

## SECTION 35 20 16.25

FABRICATED SLIDE GATES  
04/08

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM A 193/A 193M	(2009) Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High Pressure Service and other Special Purpose Application Service
ASTM A 240/A 240M	(2008) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM A 276	(2008) Standard Specification for Stainless Steel Bars and Shapes

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

**SD-02 Shop Drawings****Detail Drawings**

Make, model, weight of each equipment.

Descriptive literature, specifications and identification of materials of construction. Show the equipment fabrications and interface with other items. Include dimensions, size, and locations to other work, and weights of associated equipment associated therewith.

**Gate operator and stem 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.

SD-08 Manufacturer's Instructions

instructions

Special shipping, storage and protection, and handling instructions

Manufacturer's written/printed installation instructions

1.3 DEFINITIONS

a. Submersible: The ability to exclude water when submerged under a 20 foot 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 gate operator, supported by gate frame, such that operating thrust loads are not applied external to the assembly.

1.4 EXTRA MATERIALS

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

PART 2 PRODUCTS

2.1 MATERIALS

Detail Drawings shall call out all component materials.

a. Stainless Steel:

1. Plate, Sheet, and Strip: ASTM A 240/A 240M, Type 316L.

2. Bars and Shapes: ASTM A 276, Type 316L.

2.2 PERFORMANCE REQUIREMENTS

Leakage shall not exceed 0.1 gallon per minute per foot of gate periphery under either seating or unseating head conditions.

2.3 SLIDE GATES

2.3.1 Rising Stem Type

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.

#### 2.3.2 Guide Frames

1. 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. Weight: Not less than 9 pounds per linear foot for stainless steel.
  - 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. Weight: Not less than 9 pounds per linear foot for stainless steel.
4. Join vertical guide frames and invert with factory welded corners.
5. Size guided slot to provide a minimum disc engagement of 1 inch on each side.

#### 2.3.3 Disc

1. Disc Plate (Sliding Member): One-piece stainless steelplate. 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 1/2 inch.
2. Reinforce gate disc with one-piece stainless steel angles or channels welded to the disc plate. Bolted reinforcements will not be permitted.

#### 2.3.4 Operator Support Yoke

1. For self-contained gate operators, attached to the vertical extensions of the guide frames.
2. Constructed from at least two aluminum or stainless steel angles, or two other suitable shapes, and bolt in place to provide a rigid assembly.
3. Maximum Deflection: Not to exceed 1/4 inch under full operator

applied loading.

#### 2.3.5 Stems

1. 1 inch minimum diameter, ASTM A276, Type 316 stainless steel.
2. Threads: Acme type with RMS surface roughness of 63 microinches or less on the flanks for manually operated gates and 32 microinches or less on the flanks for electrically operated gates. Extend threaded portion of stem 2 inches 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 a 40 pound 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.

#### 2.3.6 Stem Covers

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

#### 2.3.7 Gate Operator

Gate operator and stem calculations shall be performed for each gate.

#### 2.3.8 Manufacturers

1. Aluminum:
  - a. Hydro Gate Corp.
  - b. Rodney Hunt Co.
  - c. Whipps, Inc.
  - d. H. Fontaine, Ltd.
  - e. Or equal.
2. Stainless Steel:
  - a. Whipps, Inc.
  - b. Hydro Gate Corp.

- c. Rodney Hunt Co.
- d. H. Fontaine, Ltd.
- e. Or equal.

## 2.4 GATE OPERATORS

### 2.4.1 General

1. Components: Withstand a minimum of 250 percent of design torque or thrust at extreme operator positions without damage.
2. Mount at walkway level, 36 inches above floor, unless otherwise indicated.
3. Gear train and gate stem sections shall produce a self-locking drive train.
4. Lift Nuts: Internally threaded with cut or cold-rolled Acme threads corresponding to stem threading.
5. Roller Bearings: Ball-thrust or tapered above and below lift nut to support both opening and closing thrusts.
  - a. Grease lubrication fittings for bearings.
  - b. Input pinions with needle or ball bearings.
6. Lubrication: Furnish rising stem gates with an insert lubricator flange in lift, with grease fitting for greasing stem threads below stem nut.

### 2.4.2 Type 1, Handwheel-Operated Bench Stands

1. Direct drive.
2. Sealed, ball thrust, roller or needle bearing type and equipped with bronze lift nut, internally threaded with Acme threads.
3. Furnish mechanical seals at housing penetrations.
4. Handwheel and Baseplate: Cast iron or cast aluminum.
5. Manual Effort: Not to exceed 40 pounds.

### 2.4.3 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 40 pounds.

#### 2.4.4 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 40 pounds.

4. Lift Nut: Internally threaded with Acme threads.

5. Furnish ball thrust or tapered roller bearings above and below the lift nut to support both opening and closing thrusts.

a. Grease lubrication fittings for bearings.

b. Input pinions with needle or ball bearings.

c. Mechanical seals at housing penetrations.

#### 2.4.5 Identification Tagging Requirements

1. For each gate operator, 1 1/2 inch 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 1/4 inch minimum high numbers and letters stamped on and filled with black enamel.

#### 2.5 APPURTENANCES

1. Lifting Lugs: Furnish suitably attached for equipment assemblies and components weighing over 100 pounds.

2. Anchor Bolts: ASTM A 193/A 193M, Type 316 stainless steel sized by equipment manufacturer at least 1/2 inch in diameter, or as shown.

3. Provide manufacturer's instructions, including Special shipping, storage and protection, and handling instructions

### PART 3 EXECUTION

#### 3.1 INSTALLATION

a. In accordance with the Manufacturer's written/printed installation instructions.

b. Disassemble factory assembled gate components before installation.

c. Field mount operators after installing gates.

d. Brace thimbles internally during concrete placement.

e. Accurately place anchor bolts using templates furnished by the manufacturer and as specified in Section 05 50 13, MISCELLANEOUS METAL FABRICATIONS.

f. Lubricate stems before operating.

3.2 FIELD QUALITY CONTROL

1. Functional Tests: Conduct on each slide gate.

2. Performance Test:

a. Conduct on each slide gate.

b. Perform under actual or approved simulated operating conditions.

c. Test for a continuous 3 hour period without malfunction.

d. Adjust, realign, or modify units and retest if necessary.

3.3 MANUFACTURER'S SERVICES

Provide manufacturer's representative at Site for installation assistance, inspection and certification of proper installation, equipment testing, startup assistance, and training of Owner's personnel for specified component, subsystem, equipment, or system.

3.4 SLIDE GATE SCHEDULE

	<u>Clearwell Inlet Drainage Gate</u>	<u>Clearwell Pump Station Drainage Gate</u>
Assembly Style	A	A
Wall Opening (width/height Inches)	6x6	24x24
Gate Heigh (inches)	6	24
Material	316SS	316SS
Design Opertating Head (feet) Seating/Unseating Condition	15	15
Operator Type/ Control Style	Type 1	Type 2

-- End of Section --