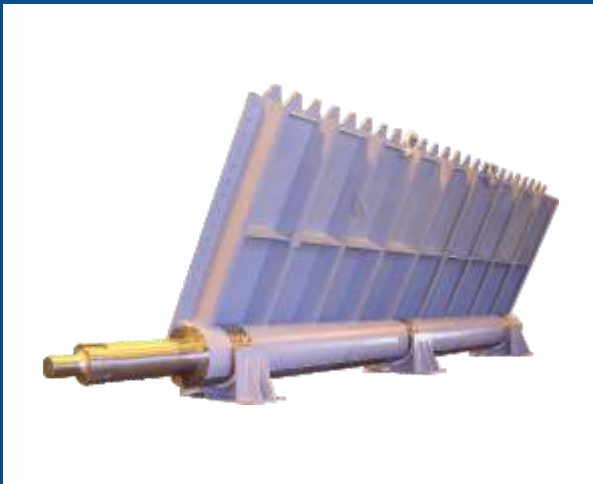




WATER & SEWAGE CONTROL EQUIPMENT



HEAVY FABRICATED GATES

**ROLLER GATES / BULKHEAD GATES / CREST GATES / RADIAL (TAINTER) GATES /
MITER GATES / BUTTERFLY GATES / BONNETED GATES / SWING GATES**



ENGINEERING EXCELLENCE AND EXPERIENCE

Since 1948, the engineering team at Jash has pioneered safe and reliable flow control systems in thousands of installations in India and around the world. In 2016, Jash acquired Rodney Hunt, a company with 185 years experience in manufacturing of flow control products and having a leadership position in North America. Together, we bring more than 250 years of experience in designing customized solutions to meet the needs of the most challenging applications worldwide.

SUPERIOR QUALITY

We bring exceptional quality to every project, using application-based solutions, proven designs, manufacturing flexibility and rigorous testing procedures. We offer one of the most flexible and comprehensive cast, metal fabrication, machining, assembly and testing operations at our in-house facilities in India (ISO 9001:2015, ISO 14001:2015 & BS OHSAS 18001:2018 Certified) and in USA. This allows us to monitor and ensure quality in all aspects of production and to provide consistent reliable and superior products.



9100 x 8650mm Roller Gate for Idaho Power's Swan Falls, ID, USA

COMPREHENSIVE PRODUCT OFFERING

Our product offering is unrivalled in the flow control marketplace. From all types and size of cast and fabricated gates, in wide variety of material options encompassing metals and plastics, to custom valve and actuation options, we bring a total solution to every project. The breadth of our product offering enables us to bring an unequaled impressive range of expertise to your planning and decision making process.

RESPONSIVE SERVICE

We pride ourselves on providing professional responsiveness to your needs throughout the design, manufacturing & installation processes. Our engineering team is available for consultation during all phases of your project. Dedicated project managers serve as a single point of contact once the order is in-house and our knowledgeable field service team is always ready to provide on-site support.



7600 x 3050mm Structural Steel Crest Gate for Newton, NC, USA

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3200 x 13400mm Stainless Steel Bulkhead Gate with Integral Slide Gate for Newtown Creek, NY, USA

HEAVY FABRICATED PRODUCTS



6100 x 2400mm Structural Steel Crest Gate for Landsberg Fish Passage in Ravensdale, Washington, USA

01 SERIES: A-511 / 512 / 513 / 531 / 532 / 533 BULKHEAD GATES

- Size Range: 900 x 900mm up to 8000 x 8000mm
- Head Range: Up to 60 meter seating and unseating
- Sealing: Resilient sealing system
- Mounting: Side wall embedded / Side wall anchored / Face wall mounted

02 SERIES: A-515 / 517 / 535 / 537 ROLLER GATES

- Size Range: Up to 6100 x 6100mm (Square or Rectangular sizes to fit the exact project requirements)
- Head Range: Up to 90 meter
- Sealing: Resilient sealing system
- Mounting: Side wall embedded / Face wall mounted

03 SERIES: A-315 / 316 / 335 / 336 / 345 / 346 TILTING WEIR GATES

- Size Range: Up to 8900 x 3050mm (Square or Rectangular sizes to fit the exact project requirements)
- Head Range: Up to gate height
- Sealing: Resilient sealing system
- Mounting: Side wall embedded / wall mounted

04 SERIES: A-711 / 731 / 712 / 732 CREST GATES

- Size Range: Up to 30000 x 4000 mm (Square or Rectangular sizes to fit the exact project requirements)
- Head Range: Open channel flow
- Sealing: Resilient sealing system
- Mounting: Along crest of dam

05 SERIES: A-715 / 735 RADIAL / TAINTER GATES

- Size Range: Up to 14000 x 9000 mm (Square or Rectangular sizes to fit the exact project requirements)
- Head Range: Open channel flow
- Sealing: Resilient sealing system
- Mounting: Wall embedded



14000 x 3600 mm Structural Steel Tainter Gate for Phoenix Dam on the Oswego River, Phoenix, NY, USA

06

SERIES: A-811 / 831
SWING GATES

- Size Range: Up to 15000 x 4500 mm (Square or Rectangular sizes to fit the exact project requirements)
- Head Range: Up to gate height
- Sealing: Resilient sealing system
- Mounting: Wall mounted

07

SERIES: A-812 / 832
MITER GATES

- Size Range: Up to 14000 x 2000 mm (Square or Rectangular sizes to fit the exact project requirements)
- Head Range: Up to gate height
- Sealing: Resilient sealing system
- Mounting: Side wall embedded

08

SERIES: A-911 / 931
BUTTERFLY GATES

- Size Range: Up to 3000 x 6000 mm (Square or Rectangular sizes to fit the exact project requirements)
- Head Range: Up to 10 meter
- Sealing: Resilient sealing system
- Mounting: Side wall embedded / Wall mounted

09

SERIES: A-915 / 935
BONNETED GATES

- Size Range: 1200 x 1200 mm up to 3600 x 3600 mm (Square or Rectangular sizes to fit the exact project requirements)
- Head Range: Up to 150 meter
- Sealing: Resilient sealing
- Mounting: Cast in primary pour or free standing

General specification for most products can be downloaded from our website or obtained by email.

Jash has the capability to design and manufacture heavy fabricated gates for varied types heads and sizes larger than that stated above. Jash also offers custom designed gates to suit any specific application.

HEAVY FABRICATED PRODUCTS

SYSTEM FOLLOWED TO ENSURE SUPERIOR STAINLESS STEEL PRODUCTS



HEATLESS CUTTING



CONTINUOUS WELDING



100% DYE PENETRANT TESTING

NSF 61 FOR DRINKING WATER APPLICATION

All material used in manufacturing of gates are NSF 61 certified and the manufacturing processes and systems followed ensure that the final product is in full compliance to NSF 61 requirement. When required.

SEGREGATED MANUFACTURING FOR STAINLESS STEEL PRODUCTS

Manufacturing practices at our plant are aimed to avoid contamination and maintain surface integrity of stainless steel material being processed. All processing activities for stainless steel are separated from those of structural steel right from the stage of storage to subsequent handling, fabrication, assembly and dispatch.

HEATLESS CUTTING

We rely on heatless cutting of thicker stainless steel to limit the possibility of change in corrosion resistance properties of stainless steel due to exposure to heat. We use CNC water jet cutting machine which can cut stainless steel plates as thick as 75 mm at 240 bar. On certain low thickness stainless steel materials, we also employ laser cutting using nitrogen gas to achieve smooth cutting.

WELDING USING QUALIFIED WELDERS & PROCESS

We use qualified processes for TIG and MIG welding and qualified welders in conformance with AWS /ASME section IX at our fabrication facilities. These welders are qualified by qualifying agencies for welding of stainless-steel material grades like 304, 304L, 316, 316L, Duplex and Super Duplex.

CONTINUOUS WELDING

To prevent crevice corrosion and ensure long life of stainless steel welded products, we promote use of continuous welding on our products. We carry out continuous welding in two forms i.e. (i) full welding on both sides of metal joints which are in continuous close contact with each other. This increases the length of weld joints but allows for straight line cutting of contact edges, or (ii) full welding on both sides of metal joints which are in intermittent contact with each other. This reduces the length of weld joints but necessitates profiled cutting of contact edges.

100% DYE PENTERATION TESTING

To verify the quality of welding, we conduct dye penetration testing of critical weld joints by qualified inspectors. This is integral to our quality system for fabricated products and is done based on client demand.



GLASS BEAD BLASTING



BATH PICKLING

GLASS BEAD BLASTING

Stainless steel parts may get exposed to free iron particles of iron dust in spite of all the care taken during manufacturing. When these embedded iron particles or iron dust settle on the surface of stainless steel and exposed to moist air, they leave rusty patches or spots which may initiate corrosion in underlying stainless steel when condition are severe. To mechanically remove this contamination all fabricated stainless steel gates are glass bead blasted in an environmentally safe condition post welding.

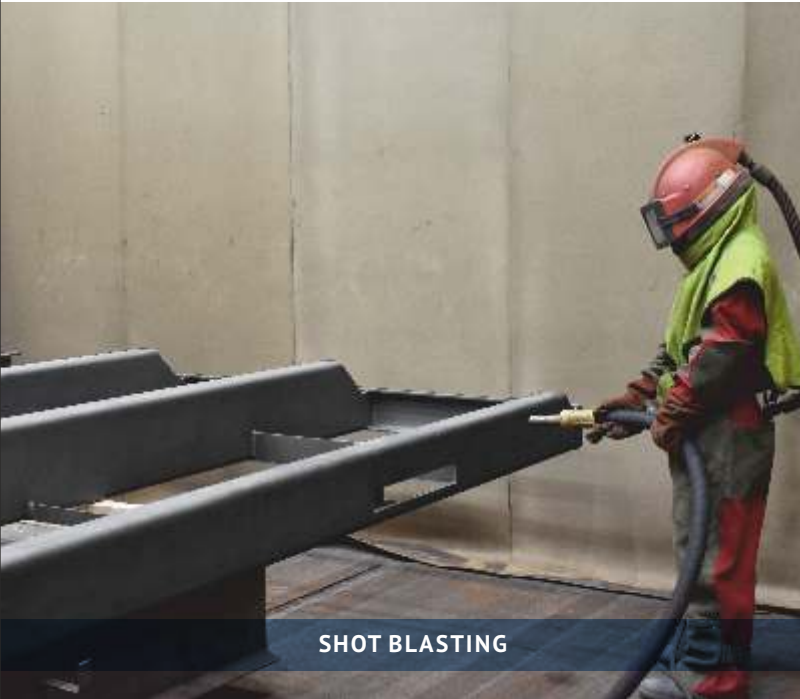
BATH PICKLING

To achieve a better outcome in removing possible contamination, the process of mechanical removal by glass bead blasting or grit blasting is supplemented by bath pickling subject to size of product. The process of bath pickling removes few microns from the surface layer of stainless steel together with all foreign matters and the oxides formed during welding and the layer of metal depleted by oxidation. Our plant uses environmentally safe and health compliant bath pickling tank of 7.5x2x2.5 meter (L X B X H) size equipped with a fume extraction system to pickle finished stainless steel products. Where bath pickling is not possible, we rely on weld joint cleaning using localized paste for pickling

PASSIVATION

Pickling leaves a clean surface that immediately starts to react with the atmosphere. The process of passivation is rinsing of this clean surface using demineralized water. In this process, the oxygen in the rinsing water reacts with the pickled surface to re-form the uniform chromium oxide layer that gives stainless steel its corrosion resistance. After passivation, stainless steel products are covered by a film of plastic to prevent any further contamination at the plant or at the site.

To prevent contamination from ferrous dust from cutting, grinding and welding at site, clients should keep stainless steel products covered / wrapped / isolated and use non-metallic slings to handle these products at the time of shifting and installation. Even after installation, stainless steel products should be suitably covered to avoid ferrous contamination from subsequent construction/ fabrication / installation activities being carried out at site. Covers should be unwrapped only when all such activities are over and the plant is to be commissioned.



SHOT BLASTING



PAINTING

WELDING USING QUALIFIED WELDERS & PROCESS

We use qualified processes for TIG and MIG welding and qualified welders in conformance with AWS / ASME section IX at our fabrication facilities. These welders are qualified by qualifying agencies for the welding of structural steel.

CONTINUOUS WELDING

To prevent crevice corrosion and ensure long life of structural steel welded products, we use continuous welding on our products. We carry out continuous welding in two forms i.e. (i) full welding on both sides of metal joints which are in continuous close contact with each other. This increases the length of weld joints but allows for straight-line cutting of contact edges, or (ii) full welding on both sides of metal joints that are in intermittent contact with each other. This reduces the length of weld joints but necessitates profiled cutting of contact edges.

100% DYE PENETRATION TESTING

To verify the quality of welding, we conduct dye penetration testing of critical weld joints by qualified inspectors. This is integral to our quality system for fabricated products and is done based on client demand.

SHOT BLASTING

During the process of fabrication and storage, structural steel parts may get exposed to moisture despite care taken during manufacturing. When structural steel reacts with water particles and oxygen, oxidization takes place on the surface and they leave rusty patches or spots which may initiate corrosion in underlying structural steel when conditions are severe. To mechanically remove this contamination and achieve required surface finish for paint, all fabricated structural steel gates are shot blasted in an environmentally safe condition after welding.

PAINTING

We offer custom-made solutions for our structural steel products to ensure durability against different climate conditions and corrosion. We have separate painting facilities to execute high-performance coating under the supervision of BGAS CSWI P certified paint supervisors to ensure utmost quality painting during the execution process.

ROLLER GATES / BULKHEAD GATES / BONNETED GATES

Description	Roller Gates	Bulkhead Gates	Bonneted Gates
Design head	Up to 90 meter	Up to 60 meter	Up to 150 meter
Sealing mechanism	Resilient bulb seals in various configurations	Resilient bulb seals in various configurations	Resilient Sealing
Actuation	Manual, Electric, Hydraulic, Cable drum hoist & Gantry Crane	Manual, Electric, Hydraulic, Cable drum hoist & Gantry Crane	Electric & Hydraulic
Advantages	<ul style="list-style-type: none"> ■ Low operating load ■ Bidirectional sealing 	<ul style="list-style-type: none"> ■ Bidirectional sealing ■ Simple technology ■ Lower cost than roller gates ■ Lower maintenance than roller gates 	<ul style="list-style-type: none"> ■ Unidirectional sealing ■ Minimal operating height for high head application ■ Lower maintenance

CREST GATES / TAINTER GATES

Description	Crest Gates	Tainter Gates/ Radial Gates
Design head	Up to gate height plus overtopping	Up to gate height
Sealing mechanism	Resilient bulb seals	Resilient bulb seals
Actuation	Electric, Hydraulic & Cable drum hoist	Electric, Hydraulic & Cable drum hoist
Advantages	<ul style="list-style-type: none"> ■ No overhead structure required ■ Able to pass floating debris ■ Facilitate maintaining upstream pool level with changing flow 	<ul style="list-style-type: none"> ■ Low operating loads mean reduced loads are imposed on structure

BUTTERFLY GATES / MITER GATES / SWING GATES

Description	Butterfly Gates	Miter Gates	Swing Gates
Design head	Up to 10 meter	Up to gate height	Up to gate height
Sealing mechanism	Resilient bulb seals	Resilient bulb seals	Resilient bulb seals
Actuation	Manual, Electric & Hydraulic	Manual, Electric & Hydraulic	Manual, Electric & Vehicle
Advantages	<ul style="list-style-type: none"> ■ Very low overhead clearance required because gate does not rise ■ Good for proportioning flows 	<ul style="list-style-type: none"> ■ Large gates possible ■ No overhead structure required ■ Low visual impact when used for coastal defense 	<ul style="list-style-type: none"> ■ No overhead structure required ■ Low cost for protection against flooding

APPLICATION:

Jash Bulkhead gates are a cost-effective way for dewatering channels. These gates are custom-designed for specific applications of almost any size. Stacking Bulkheads also permits flow control for taller openings. Bulkhead gates are usually installed and removed under balanced head conditions, utilizing an overhead crane.

Jash offers size range from 900 x 900 mm to 15000 x 6000 mm square or rectangular with the head range as per the client requirement / up to 60 meter seating and unseating head in series mentioned below:

Series:

- A-511 Stainless steel construction, embedded in channel sidewall*
- A-512 Stainless steel construction, anchor mounted to channel sidewall*
- A-513 Stainless steel construction, face or head wall mounted
- A-521 Aluminum alloy construction, embedded in channel sidewall*
- A-522 Aluminum alloy construction, anchor mounted to channel sidewall*
- A-523 Aluminum alloy construction, face or head wall mounted
- A-531 Structural steel construction, embedded in channel sidewall*
- A-532 Structural steel construction, anchor mounted to channel sidewall*
- A-533 Structural steel construction, face or head wall mounted*

Jash Bulkhead gates are large fabricated gates used to close the waterway for maintenance of the downstream equipment in most cases. These gates are operated vertically employing actuators, cranes, or hoists. The term Bulkhead gate can be used to describe what is essentially a very large slide gate or to describe a device used like stop logs but providing significantly fewer handling iterations.

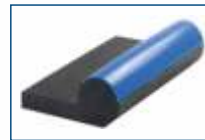
Typically, Bulkhead gates are operated under balanced head conditions, with no flow going past the gate. Smaller filler gates are frequently used to balance the head before the Bulkhead gates are removed. Balanced head operation reduces the friction load, allowing the gate to be lifted or inserted easily with a gantry or other crane.

In case it is not possible to achieve a balance head condition, the Bulkhead gate is designed for crack opening or unbalance head condition in which the gate is opened very slowly at the beginning and allow water to start flowing below the gate. But in this case, the gate operates under full water head causing maximum thrust on the gate which results in the requirement of higher lifting force due to higher sliding friction, and hence operating mechanism is required of higher capacity.

CONSTRUCTION:

Bulkhead gates are box-type fabricated construction on which sealing system and lifting arrangement are fixed. Resilient seals can be configured for seating heads, unseating heads, or for both. The seals are attached across the top of the gate and on both side vertical sides, with a seal along the invert for bottom closure.

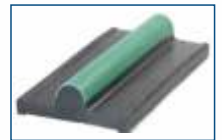
The seals are attached with stainless steel strips and retaining bolts for long-term tight sealing. Seals can be used with cladding as shown here to reduce sliding friction during the operation of the gate and increases seal life.



P seal for unidirectional water head



Double dome seal for bidirectional water head



Center dome / Double stem seal for high water head

ACTUATION:

Typically, Bulkheads are operated with either electric/manual actuators or hydraulic cylinders, providing down thrust to close the gate under the differential head. When the operating head is balanced, the gates can be lowered with a cable drum hoist or crane. When used without dedicated hoists, they essentially are stop logs and can be stacked to provide the required height. A lifting beam is generally provided by the manufacturer for the handling of Bulkhead gate per client requirement.

**Only for low head application.*

MATERIAL OPTIONS:

The client selects and specifies material of construction of various components from the following alternatives based on the application and requirement. If required, material of construction other than those listed below can also be offered upon specific request.

Structural steel is most common when the gates are used occasionally to de water an area because the gates spend only a fraction of their service life in the water.

Various grades of stainless steel, 304/304L, 316/316L Duplex, Super Duplex, are all chosen for gates that are permanently submerged or where corrosive media exists. For moderate gate sizes at lower head, aluminum can be a cost-effective approach.

Components	Material
Gate Disc / Gate Leaf	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507) / Aluminum (6061-T6)
Frame, Seal Seats	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507) / Aluminum (6061-T6)
Resilient Seals	Neoprene / EPDM Rubber (D2000)
Seal Retainer Bars	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507) / Aluminum (6061-T6)
Assembly Fasteners, Studs and Anchors	Stainless steel (304, 316) / Duplex steel (2205) / Super duplex steel (2507)
Lifting Beam, Storage Rack	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507) / Aluminum (6061-T6)



15000 x 6000 mm Structural Steel Bulkhead Gates for San Joaquin River Authority, CA, USA

APPLICATION:

Jash Roller gates are used for flood control, irrigation, industrial water control, dams, water treatment plants, sewage treatment plants & power plants, etc.

Jash offers size range up to 6000 x 6000 mm square or rectangular with head range as per the client requirement / up to 90 meter head in series mentioned below:

Series:

- A-515 Stainless Steel Roller Gates, embedded in channel
- A-517 Stainless Steel Roller Gates, face or head wall mounted
- A-535 Structural Steel Roller Gates, embedded in channel
- A-537 Structural Steel Roller Gates, face or head wall mounted

Jash Roller gates are designed to control flow and reduce operating loads for large openings, high head applications, or where frequent operation is required. Roller gates have lower operating loads under differential heads than other types of vertically operating gates as wheels provide a more efficient mechanism than the sliding surfaces of other gate types.

The overall configuration of Roller gates along with operating hoists is a cost-effective solution for high-water head applications. Thrust caused by water pressure on the gate is transmitted to frame and embedded components through roller on the leaf. Rollers or wheels reduce the operating load compared to the sliding friction of the other gate types resulting in smaller actuators for a given application.

CONSTRUCTION:

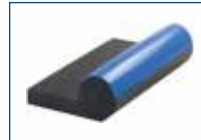
Roller gate is comprised of the gate leaf, wheels, sealing system, and lifting arrangement as the main structural members of the whole assembly.

Gate leaf is box-type fabricated construction to suit environmental conditions or cast construction upon specific requirements. The wheel assemblies, sealing system, and lifting attachment are mounted on it.

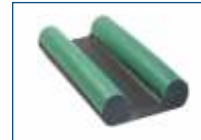
Generally, wheels are sized and spaced on the sides of the gates to support equal portions of the hydrostatic load with self-lubricating bushing and seals.

For high head application, bearings are self-alignment type to compensate for minor deflection of the gate and uniform load transfer on frame or embedded parts during operation.

Resilient seals can be configured for seating heads, unseating heads, or for both. The seals are attached across the periphery of the gate with stainless steel strips and retaining bolts for long-term tight sealing. Seals can be used with cladding as shown here to reduce sliding friction during the operation of large gates.



P seal for unidirectional water head



Double dome seal for bidirectional water head



Center dome / Double stem seal for high water head

Axles are eccentric to allow for final adjustment at the site for very large gates to ensure wheels always touch the rails or tracks during the operation of gate.



2700 x 6100 mm Stainless Steel Roller Gates for Mississippi Floodwall ORS Pump Station Rehabilitation - Phase III Saint Louis, MO, USA



2100 x 3000 mm Structural Steel Roller Gate for Bradshaw Interceptor Marques Pipeline, Sacramento, CA, USA

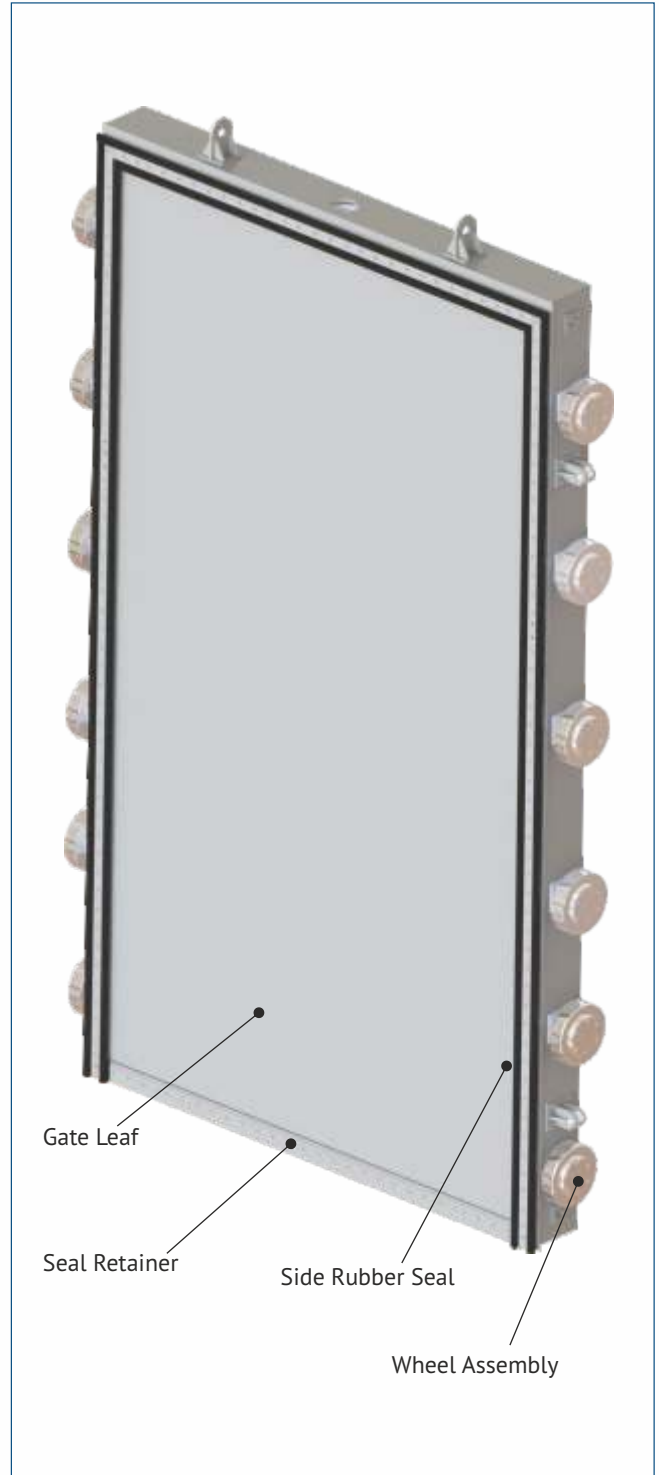
ACTUATION:

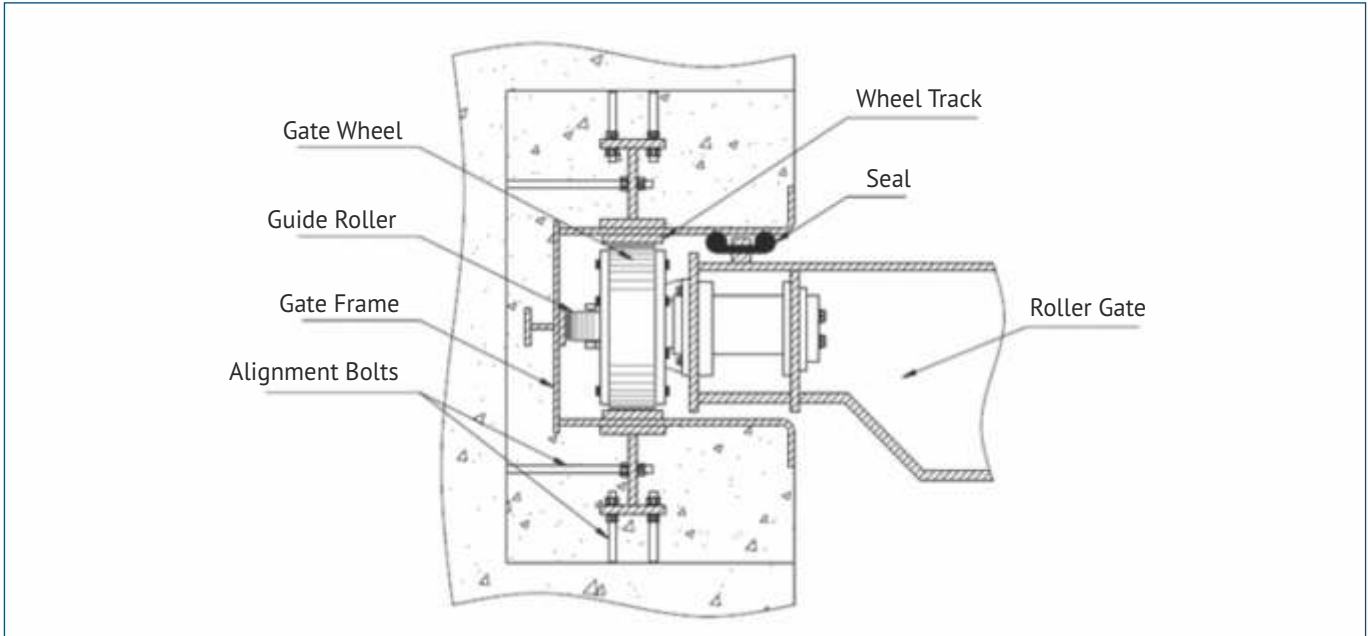
Typically, Roller gates are operated with either electric/manual actuators or hydraulic cylinders, providing down thrust to close the gate under the differential head. However, roller gates also can be designed for self-closing by adding ballast to gate leaf when operated with a cable drum hoist or crane.

MATERIAL:

Historically, roller gates were just structural steel with the track literally a railroad track and the wheels either ductile iron or hardened steel. That has changed because of the increased availability of corrosion-resistant materials providing longer service life under corrosive environments without significant maintenance.

Today, roller gates are manufactured from a variety of materials, ranging from structural steel to super duplex steel. Regardless of the materials for the gate, the wheels, axles, track, seal plates, frame and all embedded items should be stainless steel to ensure a long service life. Load-bearing members such as the wheels, axles and track may require high strength corrosion resistant materials.





MATERIAL OPTIONS:

The client selects and specifies material of construction of various components from the following alternatives based on the application and requirement. If required, material of construction other than those listed below can also be offered upon specific request.

We always recommend stainless steel frames because they are permanently submerged.

Components	Material
Gate Disc / Leaf, Frame / Embedded Parts	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Seal Seats	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Track for Wheels	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Wheels / Rollers	Stainless steel (304, 316, 304L, 316L, 17-4PH) / Duplex steel (2205) / Super duplex steel (2507)
Wheel Axles, Stems, Stem Couplings	Stainless steel (304, 316, 304L, 316L, 17-4PH) / Duplex steel (2205) / Super duplex steel (2507)
Bearings	Self-lubricating bronze bushing (B584 with graphite or PTFE inserts) / HDPE D4020 / Roller bearings
Resilient Seals	Neoprene / EPDM Rubber (D2000)
Seal Retainer Bars	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Stem Guides Bushing	Bronze (B584) / HDPE (D4020)
Assembly Fasteners, Studs and Anchors	Stainless steel (304, 316) / Duplex steel (2205) / Super duplex steel (2507)



12000 x 6000 mm Stainless Steel Roller Gate for Quail Creek Reservoir, UT, USA
Comprising of two 12000 x 3000 mm Gates, Operating Independently to Provide Overflow or Aperture Discharge



6000 x 2000 mm Structural Steel Roller Gate for Hillsboro Dam, WI, USA

APPLICATION:

Jash Tilting weir gates are normally used to control the water level on irrigation canals, reservoirs, and drainage canals. These gates, which are sometimes very large, are designed for long life and low maintenance in difficult conditions, but also incorporate several “designed-in,” installation, and field-adjustment features.

Tilting weir gates are designed for a limited differential head, as opposed to crest gates (see page 15) which are designed for full differential head.

Jash offers a size range up to 9000 x 3000 mm square or rectangular with the head range as per the client requirement in the series mentioned below:

Series:

- A-315 Stainless steel construction, embedded in sidewalls
- A-316 Stainless Steel construction, face or head wall mounted
- A-335 Structural Steel construction, embedded in sidewalls
- A-336 Structural Steel construction, face or head wall mounted
- A-345 HDPE construction, embedded in sidewalls
- A-346 HDPE construction, face or head wall mounted

CONSTRUCTION:

The tilting weir gate comprises a rectangular panel with a flat skin plate reinforced with vertical and horizontal sections and the gate is secured to a series of hinges on the down stream side of the gate leaf. To control the upstream water level the leaf is raised and lowered by an electrical actuator/ cable chain hoist/hydraulic the hinges are fitted with self lubricating bushings.

Side seal plates are mounted in the abutments or on the face of a wall and generally resilient seals attach to the sides of the moveable disc to seal against the side plates. Side seal plates to be manufactured from stainless steel. All sealing surfaces to be type 304 or 316 to avoid corrosion in the sealing area. There is a seal across the hinge or the invert of the gate in the form of a bulb or J-type seal.

Actuators connect with lifting lugs provide on the top face of the Tilting weir gate and positioned at the end of the gate span to achieve uninterrupted water flow across the gate opening.

ACTUATION:

Cable drum hoists or hydraulic actuation units are recommended options for hoisting. However, Jash also offers manual and electrical actuator for gate operation.



600 x 1000 mm Stainless Steel Tilting Weir Gate for Antelope Creek, Fish Passage Facility CA, USA

MATERIAL OPTIONS:

The client selects and specifies material of construction of various components from the following alternatives based on the application and requirement. If required, material of construction other than those listed below can also be offered upon specific request.

We always recommend stainless steel frames because they are permanently submerged.

Components	Material
Gate Disc / Gate Leaf	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507) / HDPE
Frame, Seal Seats	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Resilient Seals	Neoprene / EPDM rubber (D2000)
Seal Retainer Bars	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Stem	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Assembly Fasteners, Studs and Anchors	Stainless steel (304, 316) / Duplex steel (2205) / Super duplex steel (2507)



7850 x 2350 mm Stainless Steel Tilting Weir Gate for CWRP C21B, Singapore

APPLICATION:

Jash Crest gates are used for flow and level control, with an established reputation for long life and low maintenance in a wide range of applications.

They have been used for flow and/or water level control or to create impoundments in municipal water systems, electric power facilities, industrial complexes, and on dams for flood control, hydroelectric or recreational use.

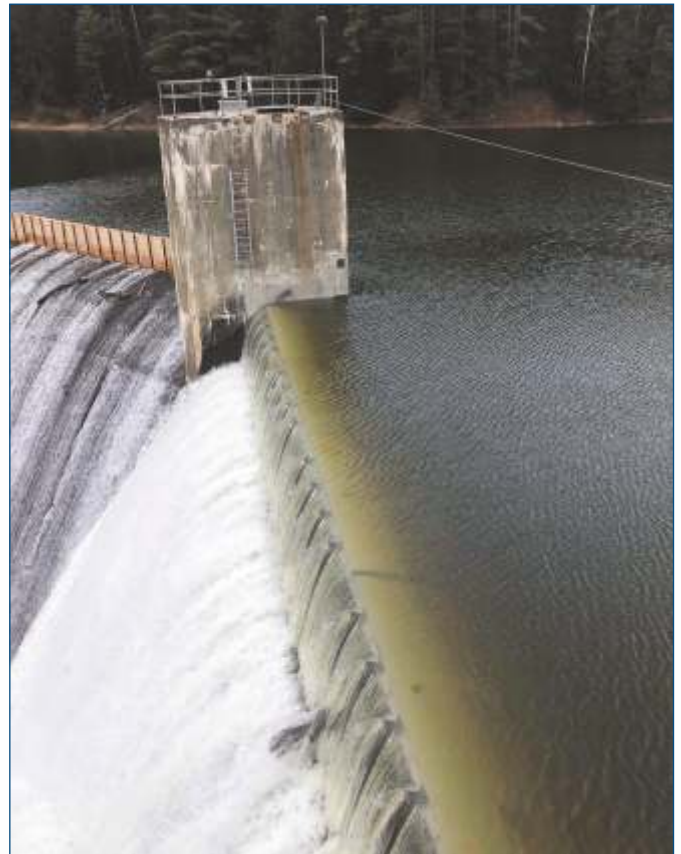
Jash / Rodney Hunt has been manufacturing hinged crest gates for over 50 years. The Bascule® and Pelican® designs were acquired from Allis-Chalmers in 1990. And are now still being produced by Jash / Rodney Hunt

Crest gates are located on the crest of a dam or other control structure, hence the name. They pivot down to open operating around a hinge-mounted just downstream of the top of the dam.

Jash offers size range up to 32000 x 4000 mm square or rectangular with the head range as per the client requirement in the series mentioned below:

Series:

- A-711 Stainless Steel Bascule® Crest Gates
- A-731 Structural Steel Bascule® Crest Gates
- A-712 Stainless Steel Pelican® Crest Gates
- A-732 Structural Steel Pelican® Crest Gates



30500 x 1800 mm Structural Steel Crest Gate for Peterson Hydro Station, VT, USA

CONSTRUCTION:

Bascule® gate is normally a flat plate design that is reinforced with vertical and horizontal members and is fitted with a single torque tube across the invert. Side seal plates are mounted in the abutments and resilient seals attach to the sides of the moveable disc to seal against the side plates.

Side seal plates are manufactured from stainless steel. All sealing surfaces to be type 304 or 316 to avoid corrosion in the sealing area. There is a seal across the hinge or the invert of the gate in the form of a bulb or J-type seal.

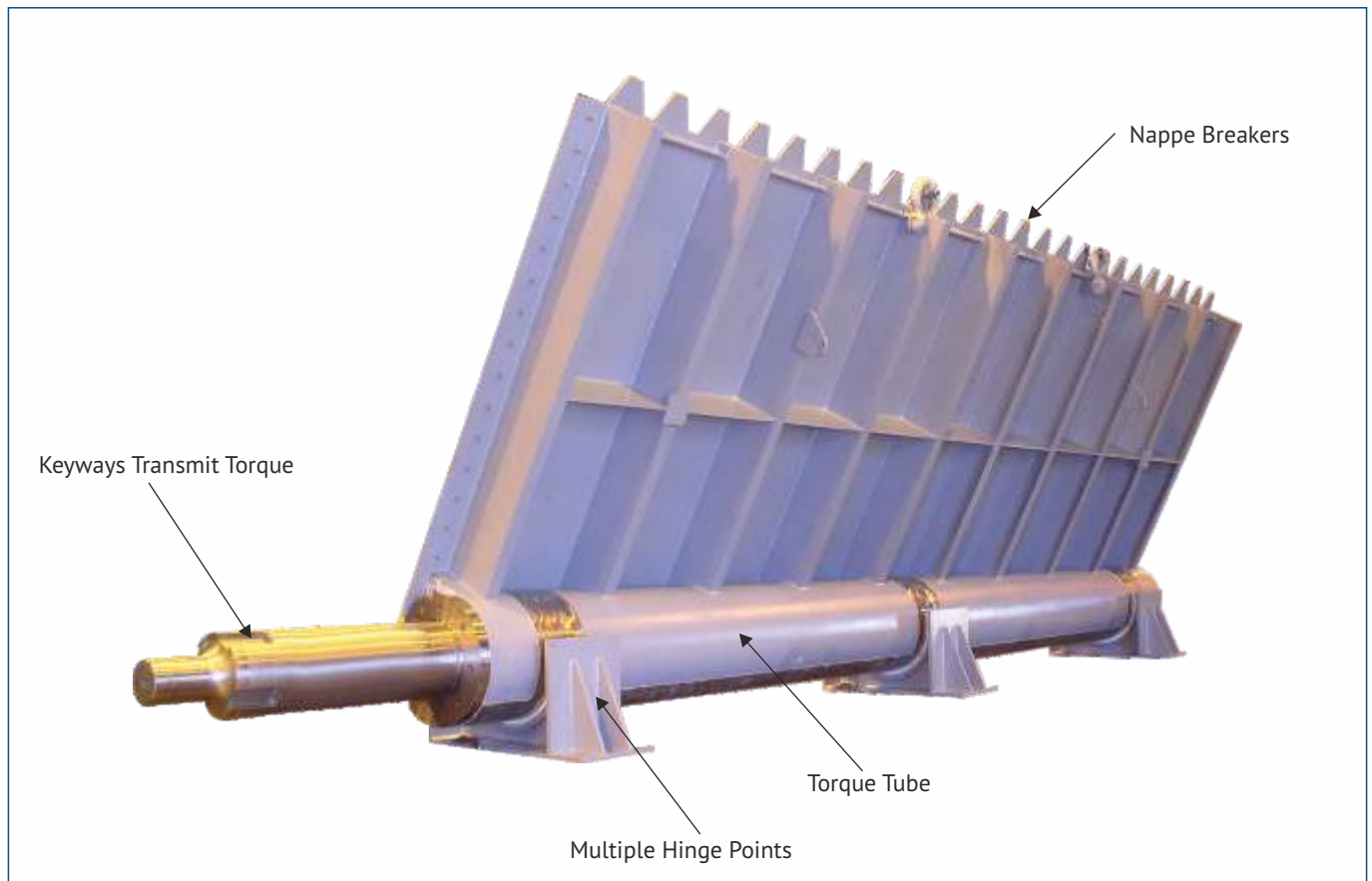
The torque tube of the Gate is supported by bearings along the invert edge of the gate. One end or both ends of the torque tube extends through the sidewall into an operating space in the abutment. A stuffing box around the torque tube prevents leakage into the operating space.

Gates can be supplied with maintenance bracing or slings to dog the gates open.

The Bascule® Gate or torque tube-style crest gate is normally limited to approximately 4 meter high. This size limitation depends on several factors, including the type of actuation, the location of the gate, the application, and the head.

ACTUATION:

Hydraulic cylinders attach to torque arms, either only one as shown below or at both ends of the gates. As the cylinders move the torque arm, the gate moves in response. Alternately, one or both ends of the gate can be heavily reinforced and the cylinders mounted above the gate on the adjacent concrete abutment. This alternate arrangement eliminates the potential for leakage around the shaft seal and potential flooding of the control vault but it does place the cylinder rods in the flow unless they are protected within a stepped abutment.



PELICAN® GATES

CONSTRUCTION:

Pelican® Gate consists of curved plates with internal braces and vertical ribs forming a strong closed-shell structure. Another primary difference between the Pelican® Gate and Bascule® Gate is that Pelican® Gate is supported by the numbers of separate hinges (instead of a torque tube), which are attached to the concrete at the invert.

A matching pair of hinge plates are welded to the bottom of the gate, and a stainless-steel pin passes through these plates (and the trunnion) to complete the "hinge" configuration.

Gates can be supplied with maintenance bracing or slings to dog the gates open.

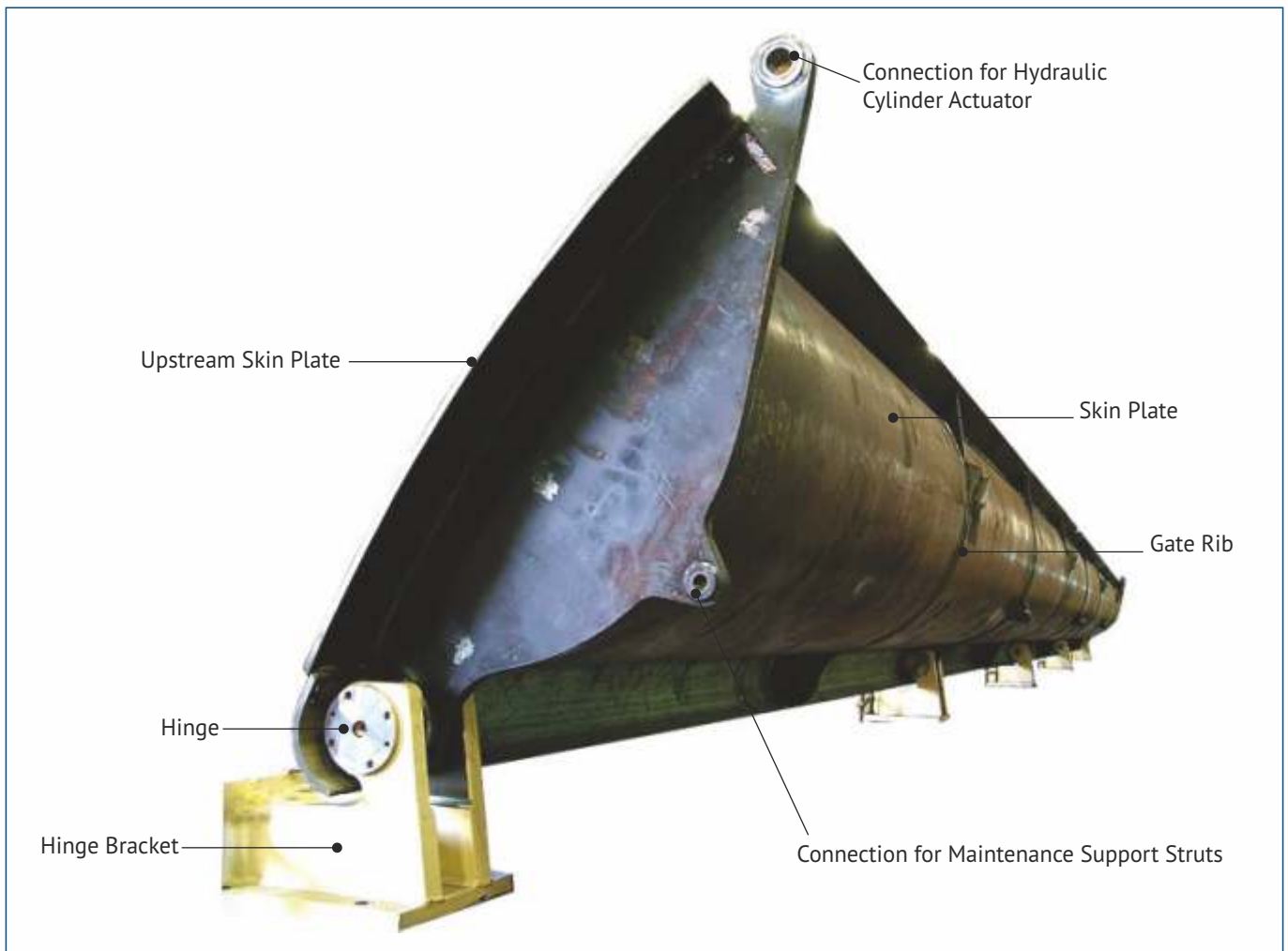
ACTUATION:

The Pelican® Gate can be operated in number of different ways.

The gate can be raised or lowered by one or more cylinders provided at the ends of the spillway or at intermediate points in between.

Although crest gates can be operated by screw stem or cable drum, hydraulic cylinders provide the flexibility of being mounted either below the gate, pushing the gate "up" to the closed position or mounted above the gate, pulling the gate "up" to closed position.

The Pelican® Gate, with hydraulic cylinders mounted beneath the gate, can be fabricated in greater lengths. A drop in downstream elevation is required for mounting the hydraulic cylinders, and to lower the gate below the crest.



20700 x 1200 mm Structural Steel Crest Gate (Pelican Style) for Lake White, OH, USA

MATERIAL OPTIONS:

The client selects and specifies material of construction of various components from the following alternatives based on the application and requirement. If required, material of construction other than those listed below can also be offered upon specific request.

We always recommend stainless steel frames because they are permanently submerged.

Components	Material
Gate Disc / Gate Leaf, Frame, Embedded Parts	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Seal Seats	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Resilient Seals	Neoprene / EPDM Rubber (D2000)
Seal Retainer Bars	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Torque Tube, Lever	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Intermediate Bearing	Self-lubricating bronze bearing (B584 with graphite or PTFE inserts) / HDPE D4020
Assembly Fasteners, Studs and Anchors	Stainless steel (304, 316) / Duplex steel (2205) / Super duplex steel (2507)



13700 x 2400 mm Structural Steel Crest Gate (Pelican Style) for Spaulding Dam, Springfield, IL, USA

APPLICATION:

Jash 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.

Jash offers size range up to 12000 x 9000 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. For larger gates 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. Power fail operation can easily be incorporated into hydraulic actuation. 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 selects and specifies material of construction of various components from the following alternatives based on the application and requirement. If required, material of construction other than those listed below can also be offered upon specific request.

We always recommend stainless steel frames because they are permanently submerged.

Components	Material
Gate Disc / Leaf and Ribs, Radial Arms, Trunnion Hub / Plates	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Frame or Embedded Parts Seal Plates	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)
Resilient Seals	Neoprene / EPDM Rubber (D2000)
Trunnion Pin, Seal Retainer Bars	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex (2507)
Side and Bottom Seal	Neoprene / EPDM (D4000)
Assembly Fasteners, Studs and Anchors	Stainless steel (304, 316) / Duplex steel (2205) / Super duplex steel (2507)



9000 x 9000 mm Structural Steel Radial Gates for Turners Falls Dam on the Connecticut River, CT, USA

SWING GATES SERIES: A-811 / 831

APPLICATION:

Jash Swing gates are used to protect against flooding or to dewater sections of a waterway for maintenance. They may be referred to as road closure gates because they most often seal a road cut in a levee.

A swing gate pivots at the end allowing rotation through 90 degrees / 180 degrees. The amount of rotation, which is usually 180 degrees depends on the site geometry and how the gate is stored in the open position. This type of gate, like miter gates, is designed for pressure in only one direction. Its simple construction and operation provide long service life with low maintenance.

Although swing gates are usually installed above typical water elevations, they can easily be installed within a river bed or salt water estuary. When mounted in water, the impact on marine ecology is almost zero because there is only a very slightly raised sill plate along the bottom.

Jash offers size range from 1200 to 15000 mm wide with heights up to 5.5 meter as required. The series designations appear below.

Series:

A-811 Stainless Steel Swing Gates

A-831 Structural Steel Swing Gates

CONSTRUCTION:

The swing gate is a pivoting gate mounted to a fixed pivot end frame supporting the gate and other embedded items to provide corrosion-resistant sealing surfaces.

Pivot bushings are self-lubricating and are usually high-performance non-metallic bronze type.

The gate can also be designed with a lifting mechanism to raise the gate a few inches allowing it to swing freely and to then lower, obtaining full contact along with the invert seal in the closed position. Latching devices hold the gate in the open and closed positions.

The seals are factory set but can be adjusted in the field to accommodate the variances encountered in large-scale construction.

ACTUATION:

Swing gate operation is infrequent. Therefore, most installations employ a motor vehicle to tow the gate in an arc to close or open it. Smaller gates can be maneuvered by a few people. In rare cases, a manual worm gear is used to rotate the gate. The lifting equipment used to raise the gate a few inches is generally a manually operated compound bevel gear.

Electric motor operation and cylinder actuation are both possible. The same range of controls and features available for other types of gates can be incorporated into the design.

MATERIAL:

Swing gates can be manufactured in structural steel, stainless steel, and duplex stainless steel depending on the corrosiveness of the media and desired length of service life. Swing gates have resilient seals of Neoprene/EPDM/Viton.



6000 x 2000 mm Structural Steel Swing Gate for Davenport, IA, USA

APPLICATION:

Jash Miter gates are normally used to shut off flow at a navigational lock or in a waterway for maintenance of downstream equipment or to protect against flooding. As the name refers, Miter gates are made up of two gate leaves that provide closure at a “miter” or angle pointed towards the upstream side of water flow.

These gates are standard in navigation locks because they provide a completely unobstructed flow path when open. Their simple construction offers long service life and low maintenance. Miter gates are designed for flow or pressure in only one direction.

These gates can be opened or closed more rapidly than other types of gates of the same size but the operation is always under a balanced head. For this reason, filler gates are incorporated into the design. Filler gate size and method of operation depend on the volume of the area that must be refilled before operating the main gate.

Jash offers custom-designed sizes and configurations to suit the project needs with and size up to 12500 x 9000 mm square or rectangular with heads up to gate height in series described below:

Series:

A-812 Stainless Steel Miter Gates

A-832 Structural Steel Miter Gates

CONSTRUCTION:

Miter gates are constructed of two leaves supported by hinges on the lock wall. When closed the leaves form a shallow pointed arch angled upstream. In the closed position, under the head, each leaf bears on a lock wall and the tip of the other leaf at the center of the lock. This arch shape is very efficient for spanning larger distances between lock walls.

Gate leaves consist of a skin plate supported by horizontal and vertical ribs connected with verticals post at the lock wall.

Each end vertical post rests on a pintle block at the sill level. The top of the post is supported by a hinge bracket.

Water thrust transmitted through the girders goes to the pintle blocks and into the walls and floor slab.

ACTUATION:

Jash offers both power and manual options for operating Miter gates.

Smaller gates can be operated manually with a bevel or worm gear drive. The manual operation may be the only practical choice for remote navigation locks where there is no power.

In concept, electric operators are the same as on quarter-turn butterfly valves. They come standard with limit switches, torque switch and a manual override is standard. Complete accessories are available and include indicator lights, integral reversing starters, pushbuttons, potentiometers, space heaters, sensors, transmitters, transducers, and other control features.

Hydraulic actuators can utilize plant air, water, or oil operating media. Hydraulic power units can include adjustable closure rates control systems and failsafe closure and valve position sensors.

MATERIAL:

Miter gates can be manufactured in structural steel, stainless steel, and duplex stainless steel depending on the corrosiveness of the media and desired length of service life. Miter gates have resilient seals of Neoprene/EPDM/Viton.



Miter Gate, Champlain Canal Lock 12 at Whitehall, NY, USA



APPLICATION:

Butterfly gates are normally used for Sewage treatment plants, water filtration plants, power plants, industrial water control jobs applications, etc.

Butterfly gates are often used where overhead clearance restrictions prohibit the use of slide gates.

Specially designed vane reduces turbulence and strengthens assembly. They are sturdily designed for long life and low maintenance in difficult conditions, but also incorporate field-adjustment features. Although Jash uses streamlined disc designs, some flow restriction is inevitable."

Jash offers size range up to 3000 x 6000 mm square or rectangular with the head range as per the client requirement in the series mentioned below:

Series:

A-911 Stainless Steel Butterfly Gates

A-931 Structural Steel Butterfly Gates

CONSTRUCTION:

The main components are disc, body, sealing arrangement and operating mechanism.

The disc rotates on its own vertical axis to regulate or shutoff the flow. Disc seals are offset from operating shaft to provide a full uninterrupted seating surface. The disc is designed to reduce turbulence during operation and strengthen the assembly.

The body or frame is the part of the assembly which contains sealing arrangement, disc resting post and mounting location for the operator. Seals are mechanically retained by means of corrosion resistant retainer and stainless steel screws. The body is designed to be field fastened to a wall thimble, angle supports anchored to the concrete channel, or direct grouted into the concrete channel.

Butterfly gates achieve tight shutoff with stainless steel seal seats to resilient seals. Depending on application, butterfly gates can be provided with three side and four side sealing options.

Seals are mechanically retained by means of a corrosion resistant retainer and stainless-steel screws. Vane mounting post is equipped with self-lubricating bushings for trouble-free maintenance and longer service life.

Although the gate assemblies are furnished factory set, they can be field adjusted without any special tools to achieve desired seal compression and leakage requirement.

ACTUATION:

Jash offers Manual and Power operation for Butterfly gates.

Manual Actuation: This operator is equipped with handwheel, crank, or nut input along with adjustable travel stops and a self-Locking feature.

Electric Actuation: Available for open-close or throttling service, complete with limit switches and torque switch as required. Manual override is standard. Also available for modulating service with position feedback for continuously adjustable automatic controls. Complete accessories are available and include indicator lights, integral reversing starters, pushbuttons, potentiometers, space heaters, sensors, transmitters, transducers, and other control features.

MATERIAL OPTIONS:

The client selects and specifies material of construction of various components from the following alternatives based on the application and requirement. If required, material of construction other than those listed below can also be offered upon specific request.

We always recommend stainless steel frames because they are permanently submerged.

Components	Material
Gate Disc / Gate Leaf	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507) / HDPE
Frame	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Seal Seats	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Resilient Seals	Neoprene / EPDM rubber (D2000)
Seal Retainer Bars	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Stem	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Assembly Fasteners, Studs and Anchors	Stainless steel (304, 316) / Duplex steel (2205) / Super duplex steel (2507)



1950 x 1900 mm Super Duplex Stainless Steel Turning Valve for Pulau Tekong, Singapore

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 or heavily reinforced to be freestanding.

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.

Jash offers size range 1200 x 1200 mm up to 3600 x 3600 mm square or rectangular with the head range as per the project requirement and up to 150 meter 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.

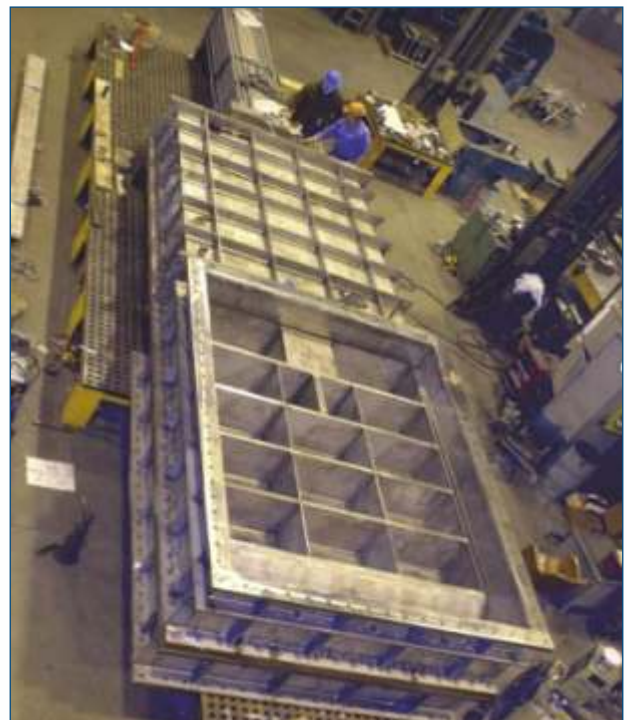
The bonnet houses the gate leaf in the open position. It bolts to the body and the bonnet cover. The bonnet may either be of cast steel or structural steel in welded construction. It is ribbed to provide proper anchorage with surrounding concrete and withstand the hydrostatic pressure of concrete or,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

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.



1200 x 1200 mm Stainless Steel Bonneted Gate, Confederated Salish & Kootenai Tribes, Ronan, MT, USA



2400 x 3650 mm Stainless Steel Bonneted Gate for Ft. Smith Dam, AR, USA

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.

MATERIAL OPTIONS:

The client selects and specifies material of construction of various components from the following alternatives based on the application and requirement. If required, material of construction other than those listed below can also be offered upon specific request.

We always recommend stainless steel frames because they are permanently submerged.

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.

Components	Material
Slide / Gate Leaf	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Body, Bonnet and Bonnet Cover	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Track	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Body and Stuffing Collar	Structural steel (A36) / Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Gland Stuffing Box	Stainless steel / Duplex steel
Seal Seats	Stainless steel (304, 316, 304L, 316L) / Duplex steel (2205) / Super duplex steel (2507)
Metallic Seals	Bronze (B98, B21, B584)
Resilient Seals	Neoprene / EPDM rubber (D2000)
Bushing and Bushing Collar	Bronze (B584)
Stems	Stainless steel (304, 316, 304L, 316L, 17-4PH) / Duplex steel (2205) / Super duplex steel (2507)
Assembly Fasteners, Studs and Anchors	Stainless steel (304, 316) / Duplex steel (2205) / Super duplex steel (2507)

PRODUCT IMAGES



11000 x 5700 mm Structural Steel Tainter Gate for LL Anderson Dam, CA, USA



3000 x 3650 mm Structural Steel Bulkhead Gates for Indianford Discharge Capacity Upgrades, Rock County, WI, USA



1700 x 1400 mm HDPE Tilting Weir Gate for Lok Man Chau Project, Hong Kong



2100 x 3600 mm Structural Steel Stop Logs for Catskill and Delaware Water Treatment Facility, NY, USA



12000 x 600 mm Stainless Steel Bascule Crest Gate for Chocolate Bayou, TX, USA

Jash Engineering also brings to you a wide range of products in cast iron, composite and steel construction so as to meet most of the flow control application

For more information about our products or to contact sales representative, visit the Jash Engineering website www.jashindia.com or call at any of our offices.



STAINLESS STEEL SLIDE GATE



STAINLESS STEEL FLAP GATE



ALUMINUM STOP LOGS



CAST IRON SLIDE GATE



CAST IRON FLAP GATE



COMPOSITE SLIDE GATE



JASH ENGINEERING LTD.

31, Sector 'C', Industrial Area, Sanwer Road,
Indore – 452 015 (M.P.) India
Phone: +91-731-6732700
Website: www.jashindia.com
E-mail : info@jashindia.com

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