Include grease lubrication fittings and input pinions.
4. Manual Crank Effort: Not to exceed 18 kilograms.

D. Type 3, Geared Floor Stands:
1. Crank-operated, with weatherproof housings with solid bronze lift nut.
2. Mount on high strength cast iron pedestal or base.
3. Maximum manual crank effort to operate gate shall not exceed 18 kilograms.
4. Lift Nut: Internally threaded with Acme threads.
5. Gears to be bevel style. Orient to suit location of gate.

E. Identification Tagging Requirements:
1. For each gate operator, 38 mm minimum diameter heavy brass tag, bearing the gate tag number shown in the schedule.
2. Attach the tags to the operator by soldered split key rings to that ring and tag cannot be removed. Use block type numbers and letters with 6 mm minimum high numbers and letters stamped on and filled with black enamel.
3. Portable Electric Drill Gate Operators

## 2.6 ALUMINUM STOP LOGS

A. Aluminum logs:
1. 300 mm high horizontal sections suitable for vertical stacking.
2. Interchangeable, so they can operate in any order of placement.
3. Designed for channel size and differential head shown on the schedule.
4. Minimum 6mm thick.

B. Assembly:
1. Aluminum log sections with stiffeners and lifting bolts.
2. 6 mm minimum thickness 316L stainless steel guides for wall surface mounting; logs to slide smoothly in the vertical guides.
3. 6 mm minimum thickness 316L stainless steel bottom anchor plate for embedded mounting; logs to stop on the bottom plate and sealed with resilient seal.
4. 316L stainless steel Lifting device with latch to engage and disengage logs, suitable for attaching to an overhead hoist, crane, or cable. Weld lifting brackets to stop logs.
5. Edges of Log Sections: Parallel to each other, with sides at right angles to the bottom.

C. Seals:
1. Resilient seal along the bottom and sides of each log to form watertight seal.
2. Seal strips for stop log guides to ensure leakage rate in accordance with AWWA C501.

## 2.7 APPURTENANCES

A. Lifting Lugs: Furnish suitably attached for equipment assemblies and components weighing over 45 kilograms.

B. Anchor Bolts: ASTM A193, Type 316 stainless steel sized by equipment manufacturer and at least 13 mm in diameter, or as shown, and as specified in Section 05 50 00, Metal Fabrications.

C. Staff Gauges: For stainless steel, downward acting weir gates. Graduated in 6 mm and marked every 50 mm and meter.

D. Manufacturer and Products:
1. H. Fontaine Ltd.
2. Stevens Water Monitoring Equipment; Force Main Enameled Style C.
3. Hydro Gate.

# PART 3 EXECUTION

## 3.1 INSTALLATION

A. In accordance with the manufacturer’s written instructions.

B. Disassemble factory assembled gate components before installation.

C. Field mount operators after installing gates.

D. Accurately place anchor bolts using templates furnished by the manufacturer and as specified in Section 05 50 00, Metal Fabrications.

E. Lubricate stems before operating.

3.2 FIELD QUALITY CONTROL

A. Functional Tests: Conduct on each slide gate.

B. Performance Test:
1. Conduct on each slide gate.
2. Perform under actual or approved simulated operating conditions.
3. Test for a continuous 3-hour period without malfunction.
4. Adjust, realign, or modify units and retest if necessary.

3.3 SUPPLEMENTS

A. Slide Gate Schedule.

B. Stop Log Schedule.

END OF SECTION

# SEWPCC UPGRADING/EXPANSION PROJECT

## Slide Gate Schedule

| Location / Description | Tag Number | P&ID Number | Assembly Style [Note 1] | Rising or Non-rising Stem | Open Frame or Self-contained | Size of Wall Opening / Gate W x H or Ø (mm) | Opening / Channel Invert Elevation (m) | Operating Floor Elevation (m) | Design Seating / Unseating Heads (m) | Operator Type [Note 2] | NEMA Rating | Voltage/ Phase | Rated Power (kW) | Service [Note 3] | Control Style [Note 4] | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |
| **AREA S - SECONDARY CLARIFIERS** | | | | | | | | | | | | | | | | |
| Clarifier 4 SE Outlet | SG-S140A | 1-0102-PPID-S107 | B | Rising | Self-contained | 1500 x 2340 | 229.089 | 233.180 | 4.2 / 4.2 | 2 | - | - | - | - | - | Mounting: face side of side walls with top seal wall mounted. Provide a stainless steel bird screen around the gate frame exposed to outside |
| Clarifier 5 SE Outlet | SG-S150A | 1-0102-PPID-S107 | B | Rising | Self-contained | 1230 x 2340 | 229.089 | 233.180 | 4.2 / 4.2 | 2 | - | - | - | - | - | Mounting: face side of side walls with top seal wall mounted. Provide a stainless steel bird screen around the gate frame exposed to outside |

**Notes:**

1. Assembly Style:
   A = Upward opening type for surface mounting on concrete wall (with top seal where indicated in Remarks column)
   B = Upward opening type for channel mounting with concrete-embedded frame and flush bottom
   C = Upward opening type for channel mounting with surface-mounted frame
   D = Downward opening weir type for surface mounting on concrete wall (with top seal where indicated in Remarks column)
2. Operator Type (see specification for details):
   1 = Handwheel-operated bench stand
   2 = Crank-operated bench stand
   3 = Crank-operated floor stand
   4 = Electric motor operator
3. Service (see specification for details):
   O/C = Open-Close
   M = Modulating
4. Control Style (see specification for details):
   1 = OPEN/STOP/CLOSE pushbuttons, OPEN and CLOSED limit switches
   2 = OPEN/STOP/CLOSE pushbuttons, OPEN and CLOSED limit switches, LOCAL/REMOTE selector switch
   3 = OPEN/STOP/CLOSE pushbuttons, OPEN and CLOSED limit switches, 4-20 mA position output, LOCAL/REMOTE selector switch

# SEWPCC UPGRADING/EXPANSION PROJECT

## Stop Log Schedule

| Location / Description | Tag Number | P&ID Number | Frame Mounting Style [Note 1] | Channel/ Frame Width (mm) | Channel Invert Elevation (m) | Top of Channel Elevation (m) | Design Seating Head (m) | Number of Frames Required | Number of Stop Logs Required [Note 2, 3] | Stop Log Material | Number of Lifting Devices Required |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **AREA S - SECONDARY CLARIFIERS** | | | | | | | | | | | |
| Clarifier 4 SE Outlet | SL-R140A | 1-0102-PPID-S107 | B | 1500 | 229.089 | 233.180 | 4.2 | 1 | 1 set | Aluminum | - |
| Clarifier 5 SE Outlet | SL-R140B | 1-0102-PPID-S107 | B | 1230 | 229.089 | 233.180 | 4.2 | 1 | 1 set | Aluminum | - |

**Notes:**

1. Frame Mounting Style:
   A = Surface mounted on concrete wall
   B = Channel mounted with concrete-embedded frame and flush bottom
   C = Channel mounted with surface-mounted frame
2. Provide sufficient number of stop logs for full height of channel from channel invert to top of channel elevations indicated.
3. Height of stop logs shall be determined by manufacturer such that the weight of each individual log does not exceed 45 kg.
4. Manufacturer to confirm dimensions with Contractor prior to fabrication.