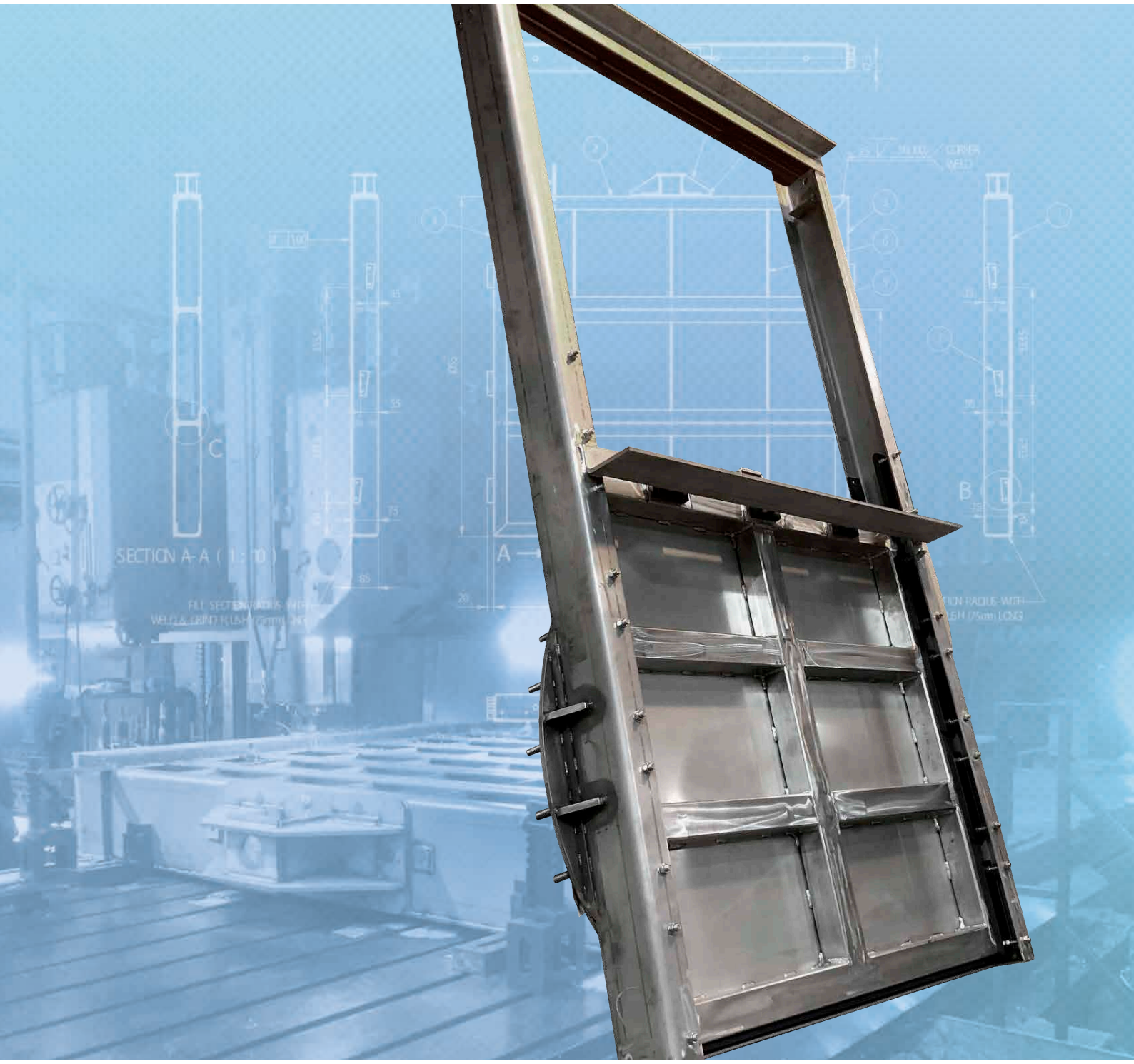
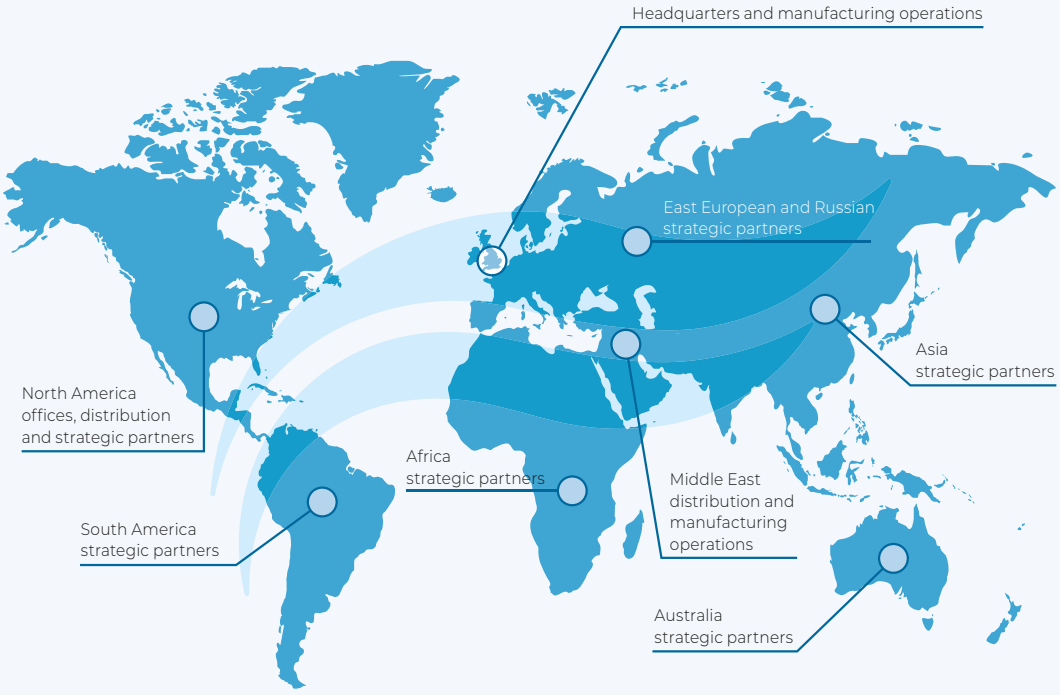
FLOW CONTROL GROUP



# Product Range Catalogue

High Performance Penstocks, Slide Gates, Flap Valves, Stop Logs,
Hydrostatic Valves, Decanting Arms and Ancillaries

COTSWOLD VALVES | FLOW CONTROL | COTSWOLD PENSTOCKS | COTSWOLD PIPELINES | INTOVALVE




**As part of the Flow Control Group, Cotswold Penstocks provides global coverage with local service and fast delivery of stock items from multiple distribution hubs.**

We work closely with our network of global partners to design, develop, deliver and install flow control solutions wherever you are.

FLOW CONTROL GROUP

**The Flow Control Group, incorporating Cotswold Valves Limited, Cotswold Penstocks Limited, Intovalve Limited and Flow Control Company Limited, offers customers solutions to suit their individual flow applications.**

Our philosophy is to work closely with customers and our supply partners to deliver products and services that offer value for money on initial purchase, and an enhanced whole life cost solution, providing industry leading TOTEX results.

Backed by our own engineered and manufactured products, and with access to a complete range of international valve brands, The Flow Control Group can supply valve, penstock and actuator packages to suit any end user applications.

### Cotswold Valves Limited
Specialists in manual and actuated valves for the water, waste-water, sewerage, and industrial sectors.

### Flow Control Company Limited
Specialists in manual and actuated valves for the oil and gas sectors.

### Cotswold Penstocks Limited
Specialists in the design, manufacture and installation of fluid level management equipment including penstocks, flap valves, stop logs, hydrostatic valves and floating arms.

### Cotswold Pipelines Limited
Specialists in pipes, pipe fittings, couplings, flange adaptors in a wide range of materials.

### Intovalve Limited
Specialist exporter of penstocks and ancillary flow control equipment to the Middle East.

The Flow Control Group supply products to customers throughout the world and have experience of dealing with all aspects of export. Our export team will assist with all aspects of documentation packing and delivery.

### Our services include:
- Valve and actuator packages
- Penstock and fluid level management packages
- Valve, penstock and actuator refurbishment and replacement
- Flood defence products
- Environmental Water Management Solutions
- Site surveys
- Hydraulic, pneumatic and electric actuation
- Full installation service CSCS carded employees confined space trained electrically and mechanically qualified
- Asset health checks
- Design and manufacture of ancillary equipment
- Design and Engineering services
- Full commissioning of valves and actuators
- Consultancy and product selection advice
- Technical services and support including training
- Worldwide coverage
- Export support including documentation packing and delivery

### We supply product for use in the following applications:
- Oil and Gas
- Engineering / Design Firms
- Industrial Processing
- Pipeline & Storage
- Refineries
- Marine / Offshore
- Municipal / Wastewater
- Food Processing
- Power Plants
- Specialist Applications

COTSWOLD VALVES | FLOW CONTROL | COTSWOLD PENSTOCKS | COTSWOLD PIPELINES | INTOVALVE

**Cotswold Penstocks design, manufacture and install penstocks, slide gates, flap valves, stop logs, hydrostatic valves and decanting arms with class leading reliability, performance and quality.**

Investment in research and development allows us to use cutting edge design and manufacturing techniques and quality control procedures to supply industry leading products to our customers. Our engineers have been responsible for significant development to the state-of-the-art design of penstocks and other flow control equipment over the last 20 years, driving standards higher and tackling ever more demanding customer requirements.

Cotswold Penstocks services both the UK and overseas markets. Our installed base ranges from single items of flow control equipment operating on private facilities to large utilities providers where hundreds of penstocks, valves and ancillary products are operating 24/7 providing control to water, wastewater and process applications.

The industries and sectors served by the business are varied, including water and wastewater treatment, sewage, desalination, flood control, materials handling, breweries, dairies, environmental protection, agriculture and civil engineering projects.

The quality of our products has been recognised throughout the water, wastewater and process control sectors. Our operations are ISO9001 accredited and our products are certified for use by national agencies, testing bodies and certification authorities internationally.

Our in-house testing facilities and procedures include off-seating hydro-testing, metallurgy analysis, stress testing and temperature testing.

Cotswold Penstocks can supply an unrivalled range of standard and bespoke flow control equipment. The standard range includes cast and ductile iron penstocks and flap valves as well as a range of standard slide gates.

In addition to the standard range of penstocks and valves, we design and supply bespoke solutions including heavy duty penstocks up to 10 mW.C. and custom made ancillaries and adaptations. Stop logs, hydrostatic valves and decanting arms are tailor made to customers individual operational requirements.

**A penstock, or sluice gate, is a valve featuring a sliding 'door' that is used for the control and isolation of fluids.**

## Penstocks and Sluice Gates

Controlled by a mechanically operated vertical spindle, the 'door' raises and lowers, regulating the flow of the control media. The spindles are operated either by hand or by actuators mounted to the top of the penstock, providing infinite levels of flow control, allowing users to precisely control their plant processes.

We design penstocks for a wide variety of duties from low seating to high off-seating heads in sizes from 100 to 5,000 $mm^2$. We are able to supply penstocks for wall, channel, side wall, weir and thimble mounting. Penstocks are available in open top and full frame designs

Flow Control Group can supply penstocks with a variety of operating equipment from direct operation by handwheel to complex control systems for electrical, pneumatic or hydraulic actuation.

We supply penstocks in a range of materials including Stainless Steel, Duplex, Super Duplex, Cast Iron and HDPE.

Our Stainless Steel, Duplex and Super Duplex penstocks are designed using Autodesk Inventor CAD software. We utilise finite element analysis with 3D and parametric modelling to optimise designs and tailor products to customer's individual requirements.

Our range of Cast Iron penstocks are rectangular metal faced, suitable for wall and thimble mounting, with on-seating heads up to 6 metres and off-seating heads up to 3 metres.

Cotswold Penstocks can supply penstocks for end-user mounting to existing flat surfaces or we can provide them factory fitted to your choice of headwall, penstock chamber or pipe run. We can also supply them with factory fitted actuators to suit your plant and existing network control systems.

Our design engineers work with customers to assess individual requirements and specify the exact valves needed for an application. We have over 40 years' experience in designing, supplying and fitting penstocks in all industry applications.

## Slide Gates

In addition to our penstocks, we manufacture a range of slide gates for use on lower pressure applications. These operate in a similar manner with the door sealing via parallel fixed seals.

## Quality Commitment

We recognise the importance of product quality for the safety and protection of personal health and protection of property. Our resources are focussed to providing clients with first class products at competitive prices – designed, manufactured, inspected and tested in accordance with the client's specifications and complying with all relevant international standards.

## Manufacturing Standards

The Flow Control Group operates an accredited ISO9001:2000 quality management system. We manufacture in accordance with BS 7775, AWWA C501 and other international standards as required.

## Industry Terminology

The British Standard (BS) and American Water Works Association (AWWA) authorities use different terminology for penstock valves. This brochure uses BS terminology and a conversion guide is provided below:

| BS 7775 | | AWWA 501 |
|---|---|---|
| Penstock | ⟷ | Sluice Gate |
| Door | ⟷ | Slide |
| Spindle | ⟷ | Stem |
| Spindle Nut | ⟷ | Thrust Nut |
| Spindle Protection | ⟷ | Stem Cover |
| Metal Seal | ⟷ | Sealing Face |
| Resilient Seal | ⟷ | Seal |
| On-Seating Head | ⟷ | Seating Head |
| Off-Seating Head | ⟷ | Unseating Head |
| Head measured from invert of aperture | ⟷ | Head measured from centreline of aperture |

Penstocks can be used in a wide range of applications and the particular operating environment, control media and application requirements will determine the specific penstock design.

The selection of the correct penstock for an application depends on a number of factors. Our engineers will work with you to analyse your requirements and specify valves, ancillary products and systems.

Our knowledgebase and experience allows us to provide solutions that will be engineered to your individual applications.

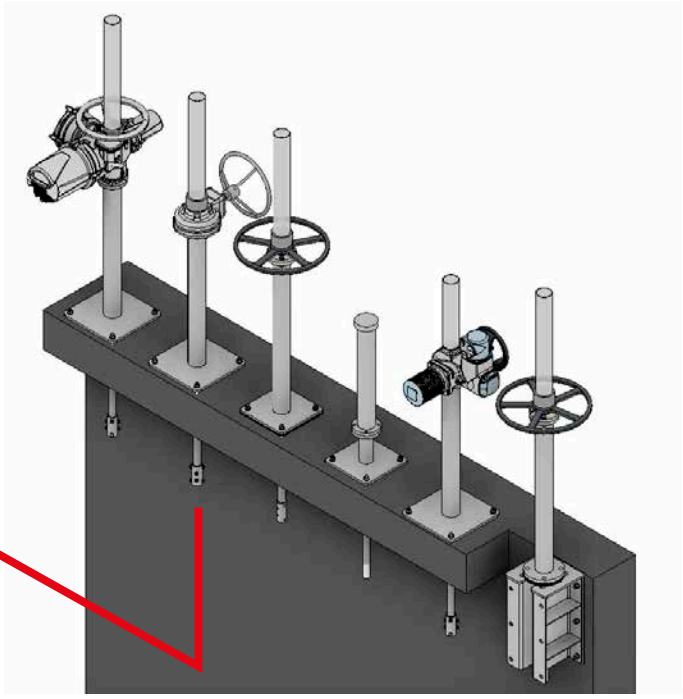
When designing a penstock our engineers will need certain information including the following:

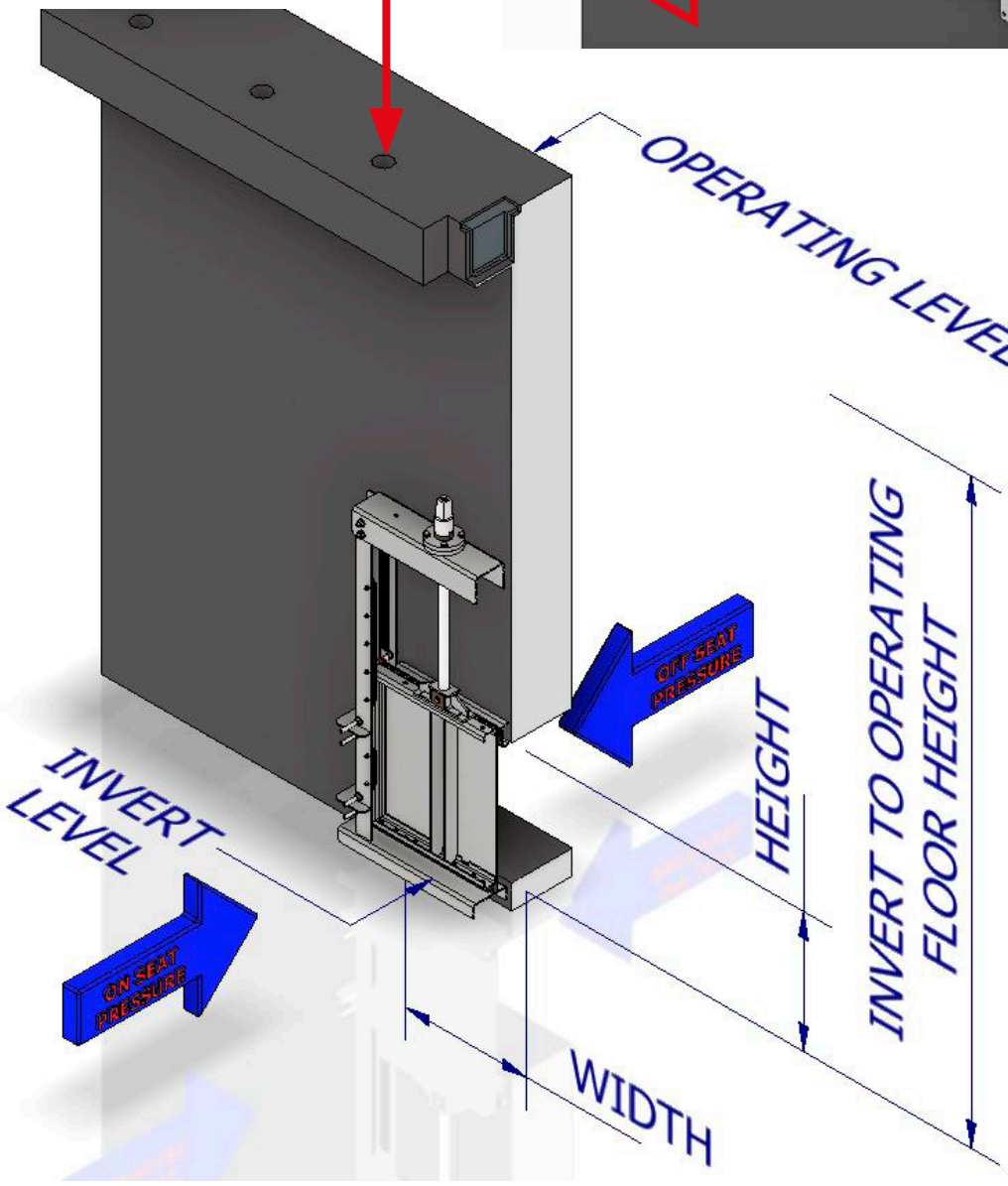
- Details of the application and frequency of operation. Make up of fluid passing through the valve and whether the valve opens infrequently or is required to be constantly modulating.
- Details of the gate size and details of the aperture.
- Information regarding the direction of flow. This will affect which face of the gate has pressure applied to it and therefore whether the sealing face is under pressure.
- Data or calculation detailing the differential head across the gate both vertically and horizontally under static conditions, opening conditions and closing conditions.
- Information on the method to be adopted for mounting / installation of the penstock - wall, channel, pipe or thimble.
- Details of the construction site including access and any space restrictions – This will determine if the penstock will be designed using a rising stem or a non-rising stem be used.
- Operational information setting out preferred method of operation - if actuated, what actuators and control systems are currently used on site. If manual, what gearing and locking methods are required.
- Are there any accessory requirements - additional equipment mounted to valve or needed to operate valve.

A guide to the information we will require is set out over the following pages and summarised in the table below. We can assist with collating this information by carrying out a site survey or you can supply us with the details.

| Selection Information |
|---|
| Details of Application – including media |
| Invert level |
| Coping level |
| Operating level |
| Height of opening |
| Width of opening |
| Fixing method |
| Pressure and direction of flow |
| Sealing face |
| Rising or Non-rising |
| Method of operation |

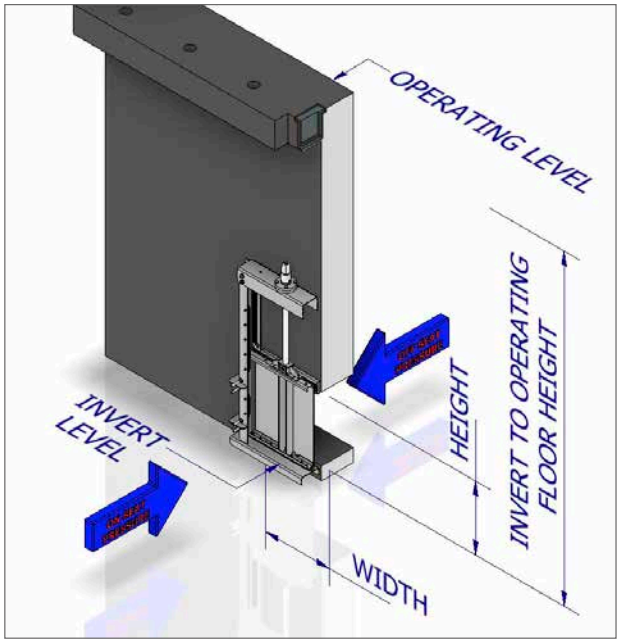
The following pages provide explanations that will allow identification of the most appropriate product for an application and assist in designing a penstock which caters for a customer's bespoke application.

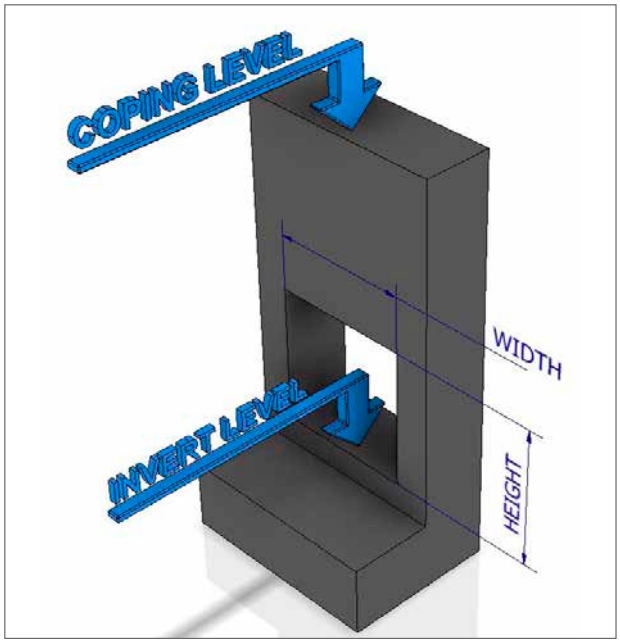



OPERATING LEVEL
INVERT LEVEL
OFF SEAT PRESSURE
ON SEAT PRESSURE
HEIGHT
INVERT TO OPERATING FLOOR HEIGHT
WIDTH

## Design Specification Terminology

To design a penstock we will need certain measurements including invert level, operating or coping level, invert to operating floor level, width and height of the opening.

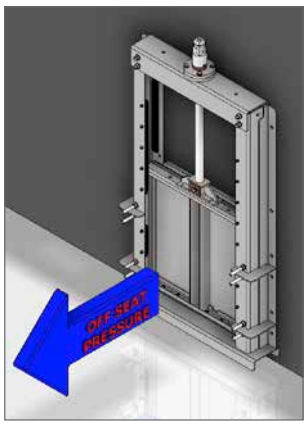


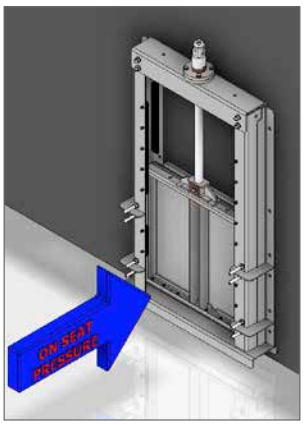

## Pressure and Direction of Flow

Critical to penstock design is understanding the pressures under which the product is to operate. This will include the differential head, the direction of flow and the nature of the operating pressure.

Direction of flow is also referred to as seat pressure.



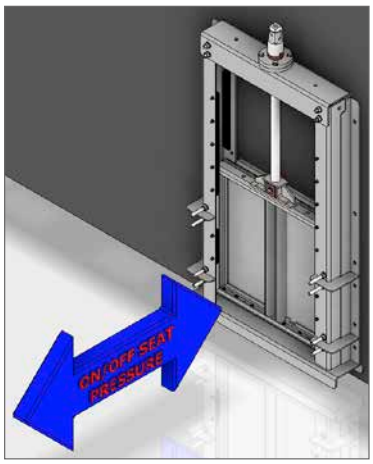

Off-Seat Pressure




On-Seat Pressure

Off-Seat pressure – where the flow of the liquid is against the rear of the gate

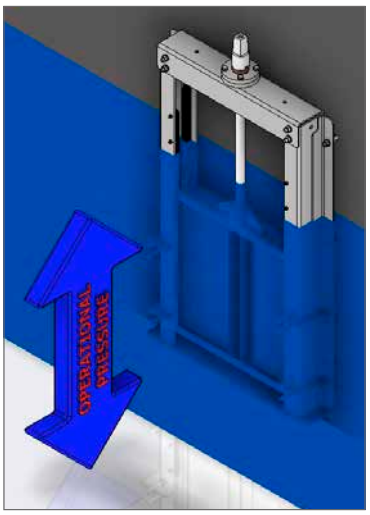
On-Seat pressure – where the flow of the liquid is towards the front of the gate.



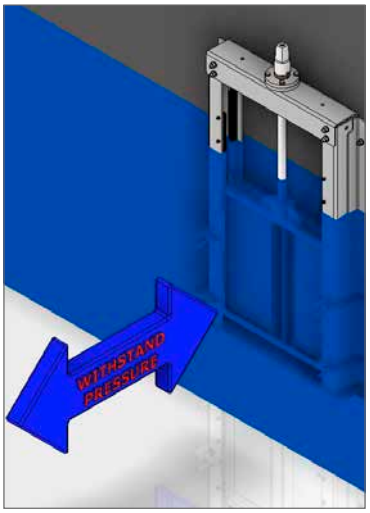

On- and Off-Seating pressure – where the flow of the liquid is on both the front and rear of the gate i.e. fluid can flow in both directions.

## Operating Pressure

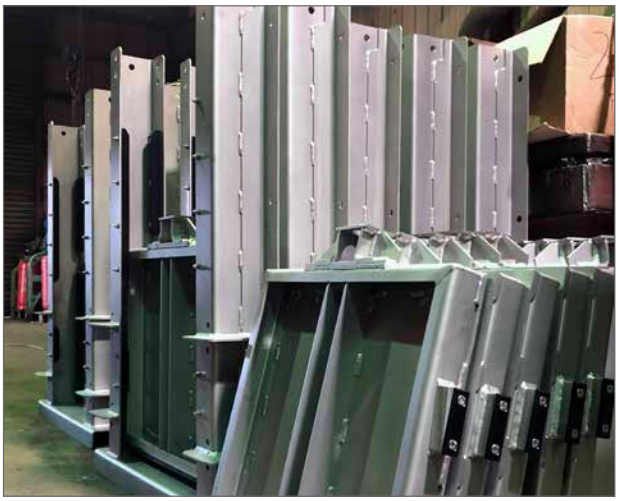
Our engineers will assist in the calculation of how much pressure will be applied to the faces of the gate in both normal and worst case scenarios.




Operational pressure – when the product is required to work against a rising or falling pressure.

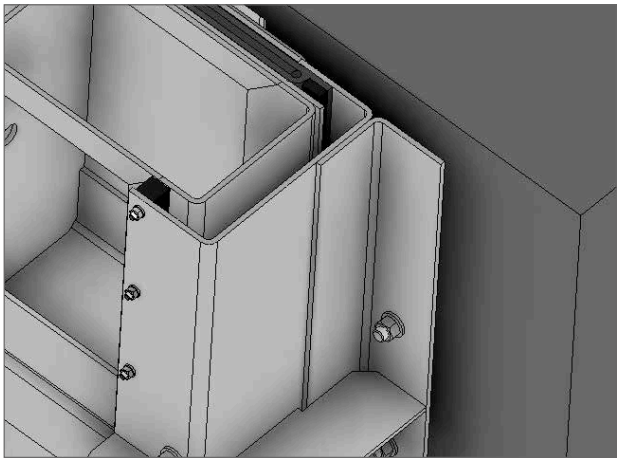



Withstand pressure – when the product is required to work against and withstand pressure

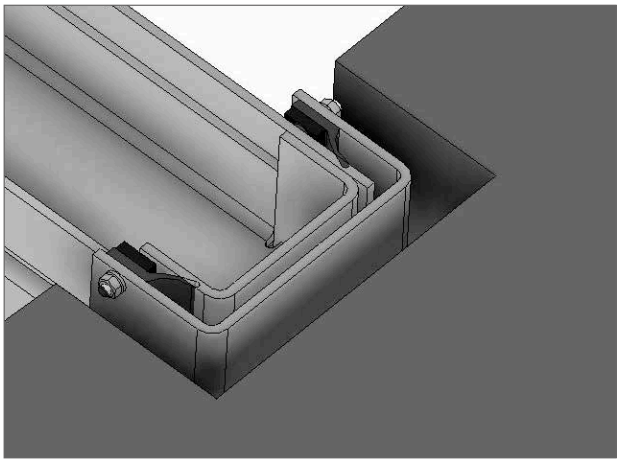


## Fixing Method

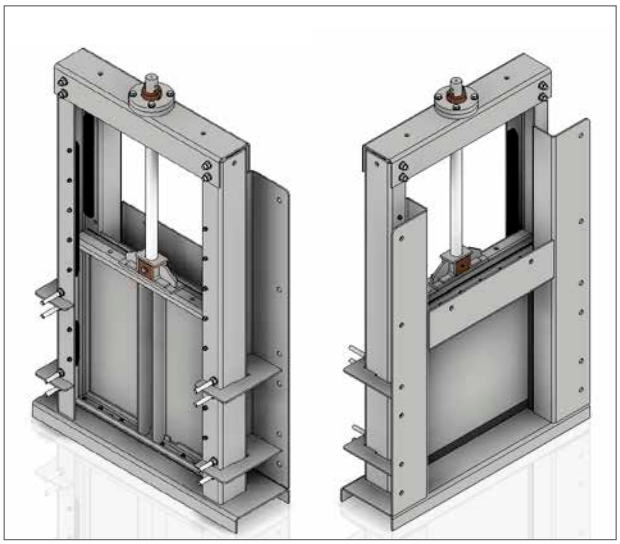
A number of different fixing methods are available with the penstock being designed accordingly. These include wall mounting, channel mounting (either within a rebate or to the side wall of the channel) or wall thimble mounts. The diagrams below illustrate the different options with the final choice often dependant on the plant design, but in the case of thimble mounted penstocks this is often determined by the pressure requirements.



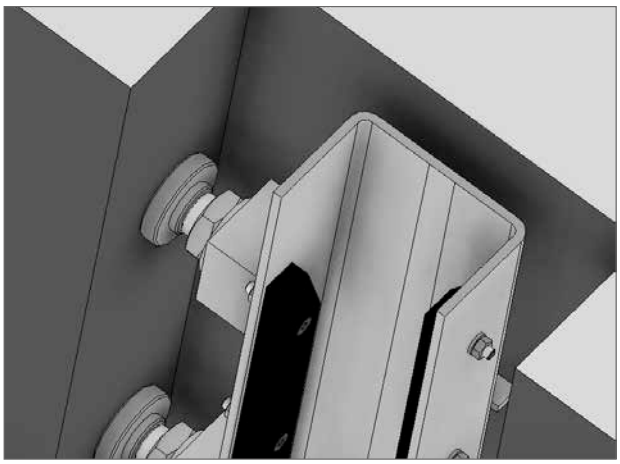
Wall mounted – Fixed to the end walls of channels, chambers or fluid chambers



Channel mounted within rebate – Installed within the channel. The rebate will be prepared as part of the civil structure.



Wall thimble mount – Where there is a requirement for a high off-seat pressure it is possible to mount the penstock onto a wall mounted thimble which is incorporated in the civil structure at the time of construction. The penstock is then attached to the thimble at a later date.



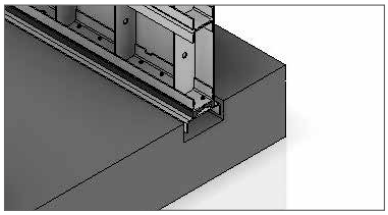
Demountable – Where there is a requirement to withstand and operate against a high off-seat pressure the penstock is fixed into the civil structure allowing for the removal / demounting of the penstock for periodic and planned future maintenance.

## Sealing Options

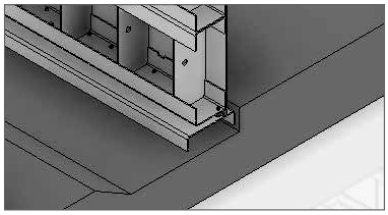
A key feature of the design and the resultant flow characteristic of a penstock will be the sealing arrangement, both in relation to the invert and the sealing faces. Seal choice depends on the media being controlled, the pressure and the direction of flow.

## Invert Options

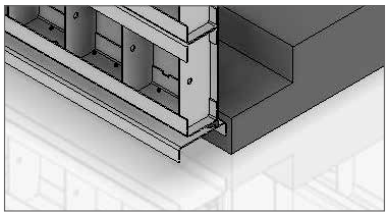
The invert sealing arrangement is often determined by the civil design, with penstocks designed to accommodate. Where a civil design is to be designed to suit a penstock, the following should be considered:



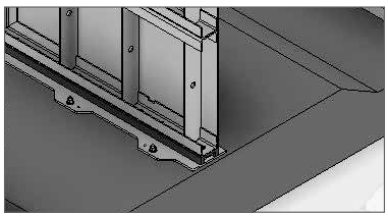
Flush invert – provides an uninterrupted flow, does not affect the hydraulics and provides no invert debris trap. Used where penstocks are channel rebate and/or demountable.



Rebate – where the design uses bottom wedges as with cast iron, or provides the opportunity to take higher load at the invert with additional civil fixings. It also allows a grit trap to be added into the hydraulics of the system/process.

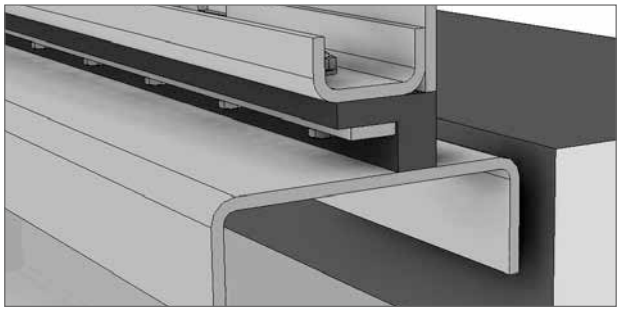


Conventional rebate – Where the Penstock is positioned up a wall and requires additional invert fixings



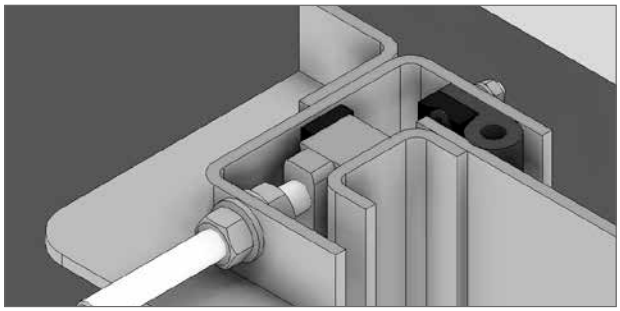
Flat plate invert – where the civils are existing and there is no possibility of creating a flush type rebate invert, this provides the best solution to smooth passage for the hydraulics and reduces grit trap concerns.

## Seals

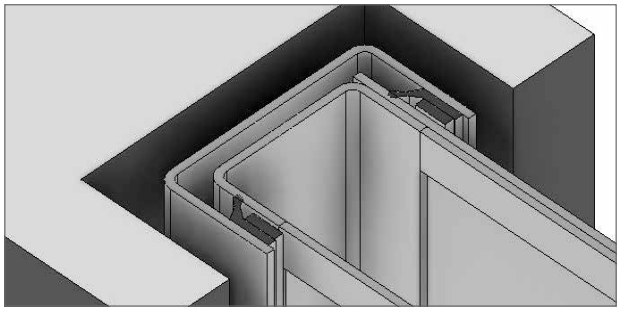


L Seal – Typically the seal used on an invert face will be an 'L' seal. This will be mechanically fixed to allow future maintenance.

Other seals are mechanically fixed to the door and / or frame of the penstock and are determined by operation and pressure factors. Cotswold Penstocks use two different types of seal – a 'P' seal (single or double) or a 'W' seal.



P Seal – EPDM 'P' seal found on wall mounted products and for high duty applications. Can be single 'P' or double 'P'. Double 'P' is specified to provide a pressure drop across the seal and aid experienced near drop tight solutions.



W Seal Wiper – EPDM 'W' seal found on door depth pressure penstocks and handstops etc.

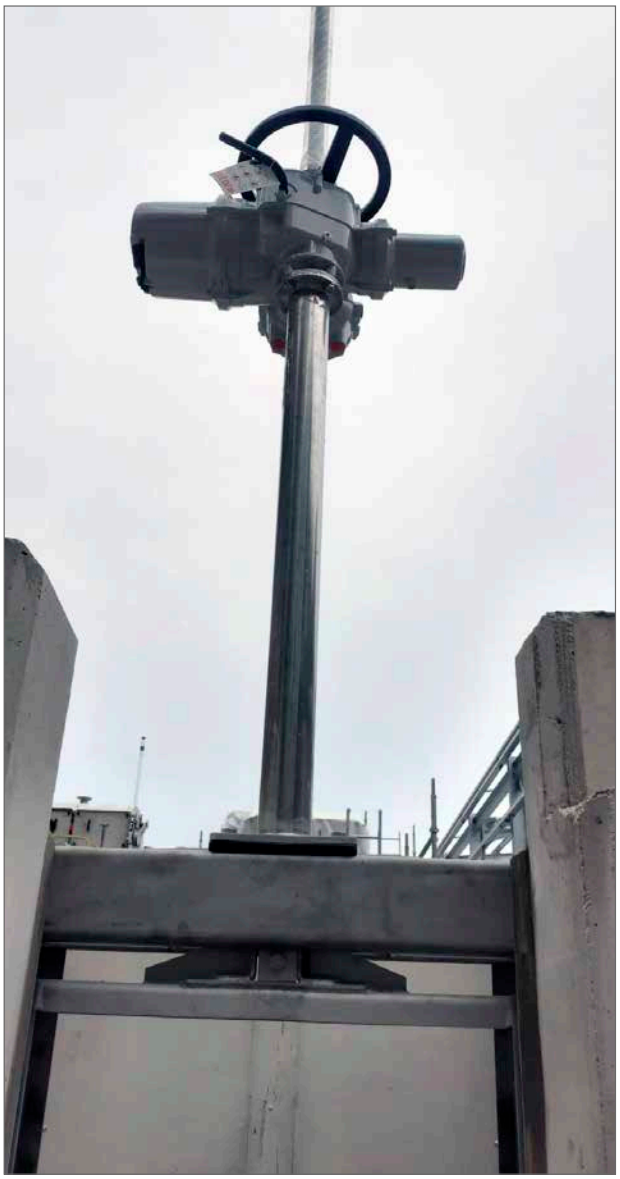
Bespoke seals – Cotswold Penstocks can also design bespoke sealing arrangements for high pressure and aggressive media applications.

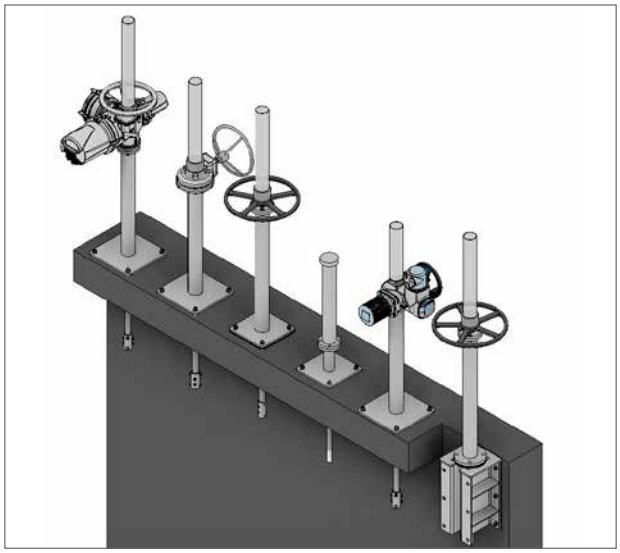
## Operation

All penstocks operate via a spindle or stem. The design of the spindle is determined by the operational requirements of the penstock including the force required to operate the penstock. A key decision in any design will be whether the spindle is to be a rising or a non-rising type. This is largely determined by space but also influenced by health and safety considerations.

### *Stem Types Rising or Non-Rising?*

Both types have advantages and disadvantages. Non-rising stem takes up less space and rising stem requires more space. The recommended stem type under BS7775:2005 is for rising. Here we offer explanations for both types:

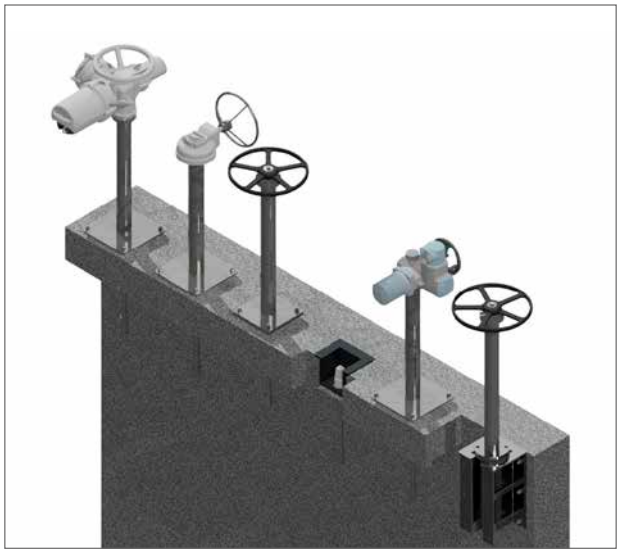




### Rising stems

**Advantages**: The screw has no contact with the control media, offers easier maintenance, easier to lubricate, offers visual indication of gate position, offers lower torques thus reducing the operator sizes and increases the working life of the product.

**Disadvantage:** Requires room above Penstock for stem rise.



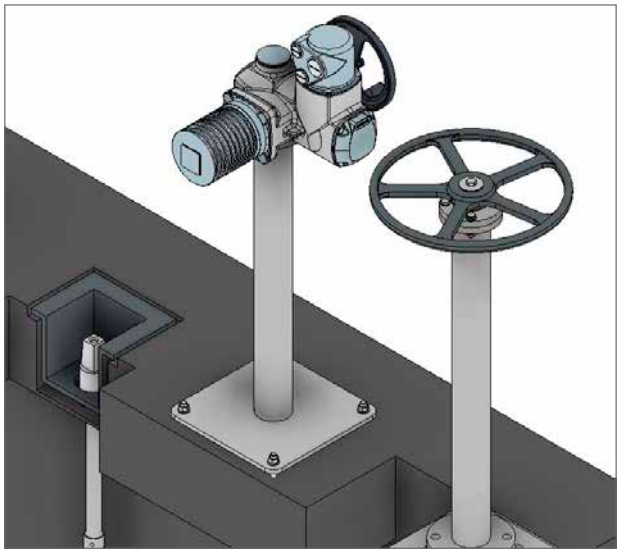
### Non-Rising stems

**Advantage:** Suitable if space is tight, restricting rise of stem.

**Disadvantages:** Screw threads are exposed to the control media which could foul the threads. No visual indication of the gate open/closed (requires an additional facility to provide indication at operator level).

## Accessories

Flow Control Group can supply a range of couplings and adaptors for connecting sections of spindles together where the operating level is raised. This includes spindle adaptors, muff couplings and universal joints. We are also able to supply a range of spindle guides and pedestals.



## Operators

Penstocks can operate via a handwheel alone, a handwheel utilising a gearbox or via an actuator.

Electric, hydraulic and pneumatic actuators are all suitable for penstock operation.

Cotswold Penstocks engineers can assist with the selection of operating methodology and the sizing of actuators.

## Actuation

Our industrial partners have been manufacturing valve actuators for more than 60 years. We work with various manufacturers to bring you the most cost effective and applicable solutions for your actuation requirements.

We can supply and install valve actuator packages with torque ranges from as low as 5 Nm up to 850,000 Nm.

- Hydraulic Actuators
- Pneumatic Actuators
- Electric Actuators
- Gear Operators
- Instrumentation
- Accessories

## Penstock and Actuator Packages

Our Factory Fit services provide combined penstock and actuator solutions, tailored to your specifications. We are able to install on-site and provide maintenance support throughout the life of the products.

In addition, our site service specialists can assist you in planning predictive maintenance schedules that will minimise your plant downtime and, where necessary, plan and execute valve replacements.

- Factory fitted solutions
- On-site Installations
- Lifetime maintenance support
- Predictive maintenance scheduling
- Planned obsolescence and damage replacement

## Material Selection

Having determined the operational information for the penstock we can start to look at the basic frame types available. We then need to look at materials selection to meet expected valve performance, compatibility with the installation environment and suitability for the control medium.

Material selection will depend on the application being considered. The table below sets out some features and benefits of standard penstock materials. For more specialised applications e.g. dockyard operation, desalination or operation in aggressive environments other material options are available.

## Penstock Materials

Our standard ranges of penstocks are available in materials including cast iron, mild steel, stainless steel and HDPE. We can also design, manufacture and install penstocks in other materials including wood, duplex, super duplex and composite plastic. Further details including British Standards are set out below.

The materials chosen will depend on a number of factors and Cotswold Penstocks are available to discuss options at the design and specification stage.

| Component | Material | British Standard |
|---|---|---|
| Frame | Mild Steel<br>Stainless Steel<br>Cast Iron | BS EN 100025 S275/S355<br>BS EN 10088 – Gr304/GR316/904L/2205/2507<br>BS1561 – Gr250 |
| Doors & Wedges | HDPE Solid plastic<br>Stainless Steel<br>Cast Iron<br>Ductile Iron | BS EN 15527 – PE300/PE500/PE1000/PE4<br>BS EN 10088 – Gr304/GR316/904L/2205/2507<br>BS1561 – Gr250<br>BS1563 EN GJS 400-15 |
| Operating Stems | Stainless Steel | BS EN 10088 – Gr304/GR316/904L/2205/2507 |
| Thrust Nuts & Drive Sleeves | Stainless Steel<br>Gunmetal<br>Aluminium Bronze<br>High Tensile Brass | BS EN 10088 – Gr304/GR316/904L/2205/2507<br>BS EN 12163, 12165, 12168 (LG1)<br>BS EN 12163, 12165, 12169 (AB2)<br>BS EN 12163, 12165, 12170 (HTB1) |
| Thrust Housings, Caps | Stainless Steel<br>Cast Iron | BS EN 10088 – Gr304/GR316/904L/2205/2507<br>BS1561 – Gr250 |
| Handwheels | Cast Iron | BS1561 – Gr250 |
| Assembly Fasteners | Stainless Steel | BS EN ISO 3506 – GrA2/GrA4/904L/2205/2507 |
| Frame Gate Seal | Phosphor Bronze | BS EN 12167 (BS2874 PB102) |
| Flush Invert | EPDM | ASTM2000 |
| Fixing Bolts | Stainless Steel | BS EN ISO 3506 – GrA2/GrA4/904L/2205/2507 |

Penstock Manufacturing Materials

## Stainless Steel Fabricated Penstock

### Applications

- Inlet works STW
- Grit traps
- Primary sedimentation
- Secondary sedimentation
- Distribution chambers
- Tertiary
- Outlets
- Pump stations
- Sea defence
- Water treatment inlets
- Water treatment backwash filter beds
- Flood defence
- Highways
- Petrochem
- Food processing
- Landfill
- Airports

### Advantages

- Impact resistance
- Freezing temp resistance
- Corrosion resistance
- Bespoke Design
- Heavy Duty
- Easy to install
- low/easy maintenance
- Reduced loads
- Low friction seals
- Available size range
- Available pressure range

## Cast Iron Penstock

### Applications

- Inlet works STW
- Grit traps
- Primary sedimentation
- Secondary sedimentation
- Distribution chambers
- Pump stations
- Sea defence
- Water treatment inlets
- Water treatment backwash filter beds
- Flood defence
- Highways
- Petrochem
- Food processing
- Landfill
- Airports

### Advantages

- Impact resistance
- Heavy Duty
- Available size range
- Available pressure range

## Stainless Steel Slide Gate

### Applications

- Distribution chambers
- Tertiary
- Outlets
- Pump stations
- Sea defence
- Water treatment inlets
- Petrochem
- Food processing
- Landfill
- Airports

### Advantages

- Impact resistance
- Freezing temp resistance
- Corrosion resistance
- Bespoke Design

## Plastic Penstock

### Applications

- Primary sedimentation
- Secondary sedimentation
- Distribution chambers
- Tertiary
- Outlets
- Water treatment inlets
- Flood defence
- Petrochem
- Food processing
- Landfill
- Airports

### Advantages

- Freezing temp resistance
- Corrosion resistance
- Bespoke Design
- Easy to install
- low/easy maintenance
- Reduced loads
- Low friction seals
- Available size range

## Penstock Range

Cotswold Penstocks has an extensive standard range of penstocks available to order in a variety of materials. Our bespoke service produces custom penstock designs and material selections to suit unique customer requirements.

We can design, manufacture and install penstocks to control the flow of media in any situation. The design will, in most cases, be based on the ranges detailed in this brochure. Where special operation circumstances exist, it is possible to design bespoke penstocks for these applications.

### Cotswold Penstocks range includes:

**CV9100W**
Stainless steel fabricated penstocks – wall mounted.

**CV9103C**
Stainless steel fabricated penstocks – channel mounted.

**CV1065**
Cast iron penstocks.

**CVHDPE**
HDPE penstocks – wall mounted.

**CVS9200**
Stainless steel fabricated slide gates.

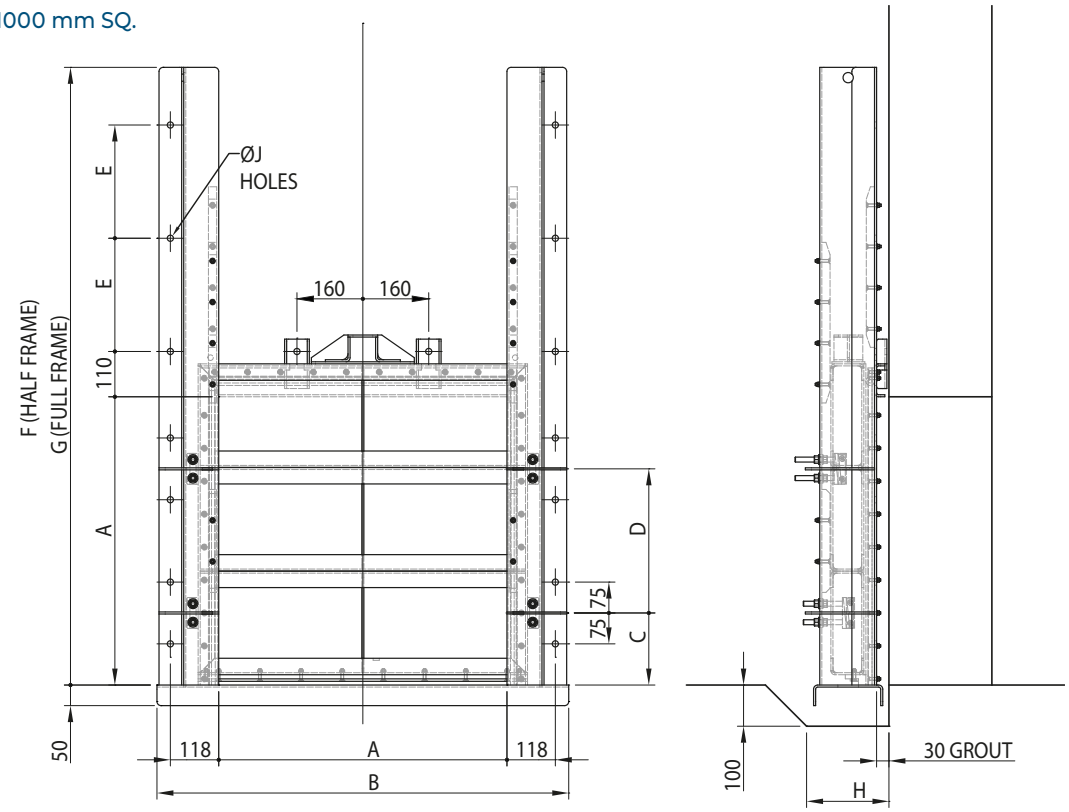
We can also design, manufacture and install bespoke high pressure penstocks.

## CV9100W Penstock

- 6 M ON 6 M OFF-SEAT PRESSURE
- Wall /Rebate Mounting Penstock
- Heavier duty 10 m, 15 m, 20 m unit and fixing systems available – details upon request
- Additional fixings for non-recessed invert applications can be provided
- Weir type or downward opening Penstocks are available

- ✓ High impact resistance
- ✓ Low temperature resistance
- ✓ Standard range and bespoke design options
- ✓ Easy installation
- ✓ Low/easy maintenance
- ✓ Low friction seals

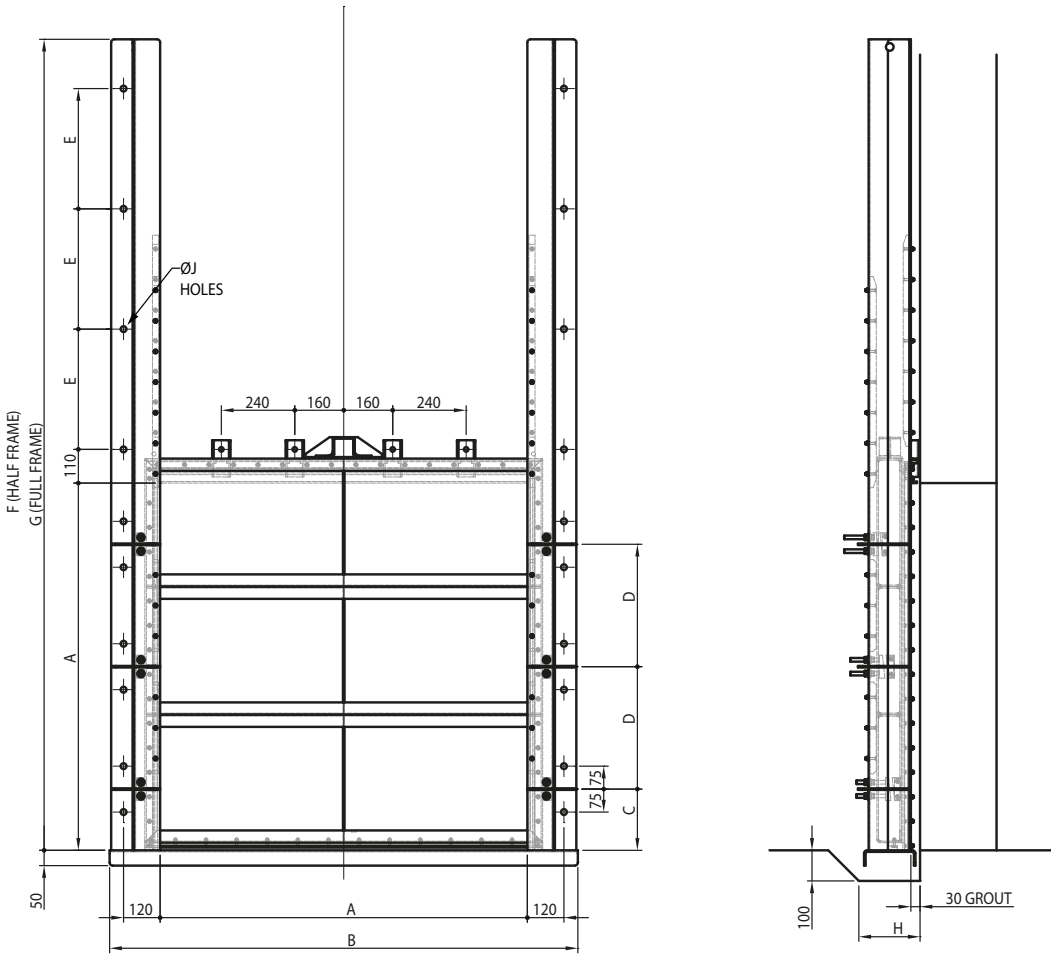
Size 500-1000 mm SQ.




| A | B | C | D | E | F | G | H | J |
|---|---|---|---|---|---|---|---|---|
| 500 | 800 | 125 | 250 | 190 | 1100 | 1250 | 200 | 15 |
| 600 | 900 | 150 | 300 | 240 | 1300 | 1450 | 200 | 15 |
| 700 | 1000 | 175 | 350 | 290 | 1500 | 1650 | 200 | 15 |
| 800 | 1100 | 200 | 400 | 340 | 1700 | 1850 | 200 | 15 |
| 900 | 1200 | 225 | 450 | 390 | 1900 | 2050 | 200 | 15 |
| 1000 | 1300 | 250 | 500 | 440 | 2100 | 2250 | 200 | 15 |
| 1100 | 1430 | 183 | 367 | 327 | 2300 | 2450 | 250 | 19 |
| 1200 | 1530 | 200 | 400 | 393 | 2600 | 2850 | 250 | 19 |
| 1300 | 1630 | 217 | 433 | 427 | 2800 | 3050 | 250 | 19 |
| 1400 | 1730 | 233 | 467 | 460 | 3000 | 3250 | 250 | 19 |
| 1500 | 1830 | 188 | 375 | 370 | 3200 | 3450 | 260 | 19 |
| 1600 | 1930 | 200 | 400 | 395 | 3400 | 3650 | 260 | 19 |
| 1700 | 2030 | 213 | 425 | 420 | 3600 | 3850 | 260 | 19 |
| 1800 | 2130 | 225 | 450 | 445 | 3800 | 4050 | 260 | 19 |
| 1900 | 2230 | 238 | 475 | 470 | 4000 | 4250 | 260 | 19 |
| 2000 | 2330 | 250 | 500 | 795 | 4200 | 4450 | 260 | 19 |

CV9100W Penstock

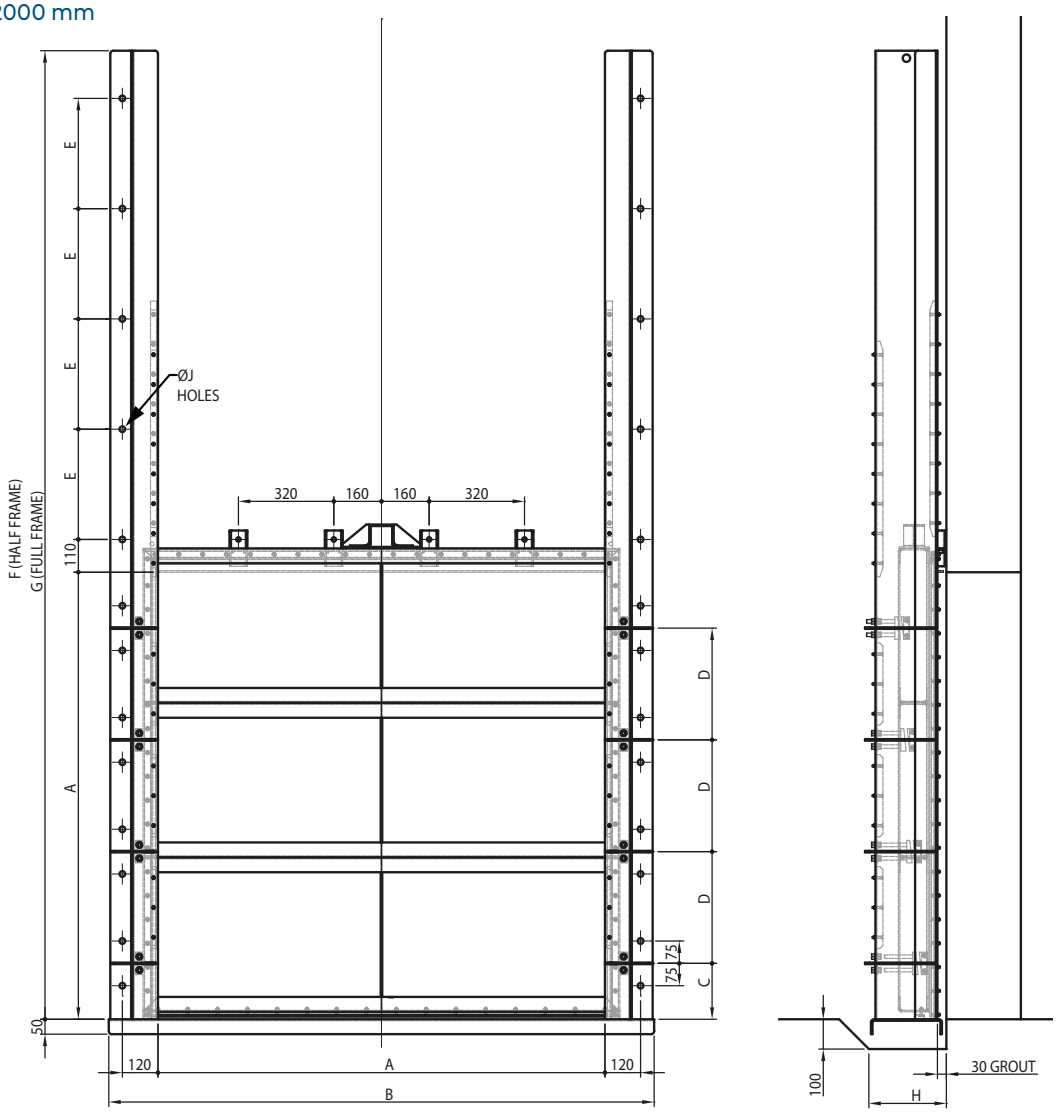
Size 1100-1400 mm




| A | B | C | D | E | F | G | H | J |
|---|---|---|---|---|---|---|---|---|
| 500 | 800 | 125 | 250 | 190 | 1100 | 1250 | 200 | 15 |
| 600 | 900 | 150 | 300 | 240 | 1300 | 1450 | 200 | 15 |
| 700 | 1000 | 175 | 350 | 290 | 1500 | 1650 | 200 | 15 |
| 800 | 1100 | 200 | 400 | 340 | 1700 | 1850 | 200 | 15 |
| 900 | 1200 | 225 | 450 | 390 | 1900 | 2050 | 200 | 15 |
| 1000 | 1300 | 250 | 500 | 440 | 2100 | 2250 | 200 | 15 |
| 1100 | 1430 | 183 | 367 | 327 | 2300 | 2450 | 250 | 19 |
| 1200 | 1530 | 200 | 400 | 393 | 2600 | 2850 | 250 | 19 |
| 1300 | 1630 | 217 | 433 | 427 | 2800 | 3050 | 250 | 19 |
| 1400 | 1730 | 233 | 467 | 460 | 3000 | 3250 | 250 | 19 |
| 1500 | 1830 | 188 | 375 | 370 | 3200 | 3450 | 260 | 19 |
| 1600 | 1930 | 200 | 400 | 395 | 3400 | 3650 | 260 | 19 |
| 1700 | 2030 | 213 | 425 | 420 | 3600 | 3850 | 260 | 19 |
| 1800 | 2130 | 225 | 450 | 445 | 3800 | 4050 | 260 | 19 |
| 1900 | 2230 | 238 | 475 | 470 | 4000 | 4250 | 260 | 19 |
| 2000 | 2330 | 250 | 500 | 795 | 4200 | 4450 | 260 | 19 |

CV9100W Penstock

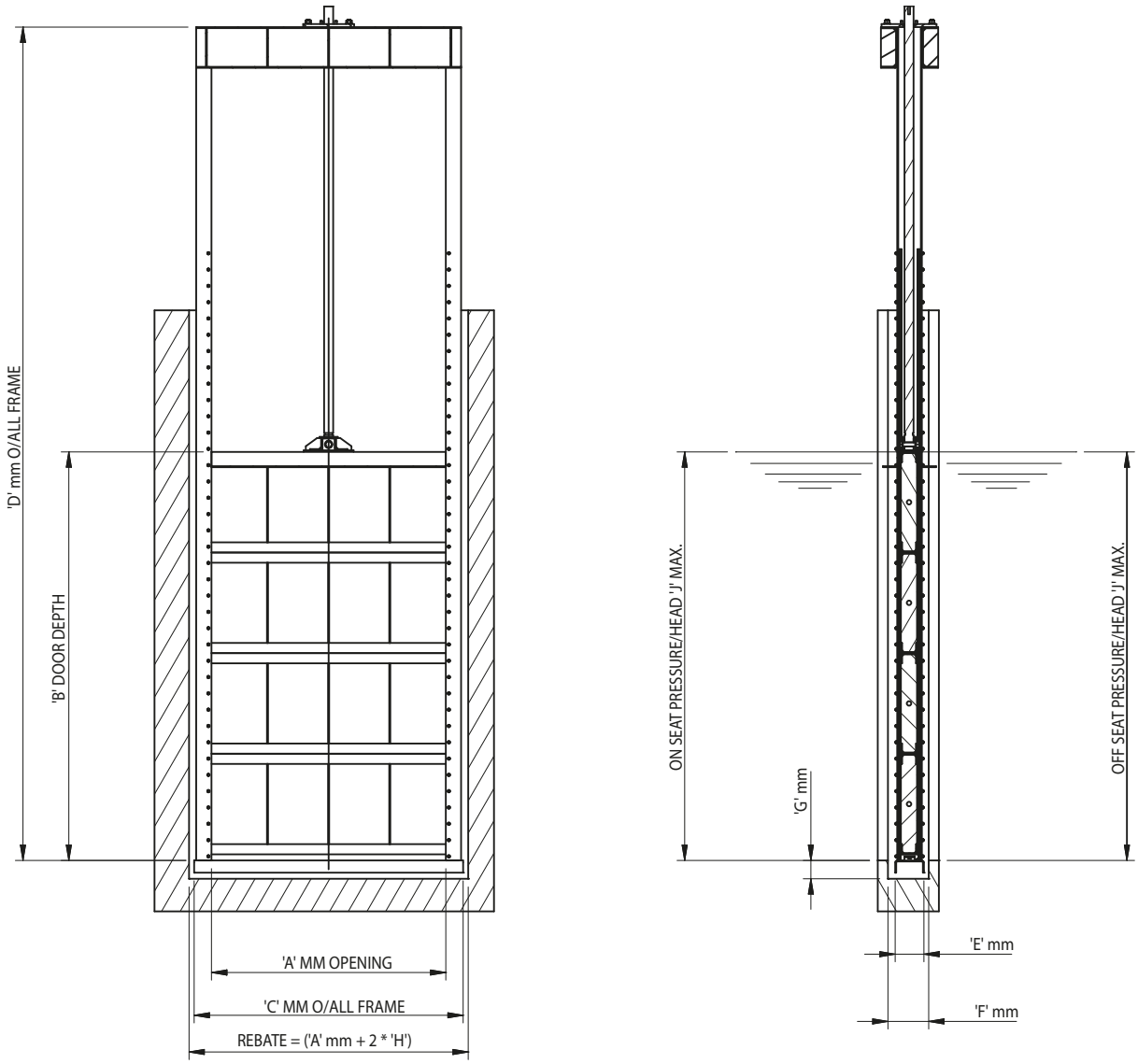
Size 1500-2000 mm




| A | B | C | D | E | F | G | H | J |
|---|---|---|---|---|---|---|---|---|
| 500 | 800 | 125 | 250 | 190 | 1100 | 1250 | 200 | 15 |
| 600 | 900 | 150 | 300 | 240 | 1300 | 1450 | 200 | 15 |
| 700 | 1000 | 175 | 350 | 290 | 1500 | 1650 | 200 | 15 |
| 800 | 1100 | 200 | 400 | 340 | 1700 | 1850 | 200 | 15 |
| 900 | 1200 | 225 | 450 | 390 | 1900 | 2050 | 200 | 15 |
| 1000 | 1300 | 250 | 500 | 440 | 2100 | 2250 | 200 | 15 |
| 1100 | 1430 | 183 | 367 | 327 | 2300 | 2450 | 250 | 19 |
| 1200 | 1530 | 200 | 400 | 393 | 2600 | 2850 | 250 | 19 |
| 1300 | 1630 | 217 | 433 | 427 | 2800 | 3050 | 250 | 19 |
| 1400 | 1730 | 233 | 467 | 460 | 3000 | 3250 | 250 | 19 |
| 1500 | 1830 | 188 | 375 | 370 | 3200 | 3450 | 260 | 19 |
| 1600 | 1930 | 200 | 400 | 395 | 3400 | 3650 | 260 | 19 |
| 1700 | 2030 | 213 | 425 | 420 | 3600 | 3850 | 260 | 19 |
| 1800 | 2130 | 225 | 450 | 445 | 3800 | 4050 | 260 | 19 |
| 1900 | 2230 | 238 | 475 | 470 | 4000 | 4250 | 260 | 19 |
| 2000 | 2330 | 250 | 500 | 795 | 4200 | 4450 | 260 | 19 |

## CV9103C Penstock

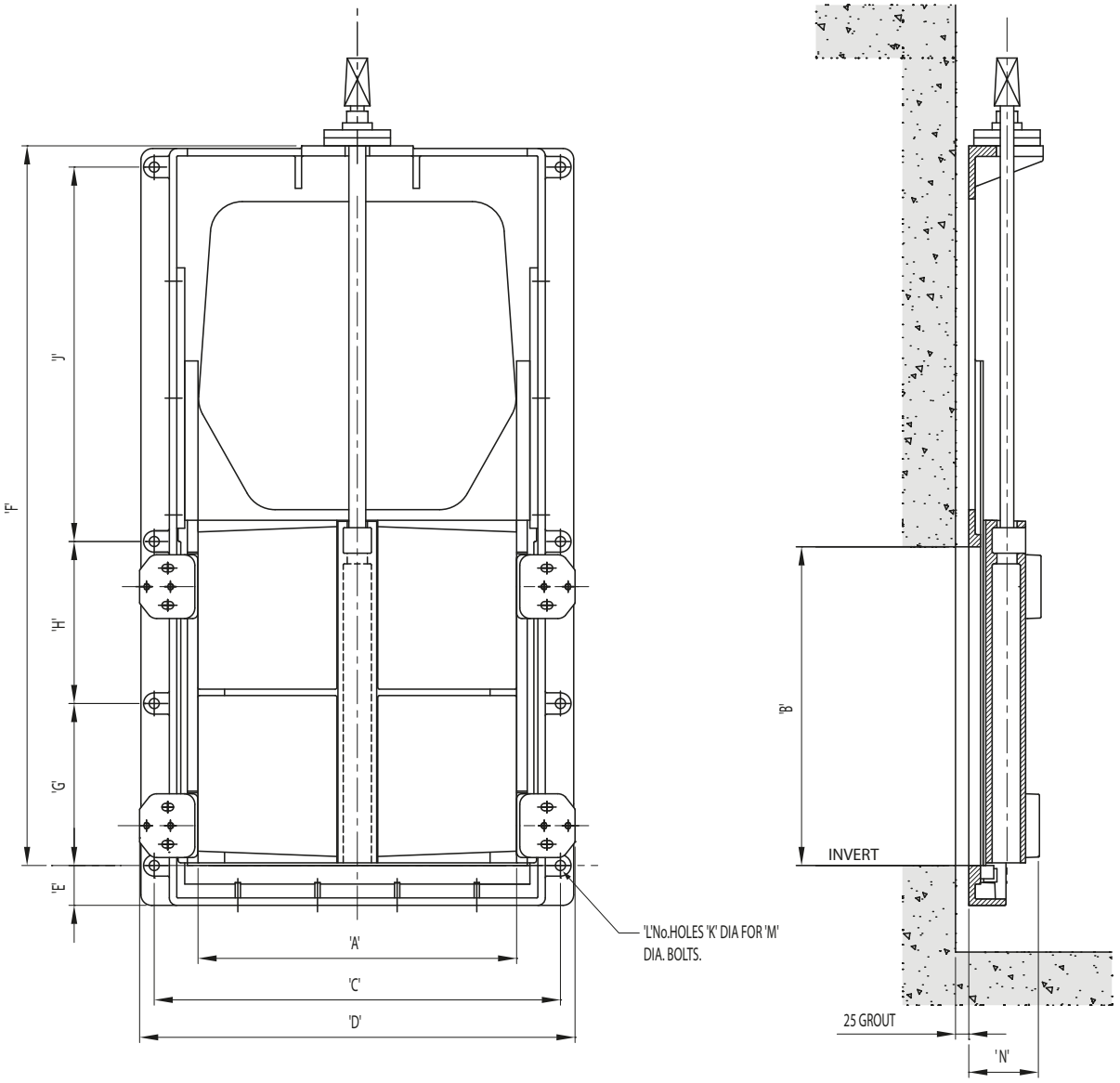
- DOOR DEPTH PRESSURE. Channel Mounting Penstock
- Rectangular designs available upon request




| A | B | C | D | E | F | G | H | J |
|---|---|---|---|---|---|---|---|---|
| 500 | 500 | 670 | 1115 | 111 | 140 | 80 | 105 | 0.5M |
| 600 | 600 | 770 | 1315 | | | | | 0.6M |
| 700 | 700 | 870 | 1515 | | | | | 0.7M |
| 800 | 800 | 870 | 1715 | | | | | 0.8M |
| 900 | 900 | 870 | 1915 | | | | | 0.9M |
| 1000 | 1000 | 870 | 2125 | 121 | 150 | 80 | 105 | 1.0M |
| 1100 | 1100 | 870 | 2325 | | | | | 1.1M |
| 1200 | 1200 | 870 | 2525 | | | | | 1.2M |
| 1300 | 1300 | 870 | 2760 | 141 | 170 | 80 | 105 | 1.3M |
| 1400 | 1400 | 870 | 2960 | | | | | 1.4M |
| 1500 | 1500 | 870 | 3160 | | | | | 1.5M |
| 1600 | 1600 | 870 | 3370 | 161 | 190 | 90 | 105 | 1.6M |
| 1800 | 1800 | 870 | 3770 | | | | | 1.8M |
| 2000 | 2000 | 870 | 4170 | | | | | 2.0M |

## CV1065 Cast Iron Penstock

- 6M ON-SEAT, 6M OFF-SEAT PRESSURE
- Wall mounting penstock
- Frame and door constructed to BS EN 1561 minimum Grade 250 cast iron
- Adustable wedge design
- To suit a wide range of operating media
- Size range up to 60 $cm^2$ available in stock for next day delivery.




| A | B | C | D | E | F | G | H | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 150 | 150 | 300 | 365 | 55 | 339 | 150 | - | 214 | 18 | 6 | 12 | 115 |
| 200 | 200 | 350 | 420 | 55 | 520 | 200 | - | 285 | 18 | 6 | 12 | 115 |
| 225 | 225 | 375 | 440 | 55 | 549 | 220 | - | 290 | 18 | 6 | 12 | 115 |
| 250 | 250 | 400 | 465 | 55 | 595 | 250 | - | 310 | 18 | 6 | 12 | 115 |
| 300 | 300 | 450 | 515 | 55 | 729 | 300 | - | 364 | 18 | 6 | 12 | 115 |
| 400 | 400 | 565 | 620 | 75 | 959 | 410 | - | 510 | 18 | 6 | 12 | 130 |
| 450 | 450 | 615 | 670 | 75 | 1055 | 230 | 230 | 550 | 18 | 8 | 12 | 130 |
| 500 | 500 | 665 | 720 | 75 | 1155 | 255 | 255 | 605 | 18 | 8 | 12 | 135 |
| 600 | 600 | 765 | 820 | 75 | 1355 | 305 | 305 | 705 | 18 | 8 | 12 | 140 |

## Weir Penstocks

Where there is a requirement to accurately control water levels, adjust flow rates, or even divert floating debris/scum away from operational equipment Cotswold Penstocks recommend that a weir penstock is used.

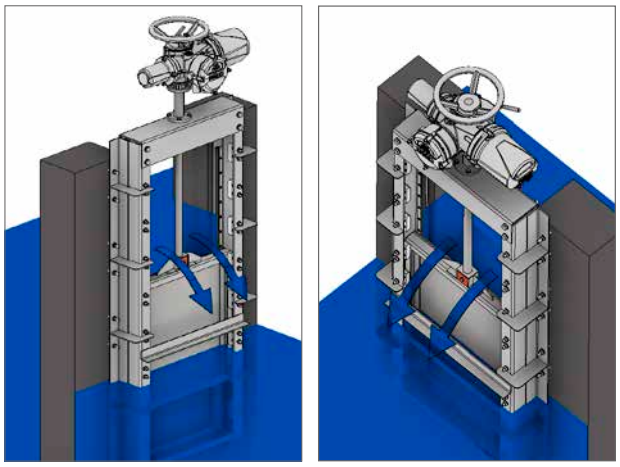
Like a traditional penstock a weir penstock comprises a sluice gate within a frame.

Where the weir penstock differs is that the gate opens downwards, regulating flow simply by adjusting the gate height either manually or automatically. This adjustment regulates the water level upstream, allowing desired levels to be maintained downstream.

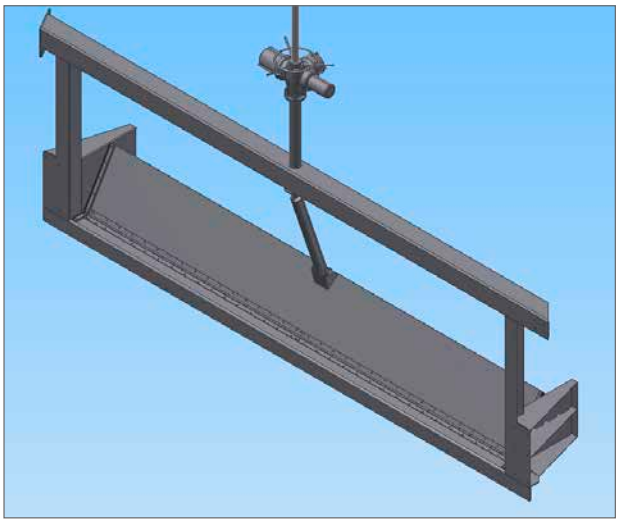
Cotswold Penstocks weir type penstocks can be supplied with broad crested, knife edge or 'V' notch weir in addition to uninterrupted flow options for precise weir measurements.

### Common uses include

- Fine accuracy water level control and flow diversion in process applications, typically 'UV ' channels.
- Penning of differing winter and summer levels
- Decanting of scum and floating debris



Weir Penstock – Permits a measured flow over a broad crest or knife edge type weir to maintain a constant upstream water level.



Tilting Weir – Allows control of upstream water levels by means of a weir plate fixed to an operating shaft. The weir plate seals off side cheeks and rotates through a 90°. The tilting weir is specified when there is insufficient levels beneath invert to permit a conventional weir Penstock.

## Leak Tolerance Standards

Due to the nature of the product, an element of leakage will often be experienced on commissioning of a penstock. Manufacturing quality standards adopted by Cotswold Penstocks minimise leakage from our penstocks with tests producing results which exceed industry standards.

BS 7775:2005 and comparable standards set out acceptable leakage rates for penstocks.

Leakage rates are defined by the amount of water which leaks through a 1 m length of seal in 1 min. BS 7775:2005 leakage rates apply to penstocks with a head of 6 m or less and widths of 2 m or less.

For penstocks with metal sealing faces subject to on- or off-seating heads up to and including 6 metres, the leakage rate shall not exceed 1.25 litres per minute per metre of seal perimeter.

e.g. CV1065 cast iron series penstock, size 600 x 600 mm, the allowed leakage rate is 0.6 x 4 x 1.25= 3 l/min.

For penstocks with resilient sealing faces subject to on- or off-seating heads up to and including 6 metres, the leakage rate shall not exceed 0.5 litres per minute per metre of seal perimeter.

e.g. Fabricated Series 9000 penstock, size 600 x 600 mm, the allowed leakage rate is 0.6 x 4 x 0.5= 1.2 l/min.

Prior to any site commissioning and leak test, it is essential that a penstock or slide gate is correctly installed. Cotswold Penstocks offer a complete installation service. Where a client wishes to install themselves we can supply full operation, maintenance and installation guidelines.

## Penstock Installation

Cotswold Penstocks supply and install penstocks for all applications. Our skilled site teams have detailed knowledge of our products and extensive experience installing them in a range of site locations internationally including:

- Water and wastewater treatment plants
- Industrial effluent plants
- Flood control
- Sewers
- Waterways
- Rivers
- Hydro-electric plants
- Industrial processing plants
- Desalination
- Spill containment

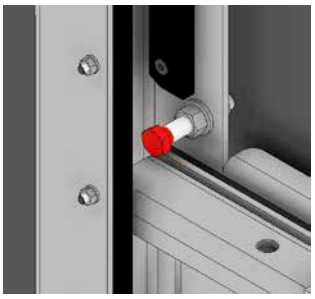
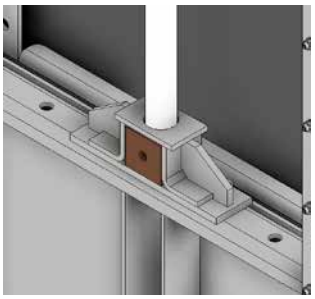
The correct installation of a penstock will not only ensure efficiency from day one, but when combined with the correct operation and maintenance regime, will provide years of trouble free performance.

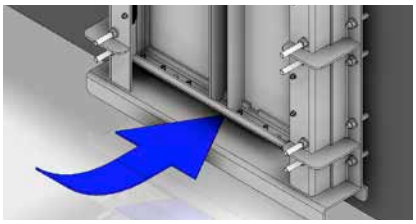
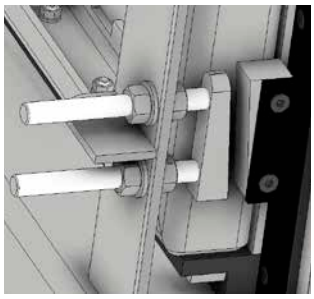
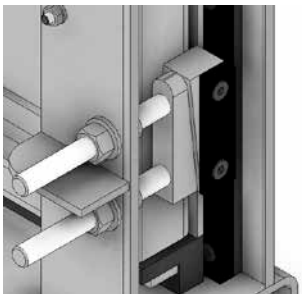
In carrying out any installation we will carry out a full site survey and produce method statements and risk assessments tailored to each installation.

Where clients wishes to carry out their own installation we provide full guidelines and can assist with advice where necessary. From experience we have identified a number of common issues relating to self-installed penstocks and set out below a troubleshooting guide to assist.

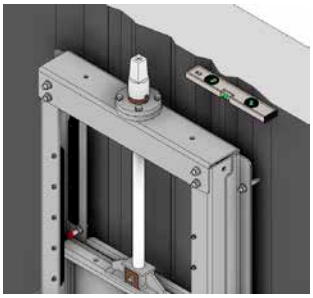
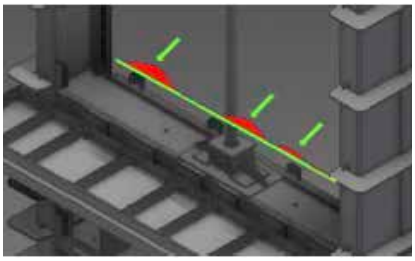
## Penstock Troubleshooting

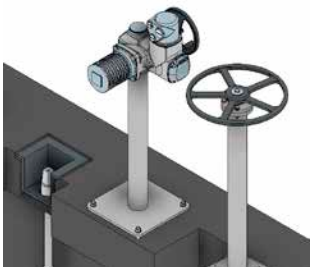
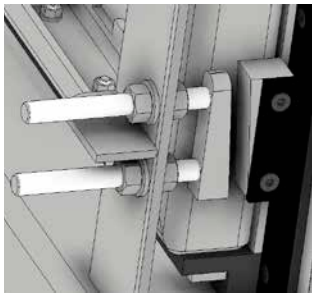
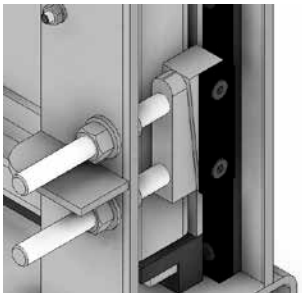
The following guide presents the most common problems experienced with self-installed penstocks. For further assistance please contact Cotswold Penstocks.

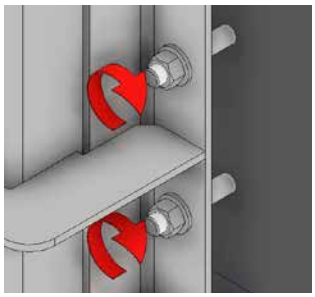
| Symptom | Cause | Remedy |
|---|---|---|
| Penstock does NOT operate - Open or close Manual and Power operation | Transit stop still fitted. | Remove transit stop SEE PIC:<br>  |
| | Power is not connected | Connect power. REFER ACTUATOR |
| | Local/stop/remote selector switch is incorrectly set | Check selector switch is in the correct position for the mode of operation required. REFER ACTUATOR |
| | Threads stripped in drive nuts or drive nuts are incorrectly fitted/ engaged/secured | Replace worn or damaged nuts and drive sleeves. Check installation is correct and threads or lift block are correctly assembled. SEE PIC:<br>  |
| | Limit and/or torque switches have tripped or incorrectly set. | Re-set switches or torque setting. Refer to actuator manufactures O & M. REFER ACTUATOR |

| Symptom | Cause | Remedy |
|---|---|---|
| Penstock fails to close | Obstruction or build-up of debris at the invert. | Open door and remove obstruction or open and close door several times to try and flush obstruction out with the flow. SEE PIC:<br>  |
| | Incorrectly adjusted wedges<br>  | Check wedges and re-adjust accordingly. SEE PIC:<br>  |
| | Torque or limit switches have tripped | 1st access the reason for the trip. Then it may be a requirement to reset or incrementally increase the torque in-line with the manufacturer's guidelines. REFER ACTUATOR |

| Symptom | Cause | Remedy |
|---|---|---|
| Excessive noise, load bang, high pitched squealing noises | Penstock door is tight in wedges or been closed for some considerable time | This is normal. Operate more frequently just to exercise the gate. Reduction in noise should result. |
| | Operating stem has not been lubricated or are covered in civil/concrete dust | Clean and lubricate operating stem. SEE PIC:  |

| Symptom | Cause | Remedy |
|---|---|---|
| Penstocks leaks in excess of the rates described in BS7775:2005 | Distorted frame during installation | Contact manufacturer follow their instructions then consider removal and re-install of the penstock to correct tolerances. SEE PIC:  |
| | Poor grouting during installation | Remove grout from affected areas and re-grout or fully re-grout the unit. SEE PIC:  |
| | Grout or other materials used during installation have been left on the faces | Clean down penstock fully removing all traces of grouting materials or debris. SEE PIC:  |

| Symptom | Cause | Remedy |
|---|---|---|
| Penstocks leaks in excess of the rates described in BS7775:2005 | Door is not closed fully. | Operate the penstocks by hand thru handwheel 'T' Key or via electric pneumatic or hydraulic actuation. SEE PIC:<br>  |
| | Torque and/or limit switches are not set. | Refer actuator manufacturers manual and reset switches. REFER ACTUATOR |
| | Loose or incorrectly set taper wedges<br>  | Re-set wedges follow manufacturers recommendations. SEE PIC:<br>  |

| Symptom | Cause | Remedy |
|---|---|---|
| Penstocks leaks in excess of the rates described in BS7775:2005 | Frame fixing bolts have not been torqued correctly | Check bolts and torque correctly, may require re-grouting. SEE PIC:<br>  |
| | Damaged seals | Remove and replace defective seal. SEE PIC:<br>  |

The correct maintenance of a penstock will lead to efficient operation. Cotswold Penstocks offers customers an ongoing maintenance option. Where clients choose to carry out their own maintenance we can provide full operation and maintenance instructions. The following is a summary of typical maintenance that should be carried out.

### Preventative Maintenance

All types of penstocks supplied by Cotswold Penstocks should give years of trouble-free operation, providing that the following simple maintenance procedures are adopted.

Frequency of required maintenance activity will be dependent upon the frequency of operation of the unit, and on the operating conditions present.

The following recommendations should therefore be taken as minimum requirements, except for modulating (flow control) penstocks where special and more frequent maintenance requirements are needed as indicated.

Whilst every care is taken that the information given herein is reliable, Cotswold Penstocks cannot accept responsibility for any damage resulting from the application of these recommendations which are intended for guidance only.

### Daily Operation – Frequent Use

- **CHECK** each month for stem and drive nut wear and if possible, visually **CHECK** the seals, grease stems and drive. Replace any worn parts.

### Monthly Operation – Infrequent Use

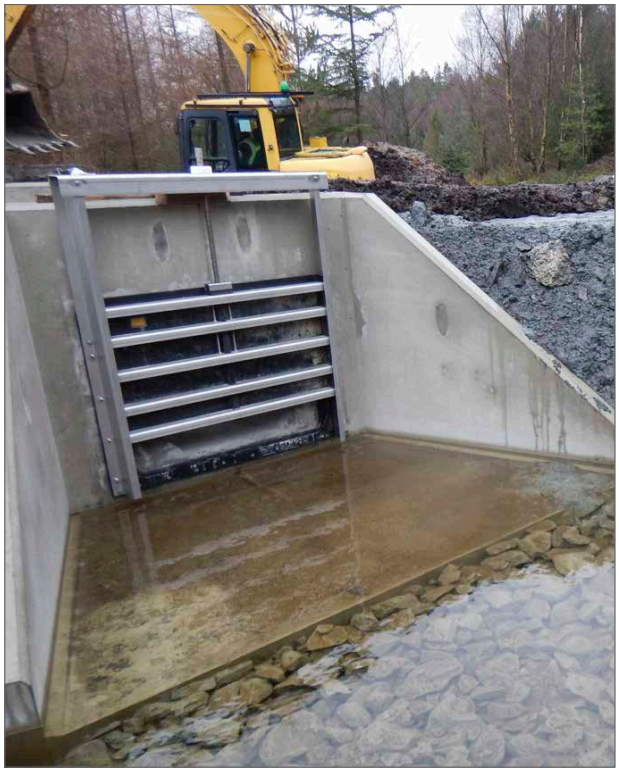
- **CHECK** every 6 months for stem wear and grease as required. Take a general visual of the unit, plan replacements as necessary.

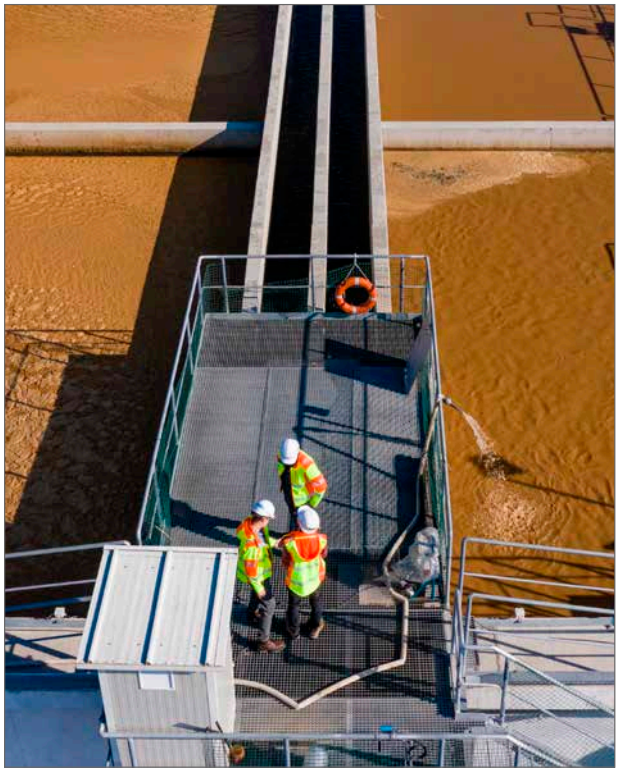
### Yearly Operation - Rare Use

- Run units through one operation to observe any issues. **LISTEN** for sticking, squealing and other noises.
- We recommend they are exercised once a month or once every 3 months over approximately 300 mm to exercise the operating gear.
- Check every 12 months for stem wear, grease as required.
- Take a general unit visual check and plan any replacements as necessary.

### Isolation – Very Rare Use

- Inspect the units every 12 months. We recommend they are exercised once a month or once every 3 months over approximately 300 mm to exercise the operating gear.
- Run through one operation checking all key parts including wedges, seals, door nuts, stems, guides, pillars and where fitted pillar brackets.
- If the units are cast iron, check over the coatings.
- Plan any replacements as required.





### Penstock and Operating Equipment Spares (2 Years)

Penstocks are designed to give many years of trouble-free service as long as maintenance schedules are followed. However, should spare parts be required in the future please contact Cotswold Penstocks who will be able to provide the latest OEM recommended spares and install them, should that be required.

If the penstock is actuated or uses a gearbox please refer directly to the equipment manufacturer for spares. Actuator and gearbox manufacturers' contact information will be provided in your contract if Cotswold Penstocks have provided this equipment as part of a factory fit service.

### Decommissioning and Disposal

Before undertaking any decommissioning procedures, it is essential to decontaminate any equipment that has been in contact with sewage or hazardous substances.

It is essential proper health and safety procedures are considered during the removal of penstocks at the end of their useful life. These procedures are available upon request. A risk assessment should be undertaken by the party in charge of decommissioning with special consideration given to lifting operations.

Transit devices should be fitted prior to the removal of the unit and remain in place while the unit is being handled. Careful consideration should be given when handling if the unit shows signs of excess corrosion or inflicted damage inflicted while removing anchor bolts.

It is advised that the disposal of components should be undertaken in an environmentally responsible manner. Recycling components such as stainless steel preserves the environment and can provide some monetary income from scrap value.

Flap Valves Manufacturing Materials

## Ductile Iron Flap Valves

### Applications

Sewers
Spill containment
Rivers
Distribution chambers
Tertiary
Pump stations
Sea defence
Flood defence
Highways
Petrochem
Landfill
Airports

### Advantages

Freezing temp resistance
Impact resistance
Heavy duty
Available size range

## Stainless Steel Flap Valves

### Applications

Sewers
Spill containment
Rivers
Distribution chambers
Tertiary
Pump stations
Sea defence
Flood defence
Highways
Petrochem
Landfill
Airports

### Advantages

Impact resistance
Freezing temp resistance
Corrosion resistance
Tailored design
Varied design duty
Easy to install
low/easy maintenance
Available size range

## Plastic Flap Valves

### Applications

Spill containment
Distribution chambers
Rivers.
Flood defence
Petrochem
Landfill
Airports

### Advantages

Freezing temp resistance
Corrosion resistance
Bespoke design
Easy to install
low/easy maintenance
Available size range

| Component | Material | British Standard |
|---|---|---|
| Frame | Mild Steel<br>HDPE Solid plastic<br>Stainless Steel<br>Ductile Iron | BS EN 100025 S275/S355<br>BS EN 15527 – PE300/PE500/PE1000/PE4<br>BS EN 10088 – Gr304/GR316/904L/2205/2507<br>BS1563 EN GJS 400-15 |
| Doors | HDPE Solid plastic<br>Stainless Steel<br>Ductile Iron | BS EN 15527 – PE300/PE500/PE1000/PE4<br>BS EN 10088 – Gr304/GR316/904L/2205/2507<br>BS1563 EN GJS 400-15 |
| Seals | Phosphor Bronze<br>EPDM<br>Neoprene | BS EN 12167 (BS2874 PB102)<br>ASTM2000<br>BS 2752-C60 |
| Hinge Links | Stainless Steel<br>Phosphor Bronze | BS EN 10088 – Gr304/Gr316<br>BS EN 12167 (BS2874 PB102) |
| Hinge Pins | Stainless Steel<br>Stainless Steel | BS EN 10088 – Gr304/GR316<br>BS EN ISO 3506 – GrA2/GrA4/904L/2205/2507 |
| Fixing Bolts | Stainless Steel | BS EN ISO 3506 – GrA2/GrA4/904L/2205/2507 |

## Flap Valves

Cotswold Penstocks manufacture a comprehensive range of valves. Flap valves are primarily used for surface water drainage to prevent reverse flow and stop flood damage. They are installed on rivers, estuaries, seawater outfalls, and can also be used on final effluent outfalls for sewage treatment plant to prevent flood damage within the works.

Applications on sea water outfalls must take account of turbulence of flow across the flap, particularly when severe wave action may be involved. Failure to do so could result in dislocation of the flap relative to its seals.

Our flap valves can be supplied for wall, flange or thimble mounting applications with either square or rectangular apertures and single or double doors.

Materials of construction include Ductile Iron, Stainless Steel, Duplex, and HDPE.

### Flap Valve range includes:

**Ductile Iron**

- Available in circular and rectangular design
- 80 to 600 mm diameter
- Metal to metal seals for durability and low leakage rates
- Wall or pipe mounted
- Integral cast lifting lugs as standard
- Double hung to ensure full face sealing

**Stainless Steel**

- 400 to 2,000 mm square
- Corrosion resistant – available in a range of stainless steels
- Designed to suit individual project requirements
- Double hung to ensure full face sealing
- Low operating head due to light weight
- Reduced maintenance

**Plastic**

- 100 to 600 mm dia. circular and 1,500 mm rectangular
- Flush face helps prevent debris build-up
- Resilient seating with low head loss
- Corrosion resistant
- Low operating head due to light weight
- Wall or flange mounted
- Suitable for direct wave action
- Corrosion resistant
- Hinge forms integral part of door

## Ductile Iron Flap Valve Specification

CV1088 flap valves use frames formed from ductile iron with a minimum grade of BS1563 EN GJS 400-15. The frames are suitable for grouting and bolting to vertical walls and fixing to flanged pipes with a % of fixing holes in a PN16 flange.

The seating side of the frame has a mechanically fixed phosphor bronze[1] seal. The valve will be supplied with a sufficient amount of special phosphor bronze taper screws. The seal will be machined and finished to the non-acceptance of 0.0025" (0.06mm).

Doors are formed from close grained ductile iron[2]. The seating side of the door has a mechanically fixed phosphor bronze seal[3]. The door will be supplied with a sufficient amount of special phosphor bronze taper screws. The seal will be machined and finished to the non-acceptance of 0.0025" (0.06mm).

The CV1088 flap valve is a double hung type design. It uses hinge pins and 2x securing split pins made from stainless steel[4]. The hinge links are made from phosphor bronze[3] of suitable size to suit the duty.

CV1088 flap valves are capable of both operating and withstanding the working heads specified and maximum leakage will be 1.25 litres/min/seal perimeter at 4m head.

Installation of the ductile iron flap valves will be by expanding/resin anchors made from electro zinc plated mild steel[5] or stainless steel grade[6]. A leakage test shall be undertaken at the maximum specified head if this is considered necessary by the client.

Ductile iron parts will be coated in accordance with the following:

- Blast clean SA2½.
- Two pack epoxy 250 microns DFT- blue.

Notes:
1 = Phosphor bronze BS1400 PB2
2 = Ductile iron minimum grade of BSEN 1563-GJS 400-15
3 = Phosphor bronze BS EN 12167 (BS2874 PB102)
4 = Stainless steel grade 316 BSEN10088-2 (1.4401/1.4404)
5 = Mild steel grade BS 7371-8:2011
6 = Stainless steel grade A4 BSEN10088-2 (1.4401/1.4404)

CV1088 Flap Valve

### Size Range

80 to 600 mm dia.

### Frame - Door

Hinge / door brackets manufactured in ductile iron

### Hinge Links

Manufactured in phosphor bronze

### Hinge Pins

Stainless steel BS EN ISO 10088 Gr 316

### Seating Faces

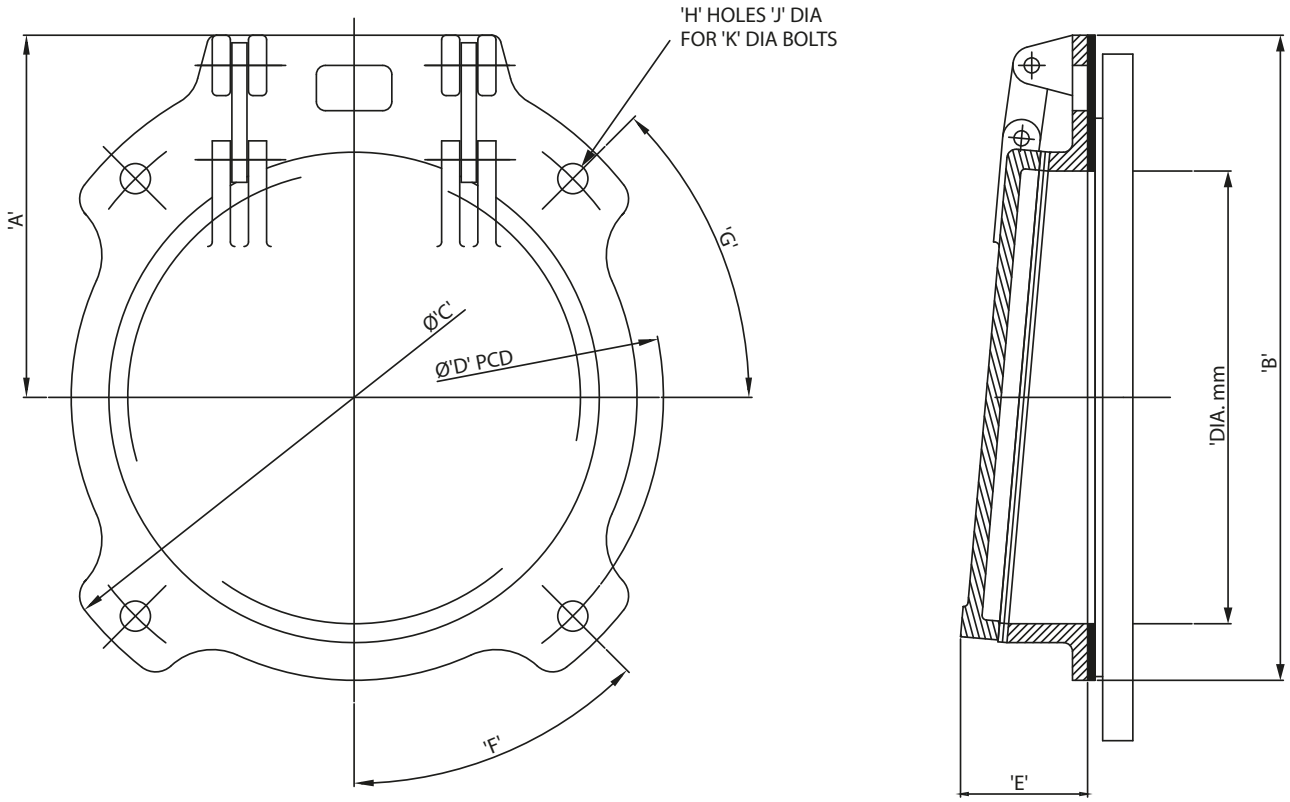
Manufactured in phosphor bronze, machined to close tolerances.

### Coating

Frame and door coated with high build epoxy as standard. Suited for the most aggressive duties

### Lifting Eye

Stainless steel Gr316




| Dia. | A | B | C | D | E | F | G | H | J | K |
|---|---|---|---|---|---|---|---|---|---|---|
| 80 | 135 | 235 | 200 | 160 | 71 | 22.5 | 22.5 | 4 | 18 | 16 |
| 100 | 145 | 255 | 180 | 220 | 83 | 22.5 | 22.5 | 4 | 18 | 16 |
| 150 | 173 | 315 | 285 | 240 | 64 | 22.5 | 22.5 | 4 | 18 | 16 |
| 200 | 193 | 328 | 340 | 395 | 80 | 45 | 45 | 4 | 18 | 16 |
| 225 | 213 | 360 | 365 | 325 | 85 | 45 | 45 | 4 | 18 | 16 |
| 250 | 220 | 380 | 395 | 355 | 90 | 45 | 45 | 4 | 18 | 16 |
| 300 | 240 | 428 | 455 | 410 | 95 | 45 | 45 | 4 | 18 | 16 |
| 400 | 420 | 640 | 580 | 525 | 115 | 33.75 | 33.75 | 4 | 25 | 20 |
| 450 | 430 | 690 | 640 | 585 | 110 | 45 | 45 | 4 | 25 | 20 |
| 500 | 450 | 750 | 715 | 650 | 110 | 45 | 45 | 4 | 25 | 20 |
| 600 | 530 | 880 | 835 | 770 | 127 | 45 | 45 | 4 | 30 | 24 |

## Fabricated Flap Valve Specification

CV6100 fabricated flap valves use frames manufactured from welded rigid mild steel sections to mild steel[1], stainless steel[2] and have removable stainless steel[2] double hung hinge bracket.

Hinge links are made from stainless steel[2] and are provided complete with phosphor bronze[3] fitted bushes. The CV6100 is a double hung type flap valve. The hinge links are made from stainless steel[2] and are provided in a suitable size for the design duty.

The seating side of the frame has resilient EPDM[4] seals fitted to the sides and soffit. These seals are mechanically fixed with stainless steel[5] fasteners, and polyethylene[6] retaining strips, so that the seal can be removed with the flap valve in-situ.

The CV6100 fabricated flap valve door is manufactured from stainless steel[2] and comprises a main sealing plate with a hollow section reinforcing matrix welded to the off-seating side of the plate. All matrix section joints are fully welded and sealed. The door is provided with a suitable lifting lug which will be welded to the bottom of the door to enable connection of a proprietary lifting device.

Installation of the fabricated flap valves will be by expanding/resin anchors made from electro zinc plated mild steel[7] or stainless steel[8].

Following installation, final adjustment and initial lubrication is to be undertaken and the door operated through one cycle (or as recommended by the manufacturer). A leakage test shall be undertaken at the maximum specified head if this is considered necessary by the client. The maximum allowed leakage will be 0.5 litres/hour per metre of door seating perimeter.

Mild steel parts will be coated in accordance with the following:

- Blast clean SA2½.
- Galvanise to BS EN ISO 1461 and or 'T' wash
- Two pack epoxy 150 microns DFT. – black.

Stainless steel parts are provided in standard un-coated self colour. All stainless parts are cleaned after fabrication by approved methods.

Notes:
1 = Mild steel grade 43A BSEN 10025:S275 JOH 1997/J2H 1994
2 = Stainless steel grade 304/316 BSEN10088-2 (1.4301/1.4307-1.4401/1.4404)
3 = Phosphor bronze BS1400 PB2
4 = EPDM to BS681-1
5 = Stainless steel grade 316 BS EN ISO 3506 pt1-2
6 = Polyethylene BS ISO 15527:2010
7 = Mild steel grade BS 7371-8:2011
8 = Stainless steel grade A4 BSEN10088-2 (1.4401/1.4404)

## CV6100 Flap Valve

### Frame, Door, Hinge Brackets, and Hinge Links

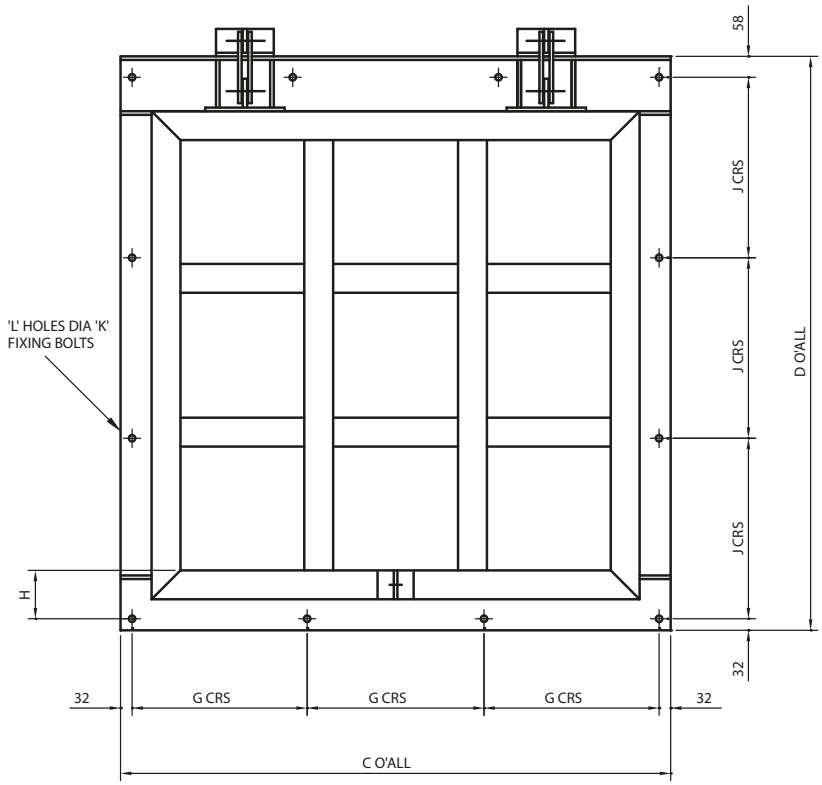
Stainless steel to BS970 gr 304/316, impact resistant and designed to suit customers pressure specifications. (Alternative tropical hard woods)

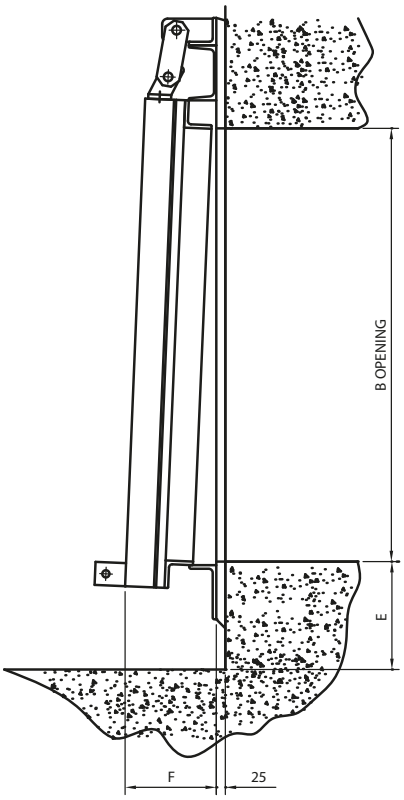
### Seating Faces

EPDM.

### Hinge Pins

Stainless steel to BS970 gr 304. St St 316 /phosphor bronze to BS2874 PB102.




| A-B | C | D | E | F | G | L | M | N | P | R | S | T | U | V | W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 500 | 716 | 822 | 328 | - | - | 358 | - | - | 358 | 30 | 30 | 108 | 108 | 8 | 15 |
| 600 | 816 | 922 | 378 | - | - | 408 | - | - | 408 | 30 | 30 | 108 | 108 | 8 | 15 |
| 700 | 916 | 1022 | 428 | - | - | 458 | - | - | 458 | 30 | 30 | 108 | 108 | 8 | 15 |
| 800 | 1016 | 1122 | 478 | - | - | 508 | - | - | 508 | 30 | 30 | 108 | 108 | 8 | 15 |
| 900 | 1116 | 1222 | 528 | - | - | 558 | - | - | 558 | 30 | 30 | 108 | 108 | 8 | 15 |
| 1000 | 1270 | 1352 | 600 | - | - | 620 | - | - | 620 | 35 | 35 | 135 | 135 | 8 | 20 |
| 1100 | 1370 | 1452 | 433 | 434 | - | 670 | - | - | 670 | 35 | 35 | 135 | 135 | 10 | 20 |
| 1200 | 1470 | 1552 | 467 | 466 | - | 480 | - | 480 | 480 | 35 | 35 | 135 | 135 | 12 | 20 |
| 1300 | 1570 | 1652 | 500 | 500 | - | 513 | - | 513 | 513 | 35 | 35 | 135 | 135 | 12 | 20 |
| 1400 | 1670 | 1752 | 533 | 534 | - | 547 | - | 547 | 547 | 35 | 35 | 135 | 135 | 12 | 20 |
| 1500 | 1770 | 1852 | 567 | 566 | - | 580 | - | 580 | 580 | 35 | 35 | 135 | 135 | 12 | 20 |
| 1600 | 1920 | 1977 | 617 | 616 | - | 622 | - | 622 | 622 | 35 | 35 | 160 | 160 | 12 | 25 |
| 1800 | 2120 | 2177 | 513 | 512 | 512 | 517 | 517 | 516 | 516 | 35 | 35 | 160 | 160 | 16 | 25 |
| 2000 | 2320 | 2377 | 563 | 562 | 562 | 567 | 567 | 566 | 566 | 35 | 35 | 160 | 160 | 16 | 25 |

## Plastic Specification - HDPE, uPVC

CV6100 Plastic Flap Valves are available in HDPE and UPVC materials.

CV6100 plastic HDPE flap valves use frames and bodies manufactured from high quality HDPE materials or a combination of HDPE and stainless-steel reinforcements. The valve hinge pin are made from stainless steel 316 material.

The seating side of the frame has resilient EPDM[1] seals to the sides and soffit. These seals are mechanically fixed with stainless steel[2] fasteners, so that the seal can be removed with the flap valve in-situ.

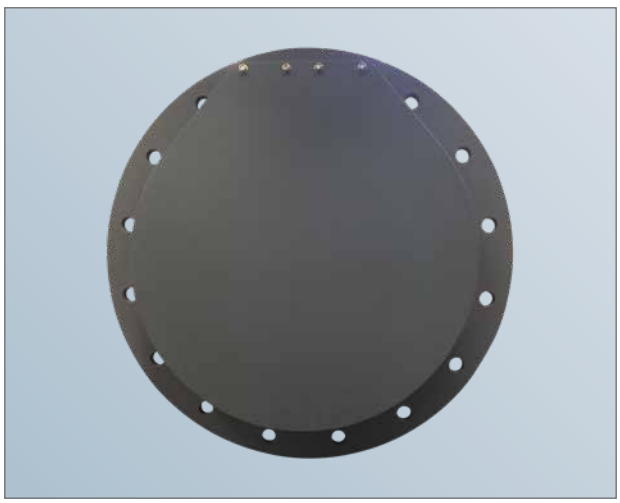
The flap comprises a main sealing plate with a hollow section reinforcing matrix welded to the off-seating side of the plate. All matrix section joints are fully welded and sealed. The door is provided with a suitable lifting which will be welded to the bottom of the door to enable connection of a proprietary lifting device. Frame reinforcements are manufactured from HDPE or a combination of HDPE and stainless-steel[3].

Hinge links are made from stainless steel[3]. The CV6100 plastic HDPE flap valve is a double hung type. The hinge links are made from HDPE and are of suitable size to suit the duty.

Installation of the flap valves will be by expanding/resin anchors made from stainless steel[4].

Following installation, final adjustment and initial lubrication is to be undertaken and the door operated through one cycle (or as recommended by the manufacturer). A leakage test shall be undertaken at the maximum specified head if this is considered necessary by the client. The maximum allowed leakage will be 0.5 litres/hour per metre of door seating perimeter.

Notes:
1 = EPDM to BS681-1
2 = Stainless steel grade 316 BS EN ISO 3506 pt1-2
3 = Stainless steel grade 304/316 BSEN10088-2 (1.4301/1.4307-1.4401/1.4404)
4 = Stainless steel grade A4 BSEN10088-2 (1.4401/1.4404)



CV6100 PVC Flap Valve

### Size Range

80 mm up to 2000 mm Dia

### Frame – Door

HDPE

### Hinge Links

Stainless Steel to BS EN 10088 Gr316

### Hinge Pins

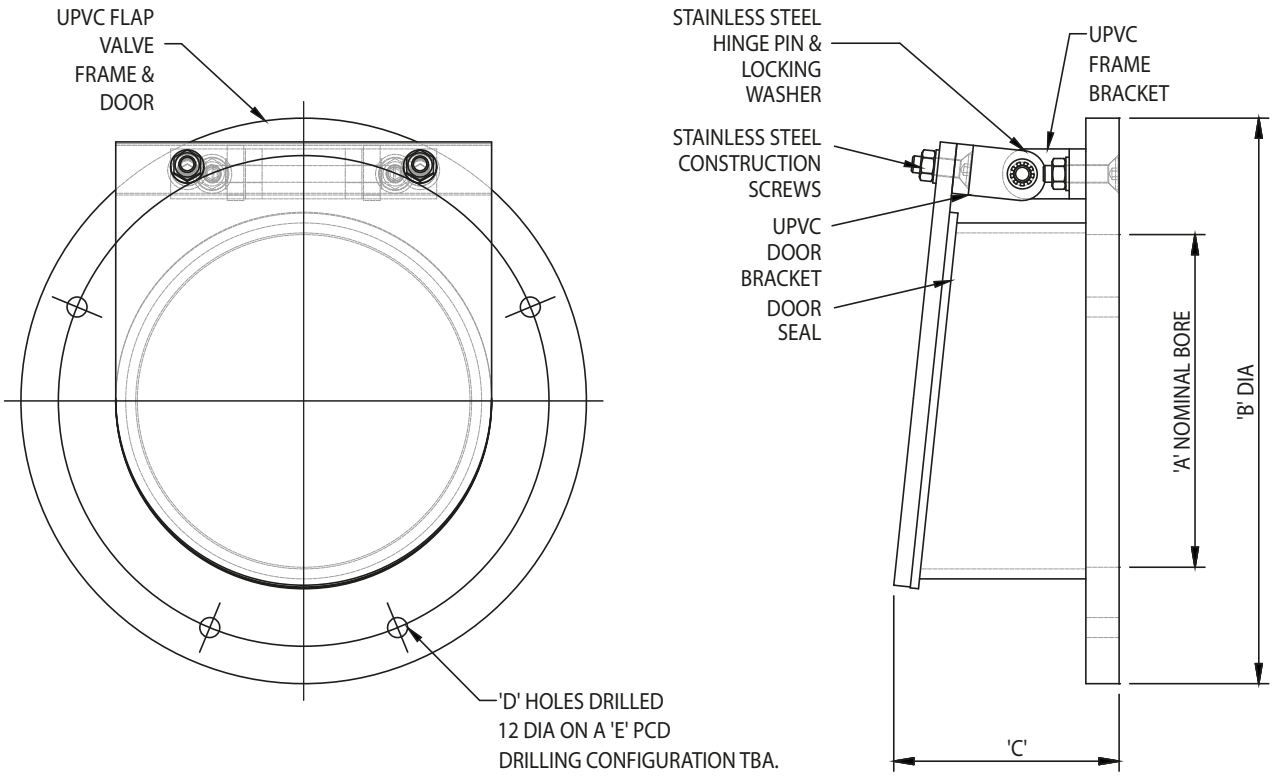
Stainless Steel BS EN ISO 3506 Gr A4

### Seating Faces

Manufactured in EPDM

### Lifting Eye

Stainless steel Gr 316




| A | B | C | D | E | Drilling Type |
|---|---|---|---|---|---|
| 80 | 200 | 101 | 4 | 160 | TBA |
| 100 | 220 | 103 | 4 | 180 | TBA |
| 150 | 285 | 109 | 4 | 240 | TBA |
| 200 | 340 | 115 | 4 | 295 | TBA |
| 225 | 368 | 118 | 4 | 324 | TBA |
| 250 | 405 | 121 | 6 | 355 | TBA |
| 300 | 460 | 125 | 6 | 410 | TBA |
| 350 | 520 | 129 | 8 | 470 | TBA |
| 400 | 580 | 134 | 8 | 525 | TBA |
| 450 | 640 | 142 | 8 | 585 | TBA |
| 500 | 715 | 147 | 8 | 650 | TBA |
| 600 | 840 | 158 | 8 | 770 | TBA |

## CV6100 Flexi Flap Valve

### Size Range

400 mm up to 4000 mm dia.

### Frame

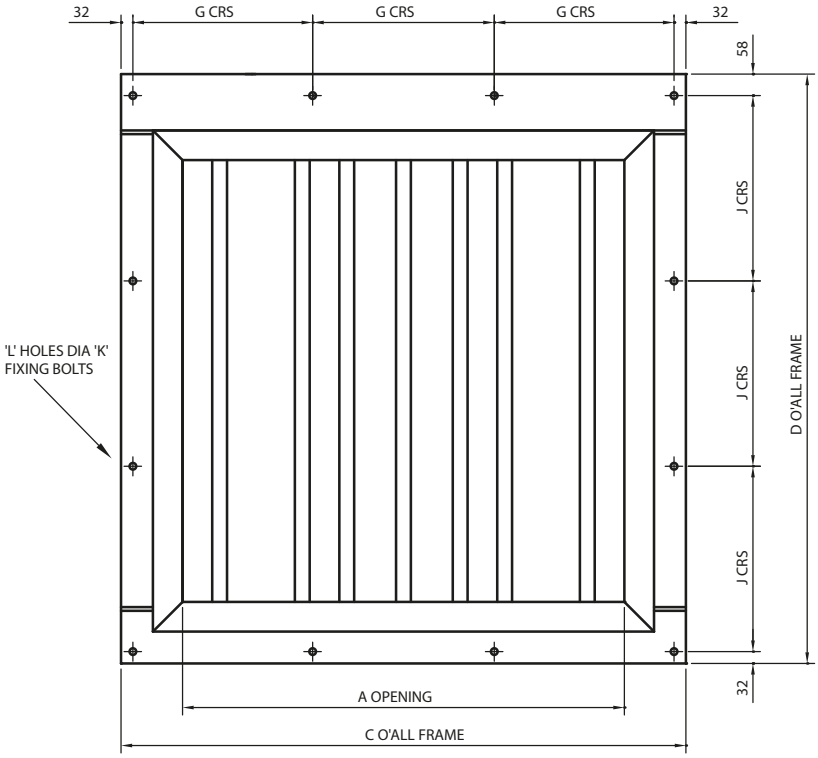
Mild Steel, St st Gr 304, 316

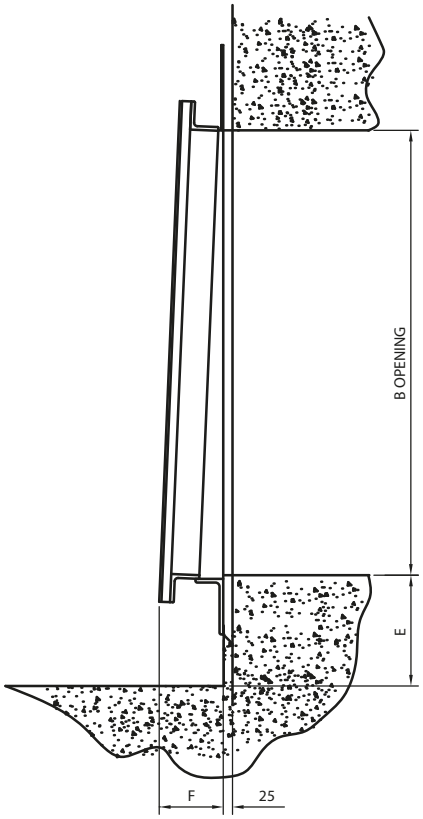
### Door

NITRILE, EPDM

### Lifting Eye

Stainless steel Gr316




| A | B | C | D | E | F | G | H | J | K DIA | L No | WEIGHT KG |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 500 | 500 | 712 | 712 | 100 | 145 | 340 | 78 | 340 | 17 | 8 | 59 |
| 600 | 600 | 812 | 812 | 100 | 145 | 390 | 78 | 390 | 17 | 8 | 73 |
| 700 | 700 | 912 | 912 | 100 | 145 | 440 | 78 | 440 | 17 | 8 | 86 |
| 800 | 800 | 1012 | 1012 | 100 | 145 | 490 | 78 | 490 | 17 | 8 | 99 |
| 900 | 900 | 1112 | 1112 | 100 | 145 | 540 | 78 | 540 | 17 | 8 | 117 |
| 1000 | 1000 | 1312 | 1315 | 125 | 176 | 420 | 123 | 420 | 17 | 12 | 204 |
| 1100 | 1100 | 1412 | 1415 | 125 | 176 | 453 | 123 | 453 | 17 | 12 | 226 |
| 1200 | 1200 | 1512 | 1515 | 125 | 176 | 487 | 123 | 487 | 17 | 12 | 258 |
| 1300 | 1300 | 1612 | 1615 | 125 | 176 | 520 | 123 | 520 | 17 | 12 | 282 |
| 1400 | 1400 | 1712 | 1715 | 125 | 176 | 553 | 123 | 553 | 17 | 12 | 308 |
| 1500 | 1500 | 1812 | 1815 | 125 | 176 | 570 | 123 | 570 | 17 | 12 | 345 |

## Stop Logs

Stop Logs are used mainly for weiring and isolation duties to allow maintenance of works. In treatment works stop logs are utilised in the isolation of screens.

Stop logs are modular in nature, giving the operator of a gated structure the ability to control the water level in a channel by adding or removing individual stop logs. A gate may make use of one or more logs. Each log is lowered horizontally into a space or bay between two grooved piers referred to as a stop log. In larger gate structures, there will be multiple bays in which stop logs can be placed to better control the discharge through the structure.

Stop logs are frequently used to temporarily block flow through a spillway or canal during routine maintenance. Stop logs can also be used over longer periods of time, such as when a field is flooded and stop logs are used in smaller gates to control the depth of water in the fields. The logs may be left in and adjusted during the entire time that the field is submerged.

Cotswold Penstocks also manufacture an adapted stop log called a Flood Gate which is used in a specialist application to protect property and critical assets from flooding.

## Stoplog Frame

Manufactured in mild steel[1] or stainless steel[2] with parallel resilient seals bonded to frame sides and a neoprene invert seal.

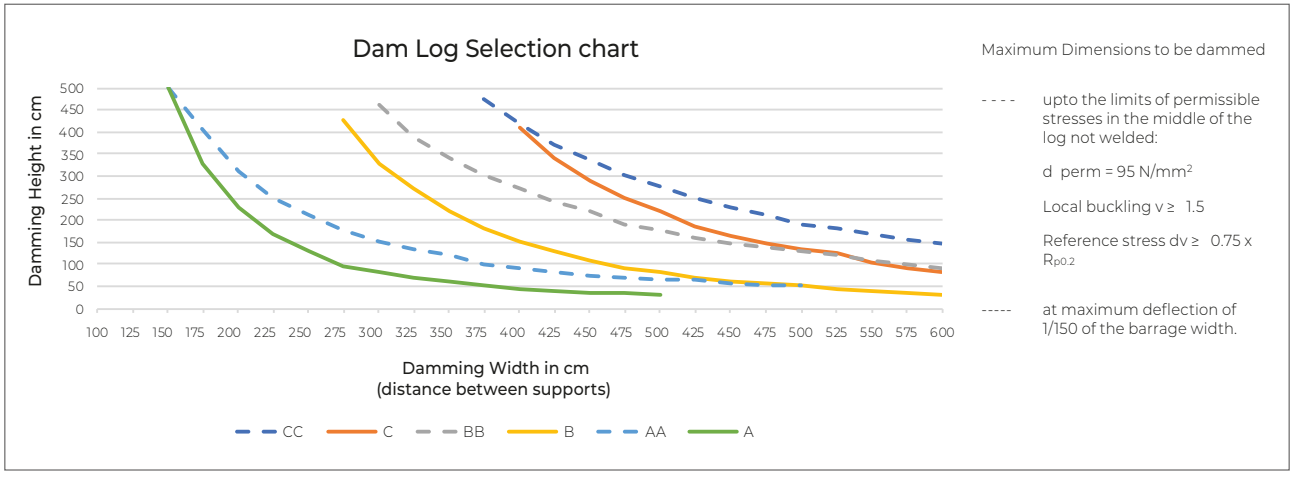
## Coating

Choice of galvanized or paint system galvanizing[3], blast clean, zinc spray, etch primer and epoxy top coat.

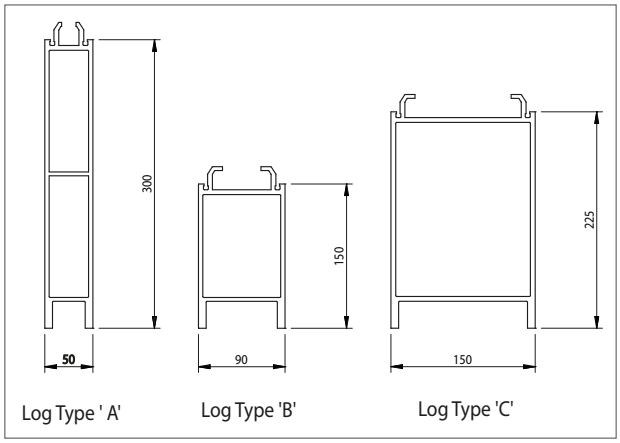
Stainless steel[4] frames can be supplied on request.

Notes:
1 = Mild steel grade 43A BSEN 10025:S275 JOH 1997/J2H 1994
2 = Stainless steel grade 304/316 BSEN10088-2 (1.4301/1.4307-1.4401/1.4404)
3 = Galvanised to Swedish Standard SA2.5
4 = Stainless steel grade BS970 Pt1 gr 304 /316

## Stop Log Selection Chart




## Stop Log Types



## Flood logs

Cotswold Penstocks design, manufacture and install a range of flood prevention solutions including flood barriers, flood gates, flood doors and specialist chemical spill containment equipment.

Our removable stop logs are available in square and rectangular aperture's which are suitable for a wide variety of applications and industries, providing similar levels of protection to permanent flood defences, with the advantage of being fully removable when not being utilised. The product can be fitted in both new and old applications.

Wall flood logs are used mainly for isolation duties, and can be found in today's water/sewage plants and also extensively in UK Environment Agency installations. They are widely utilised in the isolation of larger door apertures and other important areas of buildings and key installations.

### Flood Log Frame

Manufactured in mild steel[1] with parallel resilient seals bonded to frame sides and a neoprene invert seal.

### Coating

Choice of galvanized or paint system galvanizing[2].

### Paint System

Blast clean, zinc spray, etch primer and epoxy top coat.

Stainless steel[3] frames can be supplied on request.

### Flood Log

Manufactured in stainless steel[3] with stainless steel lifting pins and mechanically fixed EPDM interlog seals. Aluminium; HDPE solid plastic and tropical hard woods can be supplied on request.

### Lifting Arrangements

A lifting pole system is usually adequate for raising and lowering smaller flood logs. Due to Safe Working Load (SWL) requirements, it is recommended that a lifting beam be used with a davit arm located near to the stoplog.

Notes:
1 = Mild steel grade BS970 Pt1 Gr43a
2 = Galvanised to Swedish Standard SA2.5
3 = Stainless steel grade 304/316 BSEN10088-2 (1.4301/1.4307-1.4401/1.4404)

Flood walls are designed and manufactured in a wide variety of sizes and to suit different water pressures. They are an ideal method of protecting property against the catastrophic damage that flooding events can cause. Waterfront flood walls can be utilised in a wide variety of settings from providing flood protection to a residential or commercial property to environmental and agricultural applications.

Each system is load calculated based on application and the prevailing flood conditions and can be configured for flood protection heights up to 3 m. Single spans up to 2.5 m are possible.

To facilitate installation in new builds, we can supply pre-formed ground plates with integral anchors for the demountable supports. Alternatively, drill and fix anchor sockets can be provided for unobtrusive fixing through finished paving.

The slot-in stop log flood barriers can be retrospectively fitted to suitable existing foundations, in which case, load certified, chemically fixed sleeve anchors are used to attach the removable channel supports.

Custom designed gaskets that resist silt clogging and reform even after prolonged compression, together with vandal resistant covers and lockable clamps, make this flood barrier system ideal for locations where semi-permanent installation is a requirement.

### Benefits

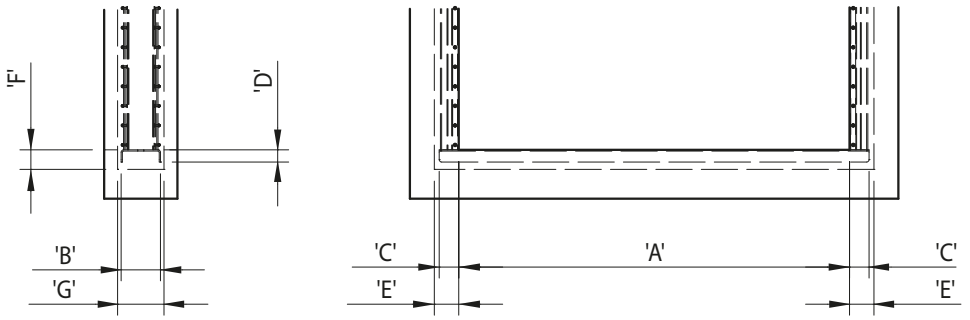
- Low cost flood barrier system.
- Lightweight - sections allow safe lifting of 10 ft beams by one person for rapid deployment.
- Flexibility – barrier can be configured to any geometry.
- High strength – single stop-log beams can span up to 10 ft unsupported.
- Choice of bottom gaskets allows flood barriers to sit on existing non-porous surfaces.
- Completely removable - leaving a totally flat ground surface.
- Vandal resistant - covers and padlockable clamps available.
- Able to be powder coated to any RAL colour.
- Long life - using galvanized and aluminum components.

### Uses

- Single building apertures.
- Openings in flood walls.
- Stainless/ aluminum system for marine environments.
- Fully removable perimeter defense to buildings.
- A stored system for erection when flood warnings received.
- A erected system for full time flood defense until access required.

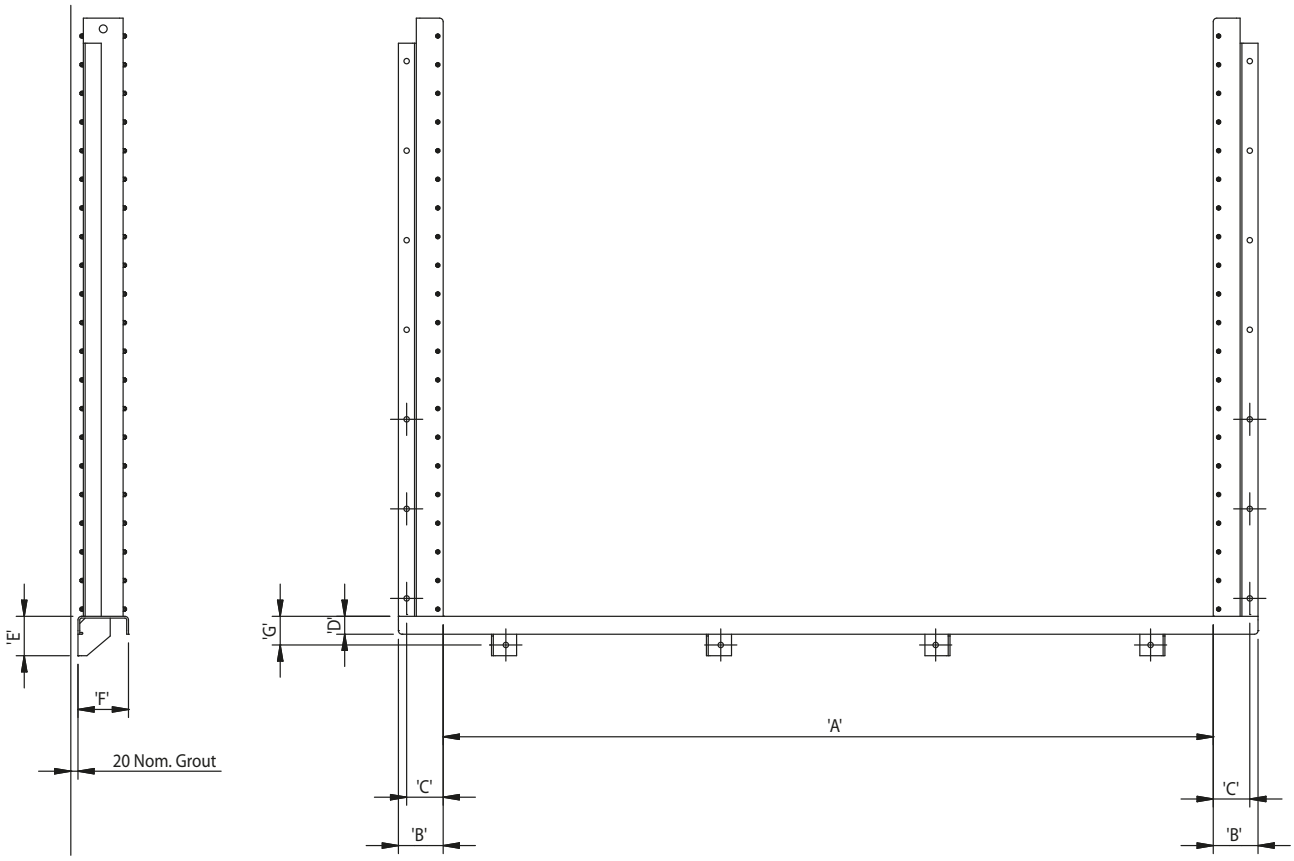
7100 Flood / Stop logs

## Stop Log Dims - Civs




| Log Type | A - Aperture | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| A | See Chart | 116 | 80 | 50 | 105 | 80 | 166 |
| B | See Chart | 156 | 80 | 50 | 105 | 80 | 206 |
| C | See Chart | 216 | 80 | 60 | 105 | 90 | 266 |

## Stop Log Wall Dims - Civs




| Log Type | A - Aperture | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| A | See Chart | 130 | 102 | 50 | 100 | 116 | 75 |
| B | See Chart | 130 | 102 | 50 | 100 | 156 | 75 |
| C | See Chart | 140 | 107 | 60 | 120 | 216 | 85 |

## 810 Flood / Handstop

Cotswold Penstocks manufacture a comprehensive range of Flood Stops, in square, rectangular and semi-circular apertures, together with a range of trim levels and designs to suit a wide variety of applications and industries. The flood stop is available in sizes up to 900 mm, over this size penstocks or stop logs are recommended.

### Frame

Welded mild steel construction[1]. Coating by means of galvanising[2] or zinc sprayed, etch primed and epoxy painted. Other options are also available such as stainless steel.

### Frame Seals

Parallel resilient EPDM seals bonded to frame sides, with neoprene flush invert seal to invert section.

### Flood Stop

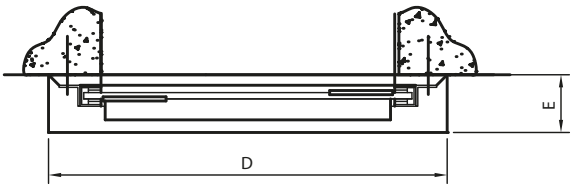
Solid PVC HDPE construction complete with stainless steel reinforcement angles if required.

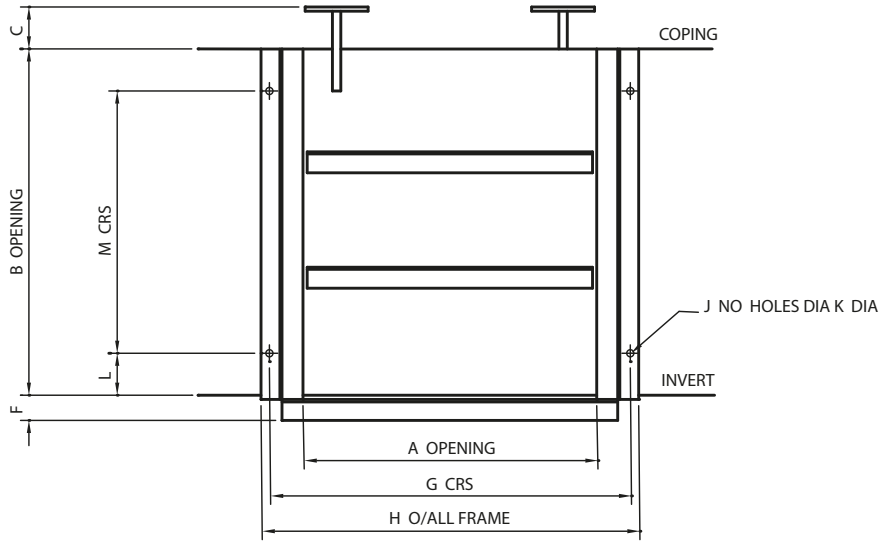
### Lifting Handles

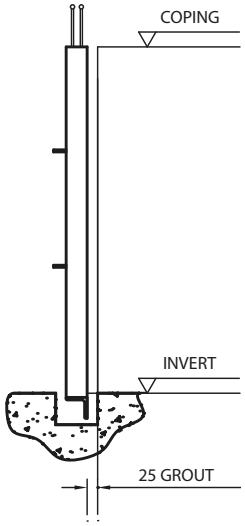
There is a choice between slotted lifting holes within the UPVC door or lifting handles manufactured in stainless steel[3] bolted through the door.

Notes:
1 = Mild steel grade 43A BSEN 10025:S275 JR
2 = Galvanised to Swedish Standard SA2.5
3 = Stainless steel grade 304/316 BSEN10088-2 (1.4301/1.4307-1.4401/1.4404)

### Wall Mounting Handstop



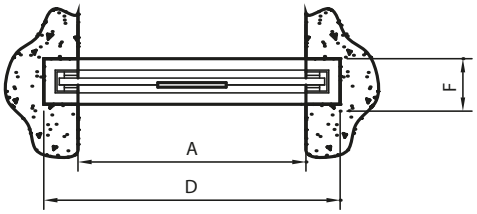



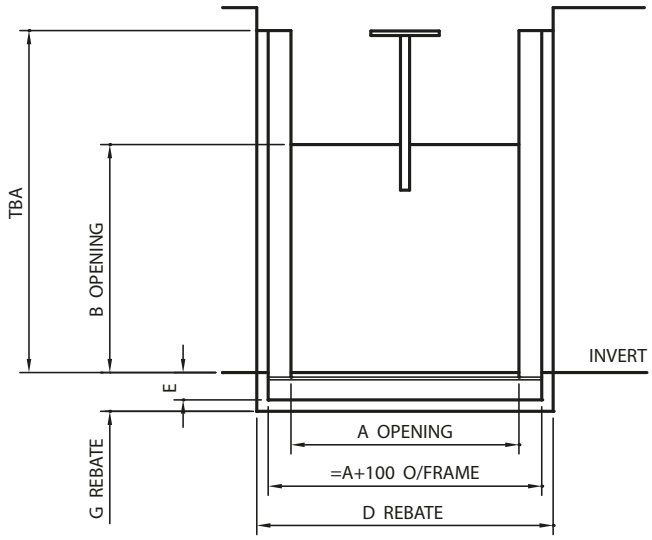



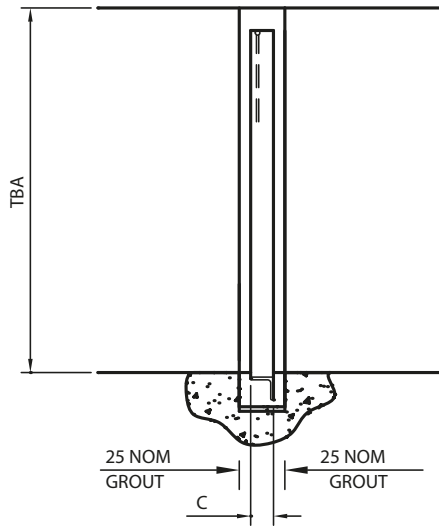

| A | B | C | D | E | F | G | H | J No | K DIA | L | M | WEIGHT KG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 100 | 100 | 250 | 75 | 100 | 160 | 300 | 2 | 12 | 50 | N/A | 3 |
| 200 | 200 | 100 | 350 | 75 | 100 | 260 | 400 | 2 | 12 | 150 | N/A | 5 |
| 300 | 300 | 100 | 450 | 75 | 100 | 360 | 500 | 4 | 12 | 100 | 100 | 8 |
| 400 | 400 | 100 | 550 | 75 | 100 | 460 | 600 | 4 | 12 | 100 | 200 | 11 |
| 500 | 500 | 100 | 650 | 75 | 100 | 560 | 700 | 4 | 12 | 100 | 300 | 16 |
| 600 | 600 | 100 | 750 | 75 | 100 | 660 | 800 | 4 | 12 | 100 | 400 | 20 |
| 700 | 700 | 100 | 850 | 75 | 100 | 760 | 900 | 6 | 12 | 100 | 250 | 25 |
| 800 | 800 | 100 | 950 | 75 | 100 | 860 | 1000 | 6 | 12 | 100 | 300 | 33 |

## 810 Flood / Handstop

Rebate Mounting
Handstop




| A | B | C | D | E | F | G | WEIGHT KG |
|---|---|---|---|---|---|---|---|
| 100 | 100 | 100 | 250 | 75 | 100 | 85 | 2 |
| 200 | 200 | 100 | 350 | 75 | 100 | 85 | 4 |
| 300 | 300 | 100 | 450 | 75 | 100 | 85 | 6 |
| 400 | 400 | 100 | 550 | 75 | 100 | 85 | 9 |
| 500 | 500 | 100 | 650 | 75 | 100 | 85 | 14 |
| 600 | 600 | 100 | 750 | 75 | 100 | 85 | 17 |
| 700 | 700 | 100 | 850 | 75 | 100 | 85 | 21 |
| 800 | 800 | 100 | 950 | 75 | 100 | 85 | 28 |

## Adjustable Bell Mouth / Hydrostatic Valves

Hydrostatic valves or adjustable bell mouth wiers are used for decanting surface liquor on primary/settlement tanks and decanting sludge off storage tanks.

The valve is designed where large flows or volumes of effluent need to be decanted.

A range of valves designs and sizes are available to suit different installation requirements.

### Specification

Body, bridge, bell mouth and gland shall be manufactured from welded rigid mild steel[1] sections and stainless steel[2].

The valve body is suitable for bolting to a mating flange. There is an adjustable gland assembly bolted to the top of the body.

The valve outlet is either a bell mouth or side outlet cowl.

The shaft pocket enables the connection of the operating stem nut. The design allows the removal of the shaft without disturbing the bell mouth.

A sliding section made from UPVC[3] or polyethylene[4] is specified and attached to the bell mouth or side outlet cowl. This is designed to slide inside of the adjustable gland box.

The gland box is adjustable in-situ by means of adjusting pins made from stainless steel[2].

In the base of the pillar there is an anti-rotation device to prevent the cylinder from rotating during operation. No guide rods are used.

The operating stem is a rising type stem manufactured from stainless steel[2]. The stem works through a machine cut operating nut housed in a thrust-taking arrangement mounted on a pillar. If actuated, the stem works through the drive sleeve of the actuator unit. (Actuator or gearbox operated hydrostatic valves utilise the drive sleeve supplied by the vendor).

For rising stems a cover tube is provided (indicating or non-indicating). Actuator cover tubes to be Manufacturers standard.

Headstocks are manufactured from mild steel and are heavy duty galvanised[5].

The hydrostatic valve is clockwise closing at the hand wheel. This will be clearly marked on the hand wheel (integrally or mechanically fixed). The hand wheel will be no smaller than 300 mm and geared so that one operator can operate the valve using an effort of approximately 180 N. This excludes electrically actuated penstocks.

Following installation, final adjustment and initial lubrication is to be undertaken and then operated through one cycle (or as recommended by the manufacturer).

Mild steel parts will be coated in accordance with the following:

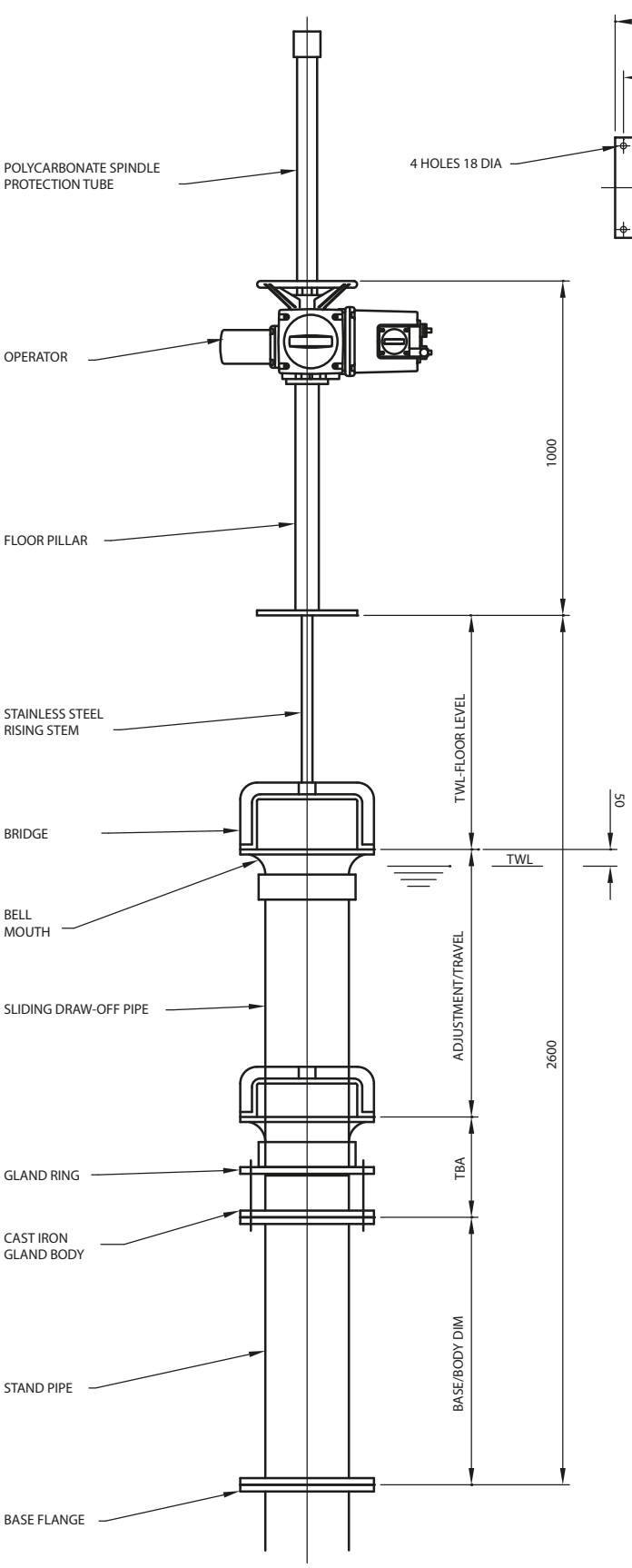
- Blast clean SA2½.
- Galvanise to BS EN ISO 1461 and or 'T' wash
- Two pack epoxy 150 microns DFT. – black.

Stainless steel parts are provided in standard un-coated self colour. All stainless parts are cleaned after fabrication by approved methods.

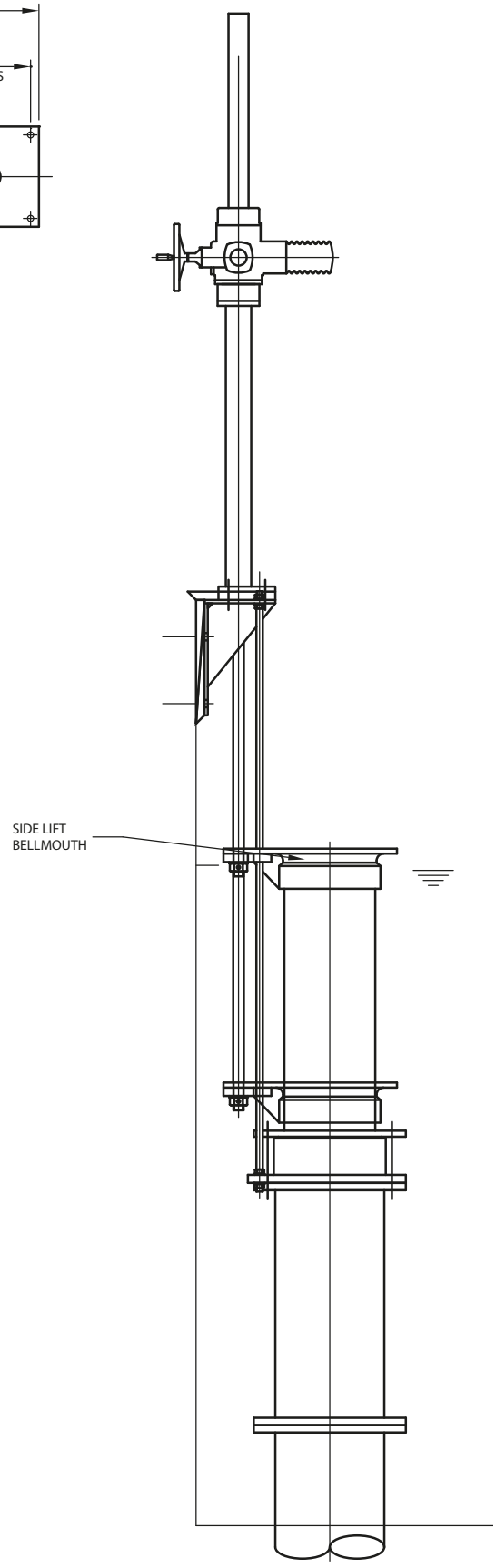
Notes:
1 = Mild steel grade 43A BSEN 10025:S275 JOH 1997/J2H 1994
2 = Stainless steel grade 304/316 BSEN10088-2 (1.4301/1.4307-1.4401/1.4404)
3 = UPVC BS3757:1978
4 = Polyethylene BS ISO 15527:2010
5 = Heavy duty galvanised BS EN ISO 146

## Hydrostatic Valves

DIRECT LIFT BELLMOUTH.




SIDE LIFT BELLMOUTH.



## Decanting Arms

Decanting Arms are used to provide a method of controlling the rate of discharge of waste liquors of all kinds, prior to their entry into drains and/or treatment plants. They are incorporated into balancing tanks or settling tanks.

To operate, the arm is arranged so that the head remains constant over the full depth of drawdown, ensuring a substantially constant rate of discharge between top and bottom liquid levels.

### Specification

Sole plate swivel bend manufactured from welded rigid mild steel sections to mild steel[1], stainless steel[2].

The bend incorporates a sole plate, integral guides and adjustable stainless steel trunion pin. The flange is designed so that a chute can be fitted. The outlet flange will be drilled to suit a mating flange.

The sole plate is suitable for grouting and bolting to a horizontal surface.

The swivel bend has bonded and pinned cast copper[3] rings. The gunmetal is machined to the non-acceptance of 0.0025" (0.06mm).

For the floating arrangement, the chute is manufactured from stainless steel[2]. Single or twin floats are fitted at the top of the chute. A scum box will be located around the float. If required, and to control the flow, a suitably sized orifice plate can be fitted to ensure a constant flow discharge. To prevent siphoning during operation, breather pipes should be included at the top of the chute.

For the decanting arrangement, the chute will be manufactured from stainless steel[2]. Fitted directly to the top of the chute will be a stainless steel[2] guide rod. The guide rod will be fitted to a stainless steel[2] trunnion shaft.

Operation should be through a trunnion mounted drive sleeve. The decanting valve operating stem will be a rising type stem and manufactured from stainless steel[2]. The stem will work through a machine cut trunnion operating drive sleeve housed in a pillar.

Headstocks are manufactured from heavy gauge mild steel and are heavy duty galvanised to BS EN 1461 after blast cleaning.

The decanting valve is clockwise closing at the hand wheel. This is clearly marked on the hand wheel (integrally or mechanically fixed). The hand wheel will be no smaller than 300 mm and geared that one operator can operate the valve using an effort of approximately 180 N.

Installation of the penstocks is by expanding or resin anchors made from electro zinc plated mild steel[4] or stainless steel[2].

Following installation final adjustment and initial lubrication is to be undertaken and the door operated through one cycle (or as recommended by the manufacturer). If considered necessary by the client's representative a leakage test shall be undertaken at the maximum specified head.

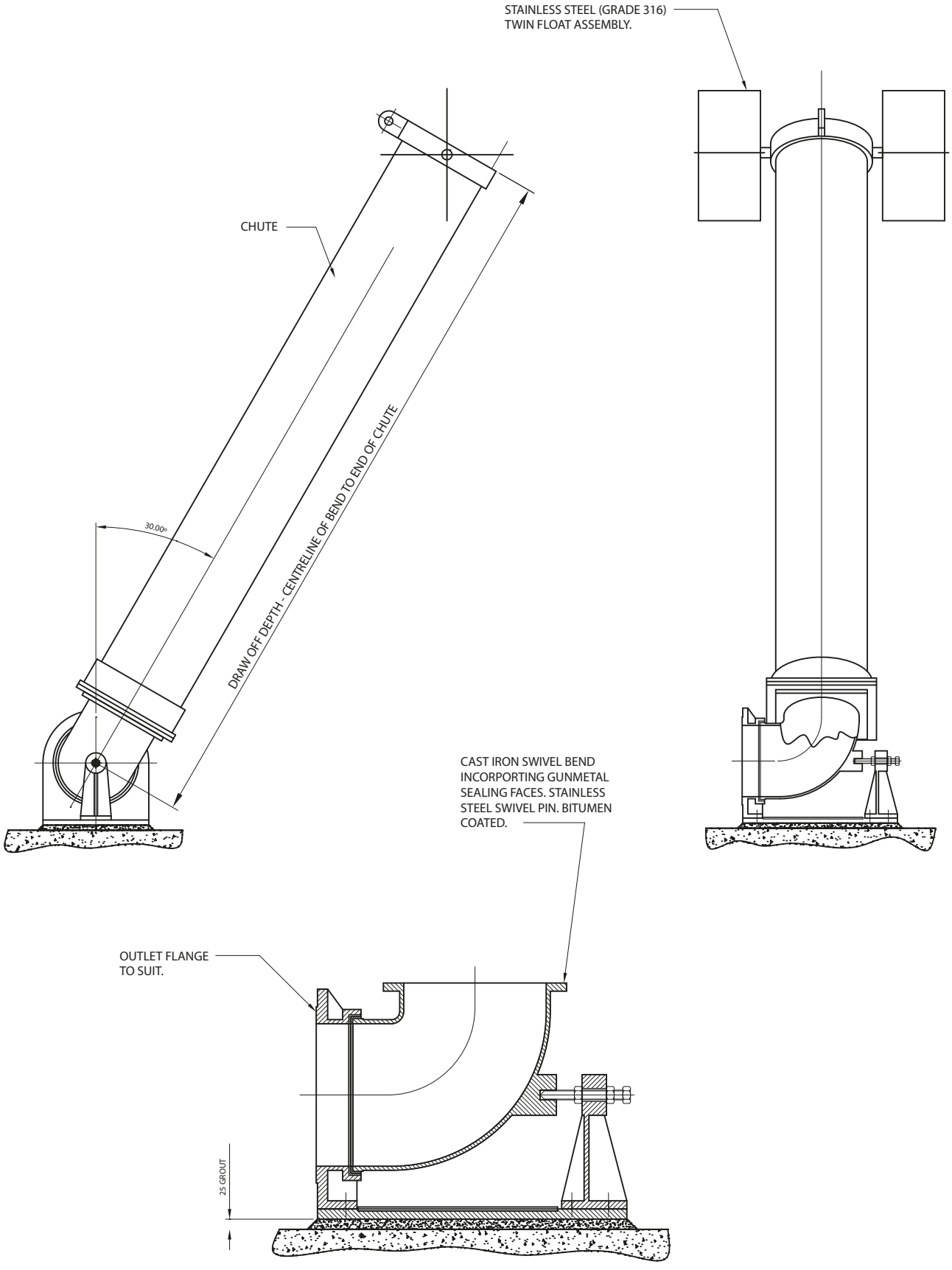
Mild steel parts will be coated in accordance with the following:

- Galvanise to BS EN 1461 and or 'T' wash
- Two pack epoxy 150 microns DFT. – black.

Stainless steel parts are provided in standard un-coated self colour. All stainless parts are cleaned after fabrication by approved methods.

Notes:
1 = Mild steel grade 43A BSEN 10025:S275 JOH 1997/J2H 1994
2 = Stainless steel grade 304/316 BSEN10088-2 (1.4301/1.4307-1.4401/1.4404)
3 = Copper grade BSEN 1982:2008
4 = Mild steel grade BS 7371-8:2011

## Decanting Arms




ENLARGED DETAIL
OF SWIVEL BEND

## Leading the way in its approach to customer's flow control requirements

The Flow Control Group is a leading global supplier of specialised products for worldwide water, wastewater, oil, gas and industrial sectors. As a bespoke valve and actuator supplier we manage procurement and provide value-added services and delivery of high-performance valves and actuation packages. Our global distribution platform expands across the Americas, Europe, the Middle East, and the Asia Pacific region.

For over four decades we have collaborated with our customers to provide tailored packages both large and small. We still offer a friendly, personal service, but have the capability to carry out large turnkey projects. This includes bespoke design, manufacture and installation using our full-time site services team and project management including full CDM co-ordination.

## VALUED INDUSTRY PARTNER

### Global Scale and Purchasing Power

As one of the largest global buyers of valves and flow control equipment, Flow Control Group leverages its strengths for our customers' benefit. No matter what the size of a project, we have the scale and purchasing power to handle it.

### Long-Standing Mill and Manufacturing Relationships

Clients benefit from our close relationships with leading suppliers across multiple product lines. These relationships established over many years, help manage the complexities inherent in multi-faceted projects with complex requirements and delivery schedules.

### Product and Technical Knowledge

We offer premium products and speciality materials capable of performing in the harshest conditions and most challenging environments and our commercial, quality, and operational management teams know each product and material well. Our staff come from a broad range of backgrounds from engineering, design, and project management to manufacturing. This makes us a diverse, in-depth resource for our customers.

### Worldwide Inventory and Logistics Expertise

Our network of strategic global locations offers our customers access to product and project coordination worldwide. Our stocking facilities in the United Kingdom, Dubai, across North America and Asia provide ready access to rail, road, inland water, and sea shipping routes. Our global network ensures fast and efficient deliveries.

### Quality and Project Management

We provide experienced document, quality, and project management services to ensure that customers' materials are delivered as required and on schedule, including coordination with multiple parties involved within a complex project.

## Installation & Turnkey Solution Provider

The Flow Control Group specialise in supply, installation and commissioning of actuated valve & penstock packages, offering clients turnkey solutions. Be it new installations, actuating existing manual valves, replacing obsolete actuators or changing power source we are able to offer tailor made solutions, designed to comply with your exact requirements, all from one single source with one point of contact.

As part of our turnkey solution, the Flow Control Group's OEM trained engineers carry out full and detailed site surveys including, where necessary, the removal of the existing drive components, collecting all the dimensions needed to design the mechanical components required to mount a new actuator to the existing valve. Where space or access is an issue, safe remote-drive solutions can be engineered using extended spindles, pedestals and drive adaptors. We use proven methodologies and sound design processes throughout.

The Flow Control Group in-house design team allow us to identify the optimum products and solutions aimed at delivering the best whole life solution. Our knowledge of individual product performance and suitability allows customers to benefit from savings that may otherwise be overlooked as a result of inappropriate product selection. Where necessary we can also show the client different assembly options within a complete CAD assembly drawing to prove design concepts before any installation takes place, providing peace of mind going forward.

Our site personnel along with the Flow Control Group's project managers have a wealth of experience in delivering a diverse range of bespoke solutions, from one man actuator installation projects to complex installation programmes including all of the following turnkey elements:

- Civil Works
- Pipe Works
- Valve Installation
- Penstock Installation
- Power Distribution
- Control Cabling
- Field Communications
- Structure Fabrication
- Valve & Actuator On-site Overhaul
- Actuator Commissioning via Certificated OEM Trained Engineers
- On-site / Client Training for end of Project Handover

## Consultancy and Technical Advice

Our ethos is to work closely with customers and consultants to achieve a solution that will offer not only value for money at the commencement of a project, but which will offer an enhanced whole life cost solution and optimum performance.

We are committed to ensuring that the needs and reasonable expectations of the customer are realised in the service we provide and the products we supply.

Our engineers have significant experience of valve operation and process requirements and have worked with customers on some of the largest engineering projects worldwide.

Flow Control Group is committed to understanding the present and future needs of its customers assisting them to find the correct solution for their flow control and process requirements. We provide, free of charge at all stages of a project timeline, a consultancy service that is aimed at identifying the optimum product and process solution. Our knowledge and expertise of flow characteristics and the suitability of products is valued by customers who appreciate the focus we can give to project and operational specification. Many customers have benefited from this approach which has generated savings and improved performance.

At the commencement of a project we offer a consultancy service designed to optimise product specification. We can carry out site surveys where required and following delivery and installation offer a final commissioning program prior to hand over.

As part of our commitment to our customers we offer training and technical advice both before and after supply.

## Valve Automation

Our automation division provides complete valves sizing and automation to industrial processes. We employ actuation specialist with experience working for market leading actuation manufacturers.

We are known for our capability to design solutions for any actuation challenge. Whether it is for a simple, quarter-turn on/off operation, or a more challenging situation, such as hazardous environment (explosion-proof), modulating multi-turn, special fail-safe triggering mechanisms, or bus networks, our engineers tailor-design assemblies for the most demanding of circumstances.

At project tender stage our pricing includes any actuated or gearbox operated valves to be mechanically assembled, stroke tested and commissioned before being delivered to the client. This includes all adaption components designed in-house by our engineering team and manufactured in our in-house facility.

Before being shipped to the client, all electric and pneumatically actuated valves are powered, stroke tested and commissioned via OEM trained engineers. This removes any delay when it comes to installation on-site by others and removes the chance of faults occurring after the valves have been installed. This reduces project installation times and ultimately reduces project delivery costs.

We are able to attend site to fit, test, repair and commission all actuators.

### Our valve automation services include:

- Electric, pneumatic, hydraulic and electro-hydraulic
- Fail-safe operations
- Controls (local and remote)
- Repair, maintenance and installation

## On-site Commissioning and Servicing

Our certified engineers have the breadth of experience necessary to work on all types of valve, from severe service control valves to critical isolation valves. Our engineers are well known for their reputation of providing expert assistance under challenging conditions.

We are able to carry out the commissioning of valves and actuators on site and can install or assist in the installation of flow control equipment. We have the experience and expertise to offer a complete service, retrofit and repair package for both planned and reactive maintenance needs to make valve servicing as hassle free as possible.

Our specialised On-Site Surveys are designed to provide information on the condition of valves, penstocks and actuators which can be integrated into preventative maintenance programmes and provide the most effective and appropriate maintenance regime for plant.

Our site team is able to carry out a full retrofit service of valves and actuators including the automation of valves previously operated manually.

## Actuator service and repair

Our expert team of technicians is available to perform actuation service and repair, either in our facility or out in the field/on-site at your business location.

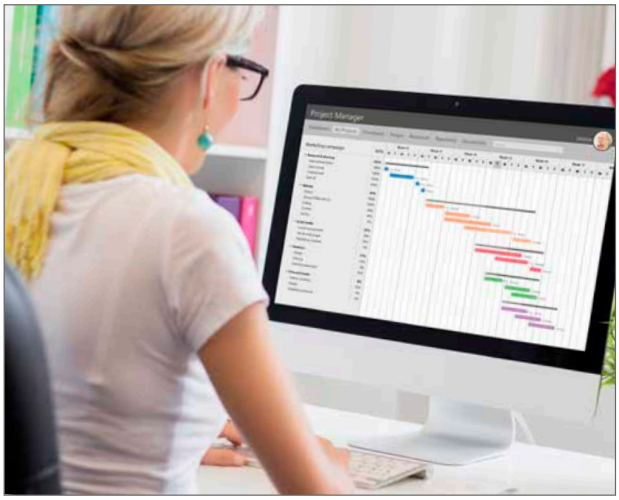
### Repair, maintenance and installation services include:

Facility

- Actuation repair
- Re-calibration
- Installation
- Servicing of parts & accessories

Field

- Installation
- Calibration/setting switches
- On-site cycle testing



## Manufacturing and Design

We can design and manufacture ancillary valve equipment in our in-house facility. To complete valve and actuator packages we design, machine and fabricate drive bushes, mounting kits, pedestals and extension spindles.

Utilising Inventor CAD design software and finite element analysis we ensure high quality manufacture is achieved.

Innovation in both product and processes through targeted research and development leads to continuous improvement and enhanced product offering. This in turn leads to operational efficiency for customers and TOTEX improvements.

All valves supplied by us, including those fitted with gearboxes, actuators and other ancillary items, can be provided in 3D CAD blocks and we are able to satisfy all BIM functionality requirements.

The availability of an in-house manufacturing facility allows us to offer tailor made solutions to customers.

## Documentation Packages

All valves and actuators can be supplied with full technical documentation and operation and maintenance manuals. These can be provided in both hard copy and electronic format. For projects we can provide an electronic bible of documents and technical information indexed by tag numbers and site layout drawings.

To identify product on site in the future we can supply identification tags in a variety of materials which can include, if required QR codes which will allow access to online technical data information. This allows plant operators to access technical information with ease in the future.

We also maintain an in-house data base of all products supplied on projects and can if requested provide information to operators at any time.

Utilising project specific data we can provide customers with warranty and service information to ensure products achieve maximum performance throughout their useful life.

## Project Management

Flow Control Group goes beyond product supply to offer project management expertise. Through dedicated teams of project management professionals, we work with our customers to facilitate the planning, budgeting, procuring, and delivering of materials for projects around the world.

We offer project management expertise for single products to the most complex material packages. Our project management methodology is centred on communication regarding scope, time, quality and budget with our customers. It is important to us that our stakeholders are kept abreast of the progress of their order and of any issues which may arise during execution.

Our global distribution network is staffed with project management professionals who combine international know-how with in-depth industry and local business knowledge; ensuring that complex projects and orders are completed successfully anywhere in the world.

### Project Management services include:

- Budgetary and market consultation
- Capacity and stock availability (supply lead times)
- Technical guidance
- Quality management (vendor audits, Inspection and Test Plans – ITP)
- Supply chain management (consignment and stocking options)
- Production status reports
- Documentation control (Vendor Data Books – VDB)
- Order planning, scheduling, and logistics
- Expediting
- Fabrication management
- Third party provider management (coating, inspections, and testing)

FLOW CONTROL GROUP

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