

Application

Rodney Hunt Tainter gates are normally used to control the flow of water or wastewater over a dam or drainage structure to provide a wide and unobstructed opening. These gates, which are sometimes very large, are sturdily designed for long life and low maintenance in difficult conditions, but also incorporate several “designed-in,” installation, and field-adjustment features.

- Where clear and wide waterway openings are required with economical and accurate control of water
- Diversion of water for irrigation
- To increase reservoir capacity on the top of the dam or barrage.
- In spillways or in drainage canals to maintain water elevations or water flow with high accuracy.

Rodney Hunt offers size range up to 500” x 240” square or rectangular with the head range as per the client requirement in the series mentioned below:

SERIES: A-715 Stainless Steel Radial / Tainter Gates
A-735 Structural Steel Radial / Tainter Gates

Construction

Construction-wise, the Tainter gate acts similar to a section of a drum. Pressure is transferred from the curved face through the horizontal and vertical support beams to the radial arms at the sides of the opening. The radial arms act as columns and transfer thrust to a trunnion at the end.

Flow passes underneath the curved face as the gate is opened. This design results in a lightweight, economical gate that can be opened and closed with the minimum hoist capacity required.

The Tainter gate leaf is constructed with a smooth skin plate accurately curved on the required radius. Vertical curved ribs support the curved plate. This is backed with flanged horizontal beam supports spanning the width of the opening. Horizontal support beams are made from steel sections. These beams vary in size with the width of the gate and maximum head of water. They also vary in quantity and spacing with the height of the gate. Heavy steel gussets welded to the horizontal girders transfer the water and operating loads to the supporting radial arms.

The radial arms attach to these horizontal supports and extend back to the trunnion. Each arm acts as a column in transmitting the load from the gate leaf to the trunnion. The radial arms are angled toward the center of the gate intersecting the horizontal supports at a point approximately one-sixth of the way in from each side. This reduces gate deflection, the weight of horizontal beams and helps to resist lateral thrust.

The trunnion assembly is comprised of heavy cast steel or fabricated housing hub and is bored to receive the stainless-steel trunnion pin. The self-lubricating bushing is provided between the trunnion hub and the pin. The self-lubricating property of the bushes eliminate the requirement for additional external lubrication for the lifetime of the equipment. The trunnion bracket transfers the total water load to the concrete corbel or steel beam on which it is mounted.

Generally, “J” type rubber seals are mounted across sides of the gate leaf and are held in place by stainless steel retainer bar and bolts with the provision to adjust compression against the side rubbing plate to form a watertight seal. To reduce the hoist capacity to operate the gate, side seals can be provided with PTFE cladding.

The bottom seal is also a “J” type seal that is attached to the gate by bolting. As the gate closes, its weight causes a slight deflection in the seal as it contacts the invert of the opening. This flexibility allows the bottom seal to compensate for minor installation irregularities in the stainless steel invert seal plate. The “bullet” type seal also can be used as the bottom seal to be mounted on the skin plate of the gate leaf.

Stainless steel plates are embedded across the invert and up both sides of the gate to provide a tight seal when the gate is closed. The bottom sill beam and side seal plates are typically installed in block-outs in the concrete left during primary concrete pours.

Field Adjustable

All parts of the gate are field adjustable to ensure proper installation and a tight seal in the closed position.

The seal on the gate leaf can be adjusted for proper preload at the side and invert seal plates. The trunnion supports are adjustable with adjusting bolts and locknuts so that the precise location of the hinge pins can be obtained.

Actuation

Cable drum hoists or hydraulic actuation units are recommended. Cable drum hoists are electrically driven and utilizing fully enclosed worm gear reduction units, protected and interconnected shafting with flexible couplings, grooved drums, and steel or stainless-steel cables. Hoisting units can incorporate position indicators, limit switches, slackline detection, and automatic opening and closing controls.

The hydraulic system comprises of hydraulic cylinders connected and power pack. The hydraulic cylinders attach to lifting brackets mounted on radial gate and other end can be supported on structural beam on concrete pier / side walls.

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
Frame or embedded parts seal plates	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Gate disc / leaf and ribs, Radial Arms, Trunnion Hub / plates	Carbon steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Trunnion Bush / Bearings	Self-Lubricating nonferrous material (B584 with graphite or PTFE inserts)
Trunnion Pin, Retainer bars for Seals	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex (2507)
Side and Bottom Seal (J type)	Neoprene / EPDM (D4000)
Assembly fasteners, studs and anchors	Stainless steel (304, 316)



360" x 360" Structural Steel Radial Gates for Turners Falls Dam on the Connecticut River, USA