Rodney Hunt

A ZURN Company

Bonneted Gates

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Gates

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- Precise Flow Control High Heads (to 500')
- Proven Performance
- One Source: Design, Build, Actuate
- Long Life, Low Maintenance

Bonneted Gates

Bonneted Slide Gates are normally used for regulating flow through the outlet works of dams. They are essentially a completely enclosed slide gate that is manufactured and designed to be embedded (except for the actuator) in concrete. The Bonneted Slide Gate is similar to a large rectangular, or square, gate valve.

Design Features

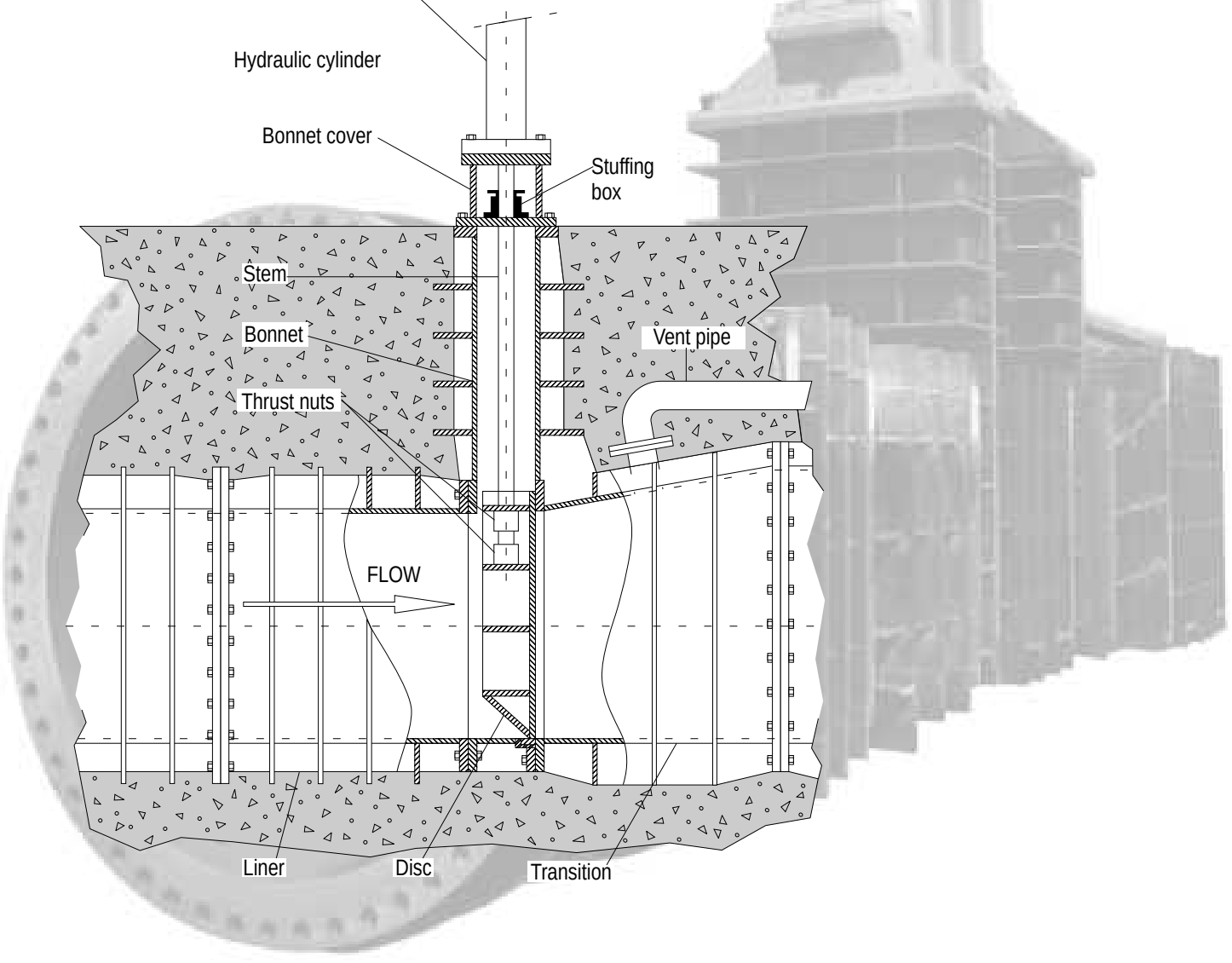
Bonneted Slide Gates consist of: a vertically sliding disc or gate, upstream and downstream frame sections, a bonnet, a bonnet cover, upstream and downstream transition sections, one or more conduit liner sections, and an actuator. Quite often the gates are used in tandem with the normal operating gate downstream, and the emergency closure gate upstream.

There are bronze or stainless steel mating seats on the disc and frame, and a special type of flush-bottom closure arrangement is also furnished.

The size of the gate depends upon the head under which the gate will operate. Normally, the bonneted gate is not larger than 10' x 10'. Rodney Hunt Bonneted Gates have been successfully used at heads up to 500'.

Operation

Bonneted Gates can be operated manually, electrically, or hydraulically.



High Pressure Bonneted Slide Gate Specifications

1. GENERAL

This specification relates to the design, manufacture and supply of the high pressure bonneted slide gate system.

The system shall include the gate disc, frame, seats, transition and liner sections, bonnet, bonnet cover, rod stuffing box and scraper, air vent manifold, gate position indication, transportation to the site, drawings, installation procedures, operating and maintenance manuals, and all other necessary appurtenances to provide a complete operating system. The system will be as manufactured by Rodney Hunt Company or approved equal.

Manufacturers shall have a minimum of 1 0 years experience in the design and manufacture of equipment of this type. Manufacturer shall submit as a minimum a list of 10 projects with bonneted gate installations. The list shall include project name, contact, telephone number, years of service, size and method of operation.

2. DESCRIPTION

The gate shall have a clear waterway opening of____inches by____inches. The gate equipment shall be arranged as shown on the con tract drawings.

3. OPERATING and LOADING CONDITIONS

1. The gate shall be designed for a normal static head of___feet, plus a surge resulting from water hammer equivalent of___feet head.
2. The gate hoisting system shall have sufficient thrust capacity to open the gate against a static head of___feet and to close the gate against a static head of___feet and when the flow through the full gate opening is___cfs. The hoist sizing computations shall conservatively consider: the weight of the disc, rod, and piston; the friction of the gate seats and rod stuffing box; and the hydrodynamic down-pull forces during operation. An allowance of 20% shall be added to the sum of the above.
3. The conduit liner and transition pieces shall be designed to resist the forces of handling, concrete placement, and hydrostatic head equivalent of___feet of water.
4. The gate structure and leaf shall be designed to withstand in an overloading condition the combined forces of a normal water level and a seismic acceleration of ___g (depending on seismic zone of location). The effects of increased pressure head shall be considered in the seismic computations.
5. The gate structure shall be designed to with stand a flood condition equivalent to___feet of head.

4. DESIGN COMPUTATIONS

Design criteria for each component shall be submitted to the Engineer for approval prior to product computation and drawing submittal. These criteria shall be established and verified from previously designed and manufactured gates by that manufacturer.

Design computations shall be performed in sufficient detail to verify that all of the above criteria are complied with. The design computations shall be made part of the submittal data. Acceptance of the design criteria and computations shall not relieve the manufacturer of the responsibility for the adequacy of the design.

5. GATE COMPONENTS

A. Gate Disc The gate disc shall be constructed of structural steel plate and shall be horizontally and vertically reinforced to resist the specified loading conditions. The bottom edge of the disc shall have a bullnose contour of a proven shape. The surface of the bullnose shall have a stainless steel weld overlay and finished to provide a minimum 250 micro-inch finish. A pocket shall be provided on the downstream side of the disc to contain the operating rod thrust nut. The thrust nut shall be attached to the operating rod in a manner to allow adjustment during installation. A seal shall be provided where the operating rod penetrates the top of the disc. Surfaces of the disc in sliding contact with the frame shall be of corrosion resistant materials. The disc fabrication shall be thermally stress relieved after completion of all welding and prior to machining.

B. Seat Facing

Seat facing materials shall be selected in accordance with the design section. Bronze seat facings shall be cast or extruded, leaded, low zinc bronze. Stainless steel seat facings shall be ASTM Type 344.

The top horizontal seat facings shall be radiused to facilitate engagement.

The contact surfaces of the seat facings shall have a surface finish smoother than 63 micro-inch rms. After installation onto the disc and frame, the seats shall be machined to a true plane, to obtain the tolerances specified under the assembly and testing section.

C. Gate Frame and Bonnet

The guide slot shall be of a design to minimize cavitation. All sliding surfaces contacting the disc shall be of corrosion resistant materials. A bronze bar shall be provided at the inert to contact the disc bottom. Frame and bonnet halves shall be flanged, bolted, pinned and gasketed in the manufacturer's shop.

D. Transitions and Conduit Liner Sections

A straight section of conduit liner shall be provided immediately upstream of the gate disc. The straight section shall have a minimum length of one gate width. The maximum inward or outward slope allowed in transition sections shall be 1:10.

Transition and liner sections shall be designed to minimize weld distortions so that the straightness criteria of the shop testing section can be obtained.

Fluidway surfaces shall have a roughness smoother than 250 micro-inch rms. Gates for operating heads in excess of 200 feet shall have the fluidway surface of stainless steel.

Grout holes shall be provided to fill the voids in the pockets on the underside of the gate assembly. The grout holes shall be threaded for pipe plugs. After grouting is complete the heads of the plugs are to be ground flush and painted.

The joint between sections shall be flanged and bolted. The flanges shall be machined to be flat, perpendicular to the fluidway, and parallel to their opposite ends. Flange bolting patterns shall be concentric. The flanges shall have the centerlines scribed and the word "TOP" stamped. A suitable gasket must be provided at each flanged joint.

E. Bonnet Cover

The bonnet cover shall be attached to the top of the gate bonnet with stainless steel studs and tapped holes in the bonnet flange. Dowel pins shall be provided to assure alignment. An 0-ring type seal shall be provided in a groove in the top of the bonnet.

The stuffing box and gland shall be cast bronze. The stuffing box shall have "V" shaped chevron packings. The packing gland shall be adjusted from the top. A rod scraper shall be provided on the underside of the bonnet cover.

F. Air Vent Piping

It shall be the responsibility of the gate manufacturer to determine the necessity of air vent piping and to determine the size, location and shape of the air vent piping system. The air vent piping shall be steel.

6. MATERIALS

The gate manufacturer shall be responsible for the selection of materials except as otherwise noted. Materials shall be used that have provided satisfactory service in past installations.

7. SHOP ASSEMBLY and TESTING

Each gate shall be assembled in the shop complete with all transitions and conduit liners, bonnets, bonnet covers, and stuffing boxes. Flange bolts shall be snug but not torqued. The stuffing box gland shall be left loose without compressing the packing. The following checks shall be made and discrepancies rectified:

1. The liner, transition and frame sections shall be checked for mismatch offsets.
2. A 3 ft. straight edge shall be used to check the waviness of the fluidway parallel to the direction of flow. The contact of the disc bottom to the frame shall be checked by the same criteria.
3. The gate shall be stroked through several operating cycles to assure smooth, non-binding operation.
4. An operation test of the hydraulic and electrical control system shall be made to demonstrate proper functioning of the system including the functioning and sequencing of all control and alarm devices.
5. The hydraulic cylinders shall be hydrostatically tested in the cylinder manufacturer's shop at a pressure of 150% of the hydraulic power unit design pressure.

8. PAINTING

The gate disc and all exposed steel surfaces shall be blasted to SSPC SP-10.

Hoisting Equipment

Prime: One (1) coat of Amerlock 400 at 5.0 mils thick
Finish: One (1) coat of Amercoat 450HS, color gray _

Immersed Equipment

Prime: One (1) coat of Amerlock 400 at 5.0 mils thick
Finish: One (1) coat of Amerlock 400 at 5.0 mils thick

9. WELDING

All welding will be done in accordance with AWS D1.1.