

SPECIFICATIONS - DETAILED PROVISIONS
Section 11294 - Stainless Steel Sluice Gates

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SECTION 11294
STAINLESS STEEL SLUICE GATES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Stainless steel fabricated sluice gates.
- B. Related Sections:
 - 1. Section 13446 - Valve and Gate Operators.

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI/AWS D1.1 - Structural Welding Code.
- B. American Society of Mechanical Engineers (ASME):
 - 1. Section IX - Boiler and Pressure Vessel Code - Welding and Brazing qualifications.
- C. American Society for Testing and Materials (ASTM):
 - 1. A 276 - Specification for stainless and heat resisting bars and shapes.
 - 2. B 584 - Specifications for copper alloy sand castings for general application.
 - 3. D 1248 - Specification for polyurethane plastics, molding and extrusion materials.
 - 4. D 2000 - Classification for rubber products in automotive applications.
- D. American Water Works Association, AWWA C 501, Cast-Iron Sluice Gates.
- E. American Welding Society (AWS).

1.03 DEFINITIONS

- A. Slenderness Ratio: The largest ratio obtained by dividing the unsupported length of the stem by the radius of gyration of the stem cross section.

1.04 DESIGN REQUIREMENTS

A. Gate Components:

1. Frames: Design for minimum safety factor of 5 with regard to tensile, compressive, and shear strength.
2. Stem: select stem diameter, stem guide quantity and stem guide spacing based on following criteria:
 - a) Slenderness Ratio (l/r): Not exceeding 200.
 - b) Tensile Strength: Suitable to withstand the force generated by the operator with the application of a 200 pound force applied to the crank or handwheel or a 250 foot-pound torque applied to the wrench nut.
 - c) Compressive Strength: Suitable to withstand buckling due to the force generated by the operator with the application of an 80 pound force applied to the crank or handwheel or a 100 foot-pound torque applied to the wrench nut. Determine buckling load using Euler Column formula defined in AWWA C 501.
 - d) Design Force for Power Actuators:
 - (i) Hydraulic Cylinder Operators: 1.25 times the output thrust at maximum hydraulic fluid operating pressure.
 - (ii) Electric Motor Operators: 1.25 times the output thrust in the stalled-motor condition.
 - e) Gates Having Widths Greater than 2 Times the Height: Provide with 2 lifting mechanisms connected by a tandem shaft.
3. Thrust Nut: Suitable to withstand thrust developed by operator with the application of a 40 pound force on the crank or handwheel with safety factor of 5. Base design on ultimate strength of material used.
4. Yokes for Self-contained Gates:
 - a) Design yoke using design loading criteria for stem.
 - b) Maximum Deflection at Design Load: Not to exceed 1/360th of the span.

5. Slide:
 - a) Deflection shall be less than or equal to 1/1000 of the span of the gate when under the design head.

1.05 SUBMITTALS

- A. Layout and installation drawings for each gate size and type.
- B. Gate Operators: Conform to Section 13446 .
- C. Wall thimbles.
- D. Manufacturer's installation instructions.
- E. Design Calculations: Submit calculations and design data substantiating conformance with the Drawings and Specifications.

1.06 QUALITY ASSURANCE

- A. Factory Markings:
 1. Mark gates according to the schedule numbers when such numbers are used.
 2. Where thimbles, frames and other components are not interchangeable, the components shall be match marked.
- B. Manufacturer Qualifications:
 1. Experience in production of substantially similar equipment during the 5 years prior to issuance of this contract, and able to submit evidence of satisfactory operation in at least 5 different installations.
 2. Manufacturer's shop welds, welding procedures, and welders: Qualified and certified in accordance with the requirements of ANSI/AWS D1.1, or ASME Boiler and Pressure Vessel Code Section IX.
 3. Assembled Gates: Shop inspected and adjusted before shipping.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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- A. Manufacturers: One of the following or equal:
 - 1. Waterman Industries, Sentinal, Ill.
 - 2. Rodney Hunt Company, Series 600.
- B. Operator Anchor Bolts and Wall Thimbles: Provided by manufacturer of sluice gates.
- C. All Gates in Sections 11294B: Supplied by one manufacturer.

2.02 MATERIALS

- A. Stainless steel, ASTM A 276, Type 316L.
- B. Ultra high molecular weight polyethylene, ASTM D 1248.
- C. Neoprene, ASTM D 2000, Grade 2 BC 510.
- D. Manganese bronze, ASTM B 584, UNS Number C86500.
- E. Silicon bronze, ASTM B 584 UNS Number C87300.

2.03 COMPONENTS

- A. Slide:
 - 1. Type 316L stainless steel.
 - 2. Rectangular or square.
 - 3. Fabricated with a flat plate reinforced with formed plates or structural members.
- B. Frame:
 - 1. Construct gate frame of Type 304L stainless steel structural members or formed plate welded to form a rigid one-piece frame.
 - 2. Flange back design to allow mounting without a box-out into the concrete opening.
 - 3. Adjustable ultra high molecular weight polyethylene pressure pads.
 - 4. Flush bottom type.

5. Allow replacement of top, side, and bottom seals without removing the gate frame from concrete or wall thimble.
 6. Machine surfaces matching with thimble.
- C. Guides and Seals:
1. Guides: Type 316L stainless steel with ultra high molecular weight polyethylene insert in contact with gate.
 - a) Minimum face width of 1 inch.
 2. Side and Top Seals:
 - a) Ultra high molecular weight polyethylene seals held in place in the guide with stainless steel fasteners, or;
 - b) Neoprene crown seal with ultra high molecular weight polyethylene bearing bars held in place in the guide with stainless steel fasteners. Primary contact with the slide shall be through the ultra high molecular weight polyethylene bearing bar. The neoprene shall not be solely relied upon for the contact seal. The seal may be maintained by ultra high molecular weight polyethylene adjustable pressure pads.
 - c) Bottom Seal: Resilient neoprene attached to the bottom member of the frame or slide to form a flush bottom.
 - d) J-bulb seals shall not be acceptable.
 - e) Field replaceable without removing gate from concrete or wall thimble.
 - f) Seals in Contact with Slide: Minimum face width of 1 inch.
- D. Stem:
1. Type 316 stainless steel.
 2. Machine cut of rolled threads.
 3. Stem Couplings:
 - a) Silicon bronze.

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- b) Threaded and keyed to stem or threaded and bolted to stem.
- 4. Stem Guides:
 - a) Type 316 stainless steel.
 - b) Split collar.
 - c) Adjustable in 2 directions.
 - d) Ultra high molecular weight polyethylene bushing.
- 5. Provide manganese bronze stop collar on stem above actuator.
- 6. Drill and connect stem to slide structural sections with Type 316 stainless steel bolts.
- E. Operating Nut:
 - 1. Locate at operator level.
 - 2. Manganese bronze.
- F. Gate Operators: Conform to Section 13446.
- G. Bolts, Nuts, and Fittings: 316 stainless steel.
- H. Anchor Bolts:
 - 1. Type 316 stainless steel.

2.04 WALL THIMBLES

- A. F-section of a depth equal to the thickness of the structure wall upon which the gate is mounted.
 - 1. Modify F-sections where required for F-section and pipe bell ring connections in a wall.
 - a) Provide flange-by-mechanical joint wall thimble where ductile iron piping connects to the wall thimble.
 - b) Provide flange-by-bell joint where spigot connects to the wall thimble.

- c) Provide flange-by-bell ring wall thimble insert where reinforced concrete piping connects to the wall thimble.
- B. Fabricated Type 316L stainless steel of sufficient section to resist permanent distortion.
- C. Width of Mounting Flange of Wall Thimble: 1/2 inch wider than mounting flange of gate.
- D. Fully machine front flange to a plane, and drill and tap to match the drilling on the flange back gate seat.
- E. Clearly mark top center of each thimble for installation.
- F. Provide stainless steel studs for attaching the gate frame.
- G. Seal joint between thimble and gate watertight, in accordance with AWWA C 501.
- H. To permit entrapped air to escape as the thimble is being cast in concrete, drill holes in each entrapment zone formed by ribs, flanges, and water stops.

2.05 METAL FINISH

- A. Sand blast gate and wall thimble after fabrication to remove weld splatter and to polish scratches. Clean the entire surface to produce an even color and sheen.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Conform to manufacturer's installation instructions.
- B. Mount thimbles and gates plumb in both vertical planes and level in horizontal plane.
- C. Provide Factory-trained Personnel to:
 - 1. Check the complete installation.
 - 2. Make necessary adjustments.
 - 3. Conduct field testing.

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- D. Coat seating surfaces between frame and wall thimble with a waterproof plastic compound prior to tightening of frame studs.
- E. Adjust wedges or other parts of the gate to the point where it will not be possible to insert a 0.004 inch feeler gauge between the gate slide and the gate frame at any point. Securely lock wedges into position after adjustment.

3.02 FIELD QUALITY CONTROL

- A. Testing:
 - 1. Leakage Tests: Conduct in accordance with AWWA C 501. Comply with allowable leakage limits set forth in AWWA C 501 for cast-iron gates.
 - 2. After the gate installation and checking, run gates through at least 2 full cycles from the closed position to full open position and back to the closed position.
 - 3. Provide certificate of proper installation. Comply with Section 01756.

3.03 SCHEDULE

- A. The Sluice Gate Schedule is not a gate take-off list.

SLUICE GATE SCHEDULE

MARK NO.	DWG. NO.	OPNG. SIZE W * H (IN. X IN.)	TYPE OF CLOSURE	DESIGN SEATING HEAD (FT. H20)	DESIGN UNSEATING HEAD (FT. H20)	WALL THIMBLE	TYPE OF FRAME	MIN. STEM. DIA. (IN.)	TYPE OF OPERATOR	OPERATOR MOUNTING	COMMENTS
1.					SPECIFY FOR EACH PROJECT						
2.											
3.											
4.											
5.											

Abbreviations

FB	=	Flush Bottom	W	=	Width	H	=	Height
STD	=	Standard	FS	=	Floor Stand	TYP	=	Typical Detail
NSC	=	Non Self-Contained	BS	=	Bench Stand	IN	=	Inches
SC	=	Self-Contained	CD	=	Crank Operator with Nut for Portable Operator	FT	=	FT

Comments:

- (1) Circular Opening
- (2) Refer to Typical Detail P717
- (3) Refer to Typical Detail P718
- (4) Crank operator shall be located towards north side of gate
- (5) Crank operator shall be located towards east side of gate
- (6) Crank operator shall be located towards west side of gate

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