BONNETED GATES

SERIES: A-915 / 935

Application

Bonneted gates are normally used for regulating flow in dam outlet works or for drawdown. It is a completely enclosed slide gate that is designed and manufactured to be embedded in concrete up to bonnet cover.

A bonneted gate consists of a vertically sliding disc, upstream and downstream frame sections, a bonnet, bonnet cover, upstream and downstream transition sections, one or more conduit liner sections, and an actuator.

Rodney Hunt offers size range 48" x 48" up to 144" x 144" square or rectangular with the head range as per the project requirement and up to 500 feet head.

SERIES: A-915 Stainless Steel Bonneted Gates
A-935 Structural Steel Bonneted Gates

Construction

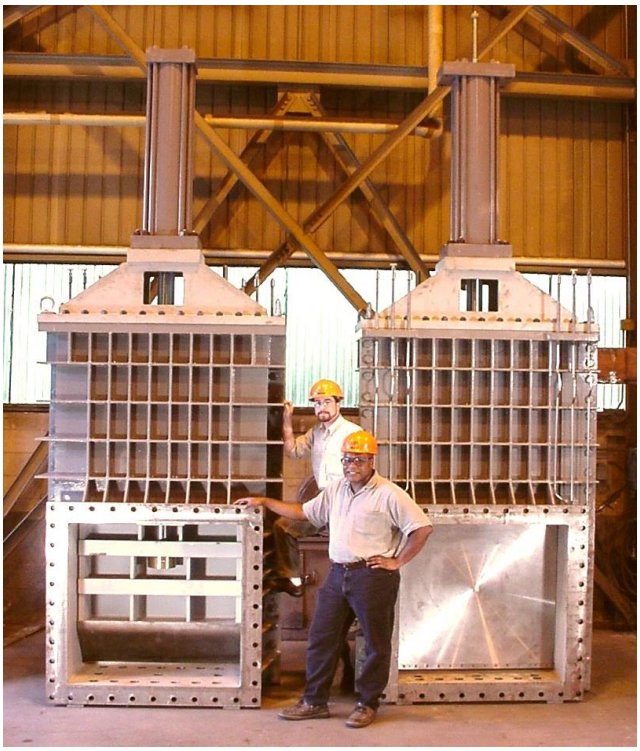
The main structural components of bonneted gates are slide, body, and bonnet. The slide or leaf of a bonneted gate slides on the seating surfaces provided on the frame consisting of bodies with closed bonnets.

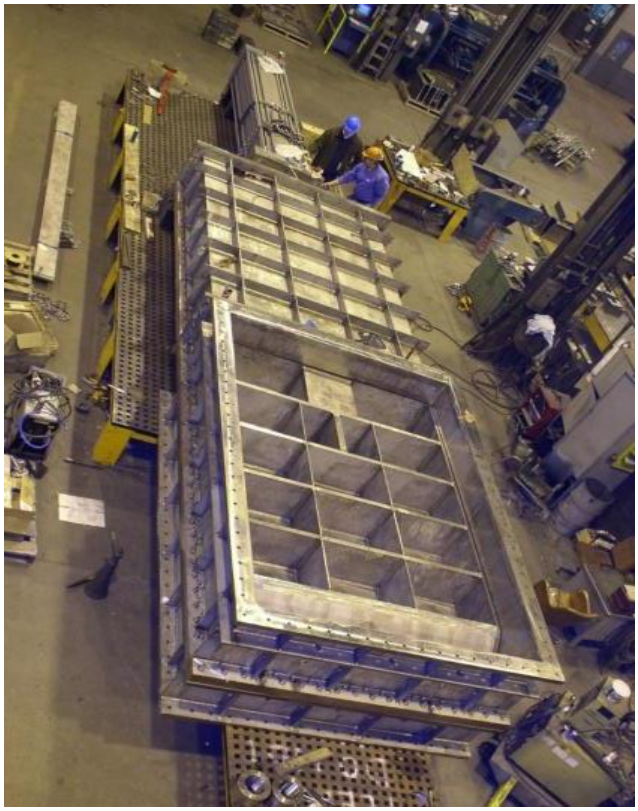
The upstream and downstream sections, the body, and the bonnet are generally embedded in concrete. The bonnet is sealed with the bonnet cover and a stuffing box through which the operating stem passes. The hoisting mechanism may be supported directly over the bonnet cover or a separate set of girders at a higher level.

The gate leaf is a rigid welded structure consisting of a skin plate reinforced by stiffeners or girders.

The body which houses the slide/gate leaf in a closed position may be in sub-assemblies with joints. The body may be cast steel, welded structural steel, or welded stainless steel.

The bonnet houses the gate leaf in the open position. It bolts to the body and the bonnet cover. The bonnet may either be of cast steel or structural steel in welded construction. It is ribbed to provide proper anchorage with surrounding concrete and withstand the hydrostatic pressure of concrete or, if not embedded the water pressure.





8' x 12' Ft. Smith Dam, AR, USA

The bonnet cover seals the gate slot and provides support for the hoist when the hoist is mounted directly above the bonnet.

Bronze seals are used on bonneted gates, making them the only commonly used heavy fabricated gate to incorporate non-resilient seals. The seals are attached with screws to the downstream face of the gate leaf. The invert is usually a flush bottom design with the seat hand scrapped to provide the water tightness required. The water load on the gate leaf is transmitted by the seals to the downstream body. The extreme velocities involved and the differential head require makeup air to reduce cavitation and vibration in almost all applications.

Bonneted gates are often supplied as paired gates with upstream and downstream transition sections as well as short sections between the pair. This entire assembly is often embedded in the primary concrete pour deep in the dam. The downstream gate is the service gate while the upstream gate functions as a guard gate.

Although this provides unsurpassed structural support, it makes gate replacement impossible. From a practical perspective, only the slide can be serviced without substantial concrete demolition. For this reason, materials of construction should be carefully considered to maximize service life. As with essentially all heavy fabricated gates, the trend is away from carbon steel and towards stainless steel, addressing corrosion concerns.
High operating heads and the friction of metal-to-metal result in large operating loads. Unlike roller gates, there are no design features incorporated in the gates to reduce operating loads. For that reason, there is a practical limit to the combination of size and pressure where this design is applicable.

Actuation
Hydraulic actuation is suitable for water, or oil operating media. Controls available for adjustable closure rates. Complete hydraulic power units are available. Control systems can be supplied for automatic failsafe closure and valve positioning. Position sensors can also be provided.

Material Options:

The client to select and specify material of construction of various components from the following alternatives based on the application and requirement. If required, material of construction other than that specified below can also be offered upon specific request.

Components	**Material**
Slide / Gate leaf	Carbon steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Body, Bonnet and Bonnet cover	Carbon steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Metallic seals	Bronze (B98, B21, B584)
Assembly fasteners, studs and anchors	Stainless steel (304, 316)
Seal seats for seals	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Track	Carbon steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Stems	Stainless steel (304, 316, 304L, 316L, 17-4PH) / Duplex steel (2205) / Super duplex steel (2507)
Gland stuffing box	Stainless steel / Duplex steel
Body and Stuffing collar	Carbon steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Bushing and bushing collar	Bronze (B584)
Resilient Seals	Neoprene / EPDM rubber (D2000)