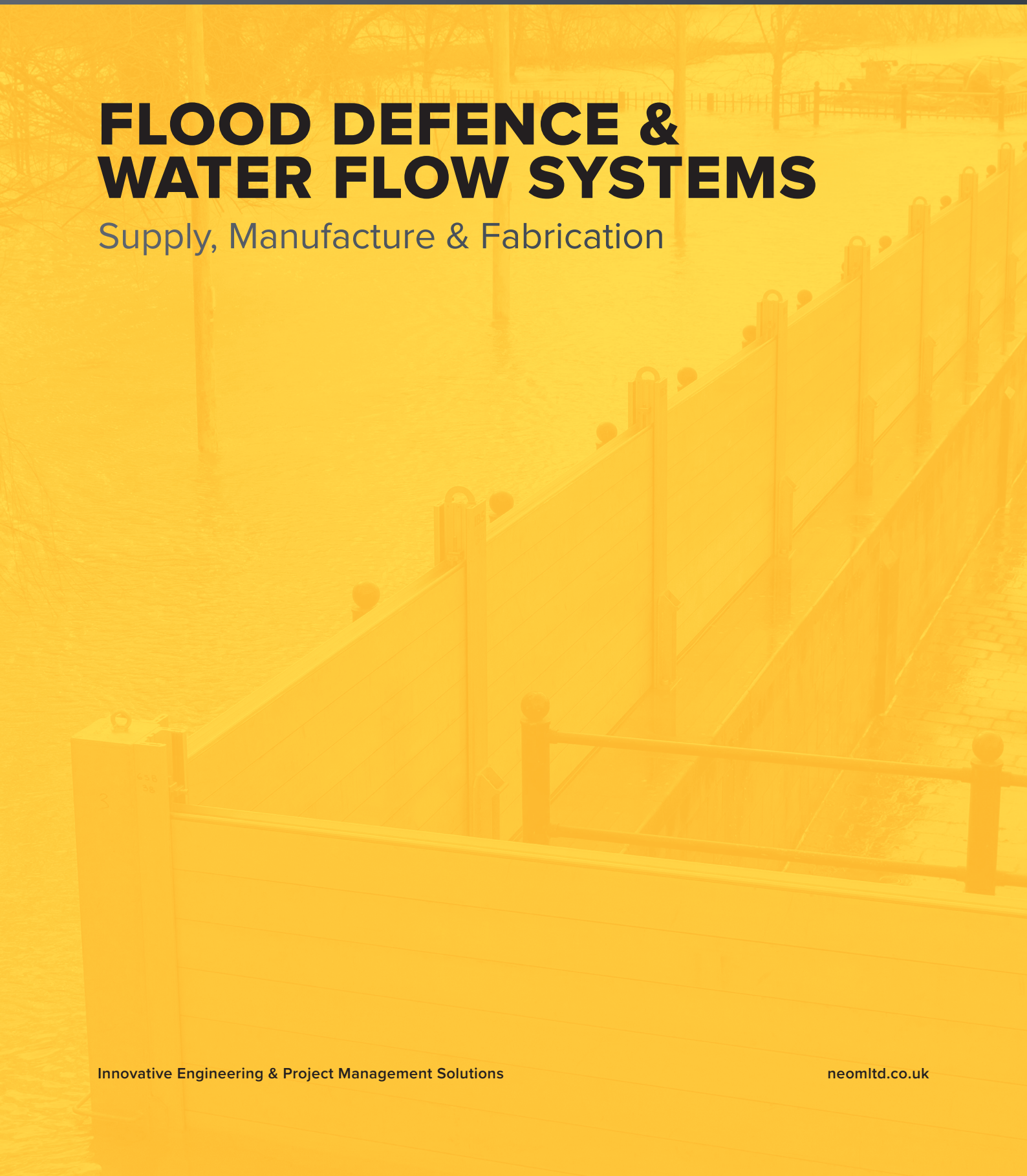
NEOM
INNOVATIVE ENGINEERING

FLOOD DEFENCE & WATER FLOW SYSTEMS

Supply, Manufacture & Fabrication



Innovative Engineering & Project Management Solutions

neomltd.co.uk

WELCOME

NEOM Industrial Limited is a specialist supplier of flood defence and water flow control systems. Founded in 1989, we have a wealth of knowledge within the water industry, specialising in the manufacture and installation of;

- Composite Stoplogs
- Aluminium Stoplogs
- Stainless Steel Stoplogs
- Lifting Beams/Poles
- Stoplog Storage Racks
- Composite Lockgates
- Bar/Trash Screens
- Penstocks
- General Purpose Fabrication
- Bellmouths - Hydro Static Valves
- Handstops
- Flap Valves
- Sludge Valves
- Penstock Mechanical and Electrical Operating Equipment

All our products are manufactured to conform to all recognised industry standards and supplied to a range of Tier 1 water defence contractors and water PLCs in the UK and around the world. Ensuring value for money through innovation, safety, and quality, we always deliver to the highest standards.

OUR VISION

The vision at **NEOM** Industrial Limited is to offer the best level of service for its clients and customers through the following goals:

Developing a high-performance team who can deliver the necessary outputs required through experience and training.

Focusing our efforts in creating a team culture where all employees feel valued and are working to a common goal. A team that can adapt to changes where required.

Focus in achieving outstanding customer satisfaction, by delivering our projects safely through Time, Cost and Quality.

Enhance our growth across the Construction Industry and become a leading company in our approach to delivery of projects for our clients.

Looking at new sustainable ways in Value Engineering across the industry where required.

QUALITY STATEMENT

NEOM has the resources, systems, defined procedures, and contractual awareness to make a fast, collaborative, and efficient start to meet the demands of their Clients to ensure a ‘right first time ’outcome.

NEOM operates an Integrated Management System (IMS) accredited to ISO 9001, ISO 14001 and 45001 (certificates attached). This system encompasses a comprehensive suite of processes which drive quality and technical assurance standards across the design, manufacture, construction, and handover delivery phases of projects. Our IMS includes tried and tested processes that can be tailored to meet the requirements of our clients. The development of bespoke project specific plans, for example,

Project Execution Plans (PEP) will ensure our performance delivers the quality and technical assurance standards our clients expect.

NEOM & SUPPLIER ACCREDITATIONS

HSQE

The company's vision of achieving a world class safety, health, environment and quality performance is supported by Neom 's cultural core values, clearly defined management systems and a range of specific behaviours, including an emphasis on staff retention reinforcing the skills knowledge base. All of these elements are implemented consistently across the business and are brought together by strong individual and collective leadership supported by a dedicated HSQE manager.

HEALTH & SAFETY

We at **NEOM** are proud of our safety record and will strive in all aspects of our work to maintain this record, continually updating and reviewing our working and operating methodology, ensuring all operatives are supported and given the correct tools & equipment to ensure they work not only efficiently but safely.

We achieve this in many ways, including regular Safety Tours and Planned General Inspections, these allow us to identify any potential breeches in our working policies, but also to look with holistic view on how we can do a job better.

Our supervisors who are all SSSTS trained as a minimum, are encouraged to produce observation cards which can use to identify potential hazards and used to track trends that we implement through early engagement before they result in an issue. Works Package Plans, method statements in addition to task specific Task Briefings and Start of Shift briefings are produced for all works and briefed out.

Our supervisors are encouraged to carry our Dynamic Risk Assessments on a regular basis as a way of ensuring we capture any change in site conditions which could create hazards not anticipated at the time our documents were produced due to the ever changing and face paced site environment

We employ highly skilled and qualified personnel within each relevant field to ensure that all workmanship is of the highest standard and maintains the highest safety standards required.

All of our senior management, project support teams and operational staff are fully trained to work across all sectors and attend regular, ongoing training to ensure they stay up-to-date, and client focused.

SUSTAINABILITY

NEOM is committed to building a sustainable long-term business based upon sound social, environmental, and economic values.

This means creating a business that is itself sustainable, providing significant potential for growth and innovation as well as attractive employment and personal development opportunities for generations to come.

We pride ourselves on being a responsible, sustainable business and aspire to support all our stakeholders in delivering a sustainable future, and to pursue activities that contribute to a more resilient society.

Sustainable construction is at the heart of Neom and is embedded in the way we work, and our goals are:

- **Reduce our environmental impact**
- **Ensure employee safety & wellbeing**
- **Support and develop our staff**
- **Provide ethical clear guidance**

WELLBEING

We want to be known in our industry as a safe place to work and one that values wellbeing. Health and Safety is critical, but the wellbeing both physically and mentally is of equal importance.

We aim to operate an effective health and safety management system to ensure we keep our employees and other parties safe from harm and want to attract, develop and retain the best people, to act fairly in their recruitment, promotion and development, and to be an equal opportunities employer, treating employees and potential employees fairly regardless of their race, colour, disability, marital status, age, gender, sexual orientation or religion and importantly show consideration towards the people and communities in which we work .

In these pressing times Neom understand Mental Health is a major concern amongst our workforce so also encourage any operative to talk in confidence to one of our trained Mental Health First Aiders, help and reassurance can be provided to those that need it. Our Mental Health First Aiders are trained to look out for any signs that may suggest any operative may be struggling with their own Mental Health and will speak on a confidential basis to the individual.

ENVIRONMENT

Through continuous improvement we optimise our resources and material use, while reducing waste and inefficiency.

Site works are planned to optimise resource efficiency, and minimise waste, noise and disruption reducing material waste and where practical, utilise materials and products that are environmentally friendly and can be recycled or reused.

We pay attention during installation activities to the emissions or pollutants, and reduce noise and general dust, taking the most stringent precautions to avoid health hazards and ensuring that environmental issues are reduced, and stringent risk assessments are carried out on all activities

As a result, we are proud of having achieved an Environmental Incident rate of zero on all our sites.

INDUSTRIAL PRODUCT LIST

Catalogue No.	Description
FS	Introduction
4000	Paddle Gates
4100	Hinged Disc Valves
4200	Wedeco Weir Penstocks
4300	Bellmouths
4400-PSK 1	Channel Mounting Penstocks S-M-L Range
4400-PSK 2	Wall Mounting Penstocks S-M-L Range
4400-PSK3	Wall Mounting Weir Type Penstocks S-M-L Range
4500	Operating Gear
4600-CM	Channel Mounting Handstops
4600-WM	Wall Mounting Handstops
4700-PSK1	Channel Mounting Penstocks. Light Range
4700-PSK2	Wall Mounting Penstocks. Light Range
4700-PSK3	Wall Mounting Weir Type Penstocks. Light Range
4800-FV1	100-600 UPVC Frame & UPVC Door Circular Flap Valves
4800-FV1F	100-600 UPVC Frame & Rubber Door Circular Flap Valves
4800-FV2	100-600 HDPE Frame & UPVC Door Circular Flap Valves
4800-FV3	100-600 SS Frame & SS Door Circular Flap Valves

Catalogue No.	Description
4800-FV3F	100-600 SS Frame & Rubber Door Circular Flap Valves
4800-FV4	500-2000 Steel Frame & Steel Door Rectangular Flap Valves
4800-FV5	500-2000 Steel Frame & HDPE Door Rectangular Flap Valves
4800-FV6	500-2000 Steel Frame & Rubber Door Rectangular Flap Valves
4800-FV7	500-2000 Steel Frame & Timber Door Rectangular Flap Valves
4800-S1	QW Manual Cable Winch for Flap Valves
4900-CM	Channel Mounting Stoplogs
4900-WM	Wall Mounting Stoplogs
4900-LB	Lifting Beam for Stoplogs
4900-LP	Lifting Pole for Stoplogs
4900-SR	Stoplog Storage Racks
5000-P1	Gate Valves
5100	Cast Iron Penstocks
5200	Cast Iron Circular Flap Valves
5300-SB	Scumboards
5300-WP	Weirplates
5300-BB	Baffle Boards
5300-OP	Orifice Plates
5400	Steel Fencing and Gatework

INDUSTRIAL PRODUCT LIST

Catalogue No	Description
5400	Steel Fencing and Gatework
5500	Steel Ladders
5700	Handrailing
5800	General Fabrication Work
5805	Teekeys for General Use
5900	Actuators / Gearbox / Cylinder Information
6000	Cut Water Gates
6100	Heavy Duty Penstocks
6100-S1	Multi-Opening Penstocks
6200	Ground Water Relief Valves
6300	Sludge Valves
6400	Sludge Plugs
6500	Ventilating Columns
6600	Lifting Davits for Stoplogs
6700	Radial Gates
6800	Tilting Weir Gates
6900	Swivel Bends
7000	Flood Defence Barriers
7100	Hydraulic Pumps for Lockgates on Canals
7200	Lock Mooring Systems
7300	Bar / Trash Screens

COMPOSITE STOPLOGS

NEOM Composite Stoplogs are corrosion resistant and for isolating duties. These stoplogs are designed and manufactured to suit modern industrial and domestic effluent environments. Utilisation of the latest synthetic materials combined with the use of steel or stainless steel provides a range of stoplogs suitable for use in most water, sewage and effluent treatment plants.

The composite stop log is constructed of a steel skeleton encapsulated with a copolymer composite. The exterior surface is smooth and flat, and the structure has no seams or joints thus assuring fluid tight integrity. It is highly corrosion resistant (25-year corrosion warranty), weather resistant, and requires little or no maintenance.

A stainless guide frame is designed for embedment in concrete, for surface mounting or mounting on channel walls. Surface mounted guide frames are often used on channel end walls. In these cases, guides have slotted mounting brackets that slide onto preset anchor bolts making installation simple. A grout base is used to prevent leakage between the guide and channel wall. Installation in an existing channel requires an in-channel guide.

All assemblies are purpose designed to suit customers' requirements.

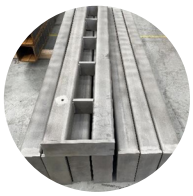
MATERIAL SPECIFICATION

All assemblies are purpose designed to suit customers' requirements.

Requirement	Description
Size Range	Any width from 100 mm to 5000 mm ; larger sizes can be accommodated depending on pressure and duty
Water Head	Suitable for static pressures upto 14 metres above invert and can be used in sewage, potable water and stormwater etc.
Mounting	Channel mounting, wall mounting or side wall mounting.
Frames	Frames are manufactured from stainless steel to BS EN 10088 grades 1.4401 (316) or 1.4404 (316L)
Door	Manufactured as a composite sandwich construction comprising a lightweight, rigid, cellular core with a fully welded steel box section matrix between two outer skins of a rigid, compressed composite plastic. The latter is ultraviolet stabilised, non-toxic and fire resistance to BS 476 Class 0 (if required). All material is internally chemically bonded and sealed
Frame Seal	Is an EPDM (Ethylene Propylene Di Methyl) wiper type seal having an angled lip seal. EPDM is chosen for its greater resistance over neoprene to ultraviolet degradation. The seal is fixed with a corrosion resistant retaining strip and stainless steel 316 fasteners
Lifting Pins	Manufactured from stainless steel to BS EN 10088 grade 1.4401 (316)
Fixing Bolts for Wall Mounting	Manufactured from stainless steel to A4-70 c/w chemical capsule
Lifting Poles / Lifting Beam	Aluminium lifting poles / Galvanised mild steel lifting beam for use with conjunction of on-site lifting appliance

MANUFACTURE PROCESS

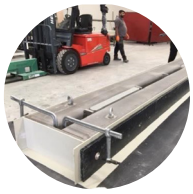
1. STEEL MATRIX PRODUCTION



During this part of the process the steel is welded to make the steel matrix. This follows through to a shot blasting process to create a rough surface for the copolymer to attach to.

*Quality hold point followed before moving to next phase.

2. BONDING PROCESS



During this part of the process the steel matrix is bonded to the surface material. This is allowed to cure for 12 hours.

*Quality hold point followed before moving to next phase.

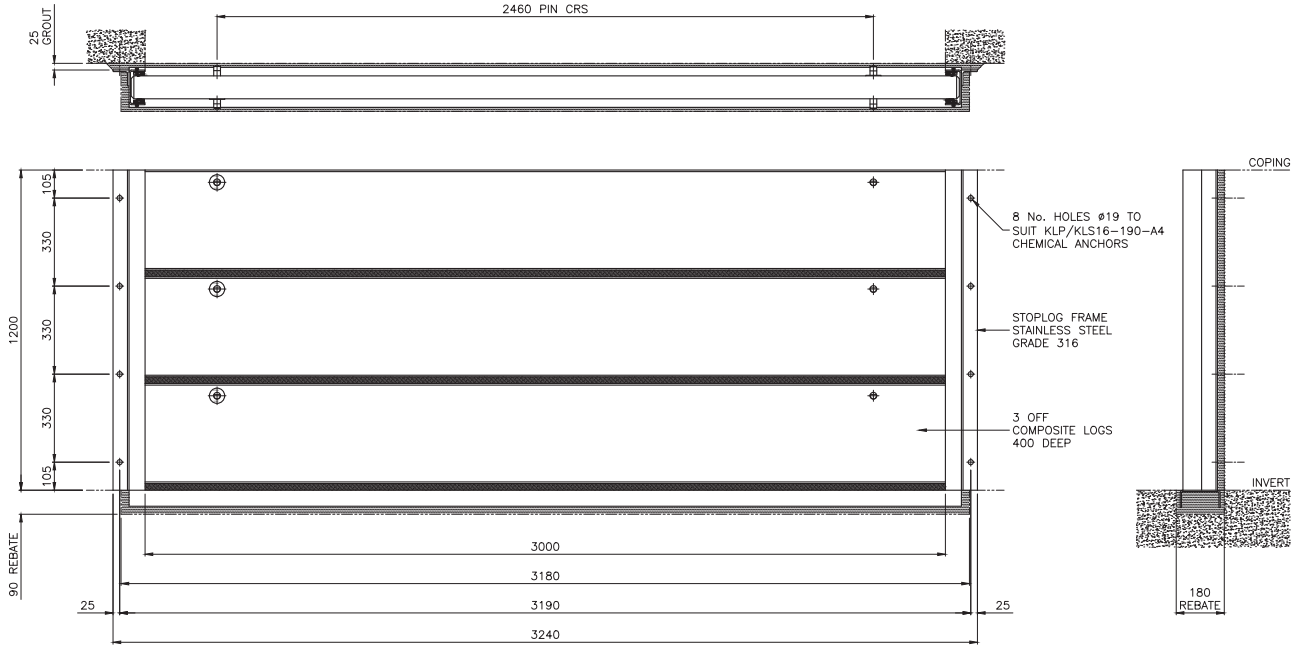
3. COMPLETE STOPLOG

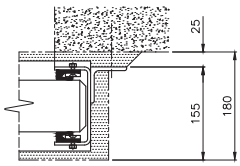
Once the bonding process is completed. The seals and end plates are installed. Stoplog is then ready for final testing once final testing has been passed the stoplogs are packed ready for collection.

EXAMPLE STOPLOG DRAWING

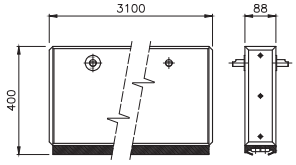
GENERAL ARRANGEMENT DRAWING

Width: 3000mm Depth: 1200mm Wall Mounted Stoplog Assembly





EXPLODED PLAN VIEW OF CHANNEL REBATE



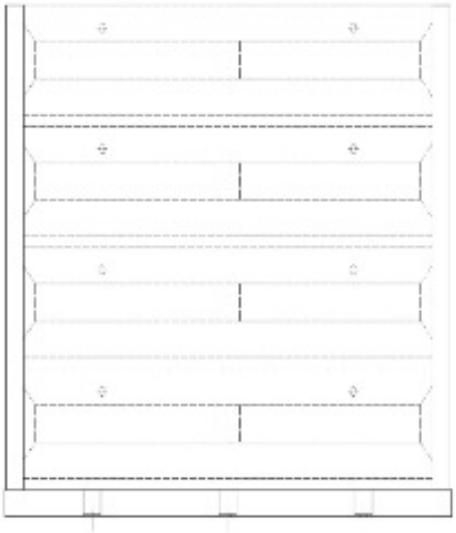
STOPLOG DETAILS

STOPLOG STORAGE RACKS

In many situations the client will require the Stoplogs to be removed from the working chamber and temporarily stored in a suitable location.

Either onto a wall face to reduce space or locally to working chamber directly onto the floor via mechanical fixing bolts. Many applications dictate the need for multi-lane storage racks. Not just for storing the Stoplog, but also the need for storage of the Semi-Automatic lifting beam provided.

Generally, all Stoplog storage racks regardless of type selection are supplied in Hot Dip Galvanised Mild Steel. However optional material available can be either 304SS or 316SS.



CONSTRUCTION MATERIALS

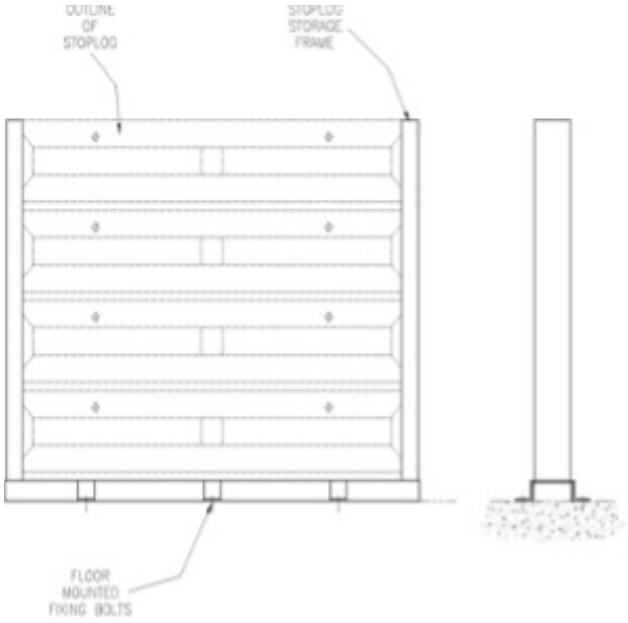
Item	Description	Materials
1	Rack	GMS, PMS, 304SS, 316SS
2	Guides	HDPE
3	Fixing Bolts	ZPS, A4

OPTIONS

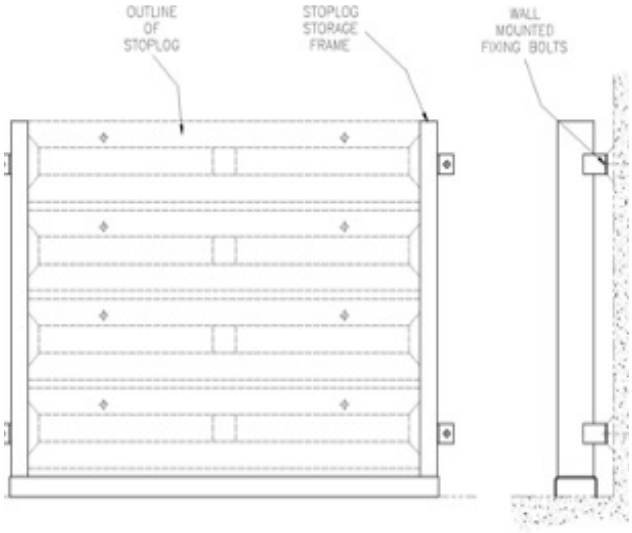
Item	Description
1	Floor Mounting, Single Lane
2	Wall Mounting, Single Lane
3	Floor Mounting, Multi Lane

STOPLOG STORAGE RACK TYPES

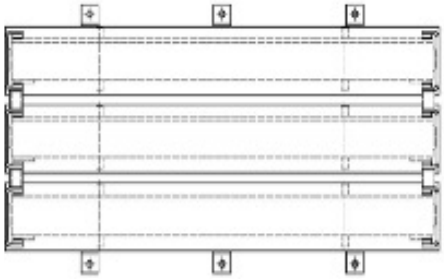
TYPE 1
SINGLE LANE FLOOR MOUNTED

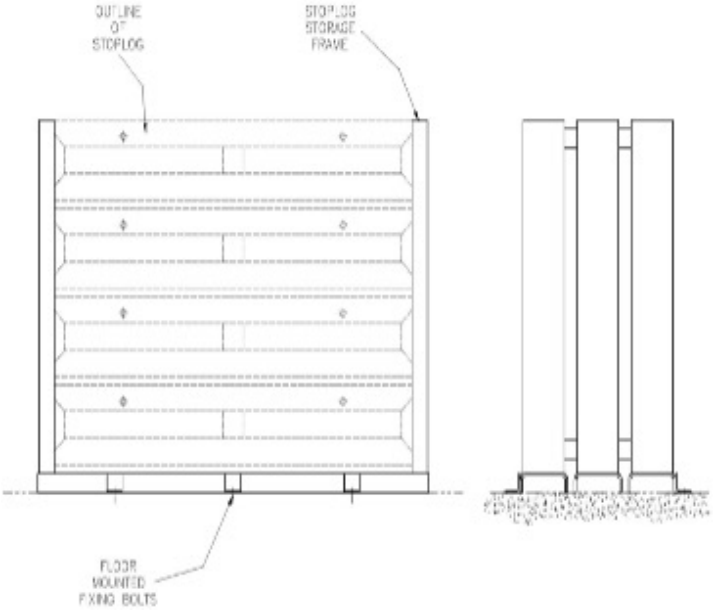


TYPE 2
SINGLE LANE WALL MOUNTED



TYPE 3
MULTIPLE LANE FLOOR MOUNTED





AN INTRODUCTION TO FLOW CONTROL

NEOM Ltd can offer the most comprehensive range of flow control equipment in the world. The traditional cast iron ranges have been the mainstay of the industry and the development of **NEOM** Ltd has created several standard ranges which cover a wide variety of types, sizes and operating conditions.

However, the wealth of experience gives **NEOM** Ltd the ability to design and manufacture penstocks for any duty or size. **NEOM** Ltd in step with its continuous programme of research and development has developed a range of stainless-steel fabricated penstocks using the latest technology. Low friction guide blocks are positioned on the frame sides to affect a clearance between the door and the resilient sealing faces attached to the frame upon immediate raising of the door, thus preventing seal drag and minimising wear.

With this comprehensive range of flow control products Neom Ltd can help our customers solve all their flow control needs. Because of this extensive range we are not limited to specific duty ranges or technologies but can offer our customers not only a technically suitable solution but also the most cost-effective solution.

Penstocks and other flow control products manufactured by **NEOM** Ltd aim to operate in almost every country in the world, thus endorsing the statement that Neom Ltd is one of the leading penstock manufacturers in the world.

PENSTOCKS

INTRODUCTION

The primary application of penstocks is the flow control and isolation of fluids associated with water, wastewater, sewage treatment plants, power generation, irrigation schemes and process plants.

The modern penstock is designed to cater for a wide variety of duties from low seating to high off-seating heads in sizes from 150mm to 5000mm square.

Selection of the correct penstock to suit the duty is important to satisfy the design criteria and provide the most cost-effective solution. Operation of the penstock is governed generally by factors outside the control of the penstock manufacturer. However, the range of available operating equipment is extensive: from simple direct operation by handwheel to complex control systems for electrical, pneumatic, or hydraulic actuation. The range of penstocks together with its associated operating equipment will cater for the most demanding specification and application. This section is intended to assist users in the selection of the most suitable products to meet requirements.

SELECTION TABLE

Please Note: Higher Heads Available

This information is based on our standard range of penstock products.

Model	Maximum Head (m)		Application								Mounting						
	On Seating	Off Seating	Sewage Treatment	Water Treatment	Industrial	Desalination	Petrochemical	Sea Defence	Hydro Power	Dockyard	High Grit Content	Reduced Leakage	Channel	Wall	Pipe	Thimble	Demountable
FABRICATED																	
NIL-4400	25	25	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
NIL-4200	2	2	■	■	■	■	■		■		■	■		■			
PLASTIC																	
NIL-4300	5	4	■	■	■	■	■		■			■	■	■			
CAST IRON																	
NIL-5100	6	-	■	■	■		■	■	■		■			■	■	■	
NIL-5150	6	3	■	■	■		■	■	■		■			■	■	■	
NIL-5170	6	6	■	■	■		■	■	■		■			■	■	■	
NIL-5130	9	6	■	■	■		■	■	■	■	■			■	■	■	
NIL-5190	16	8	■	■	■		■	■	■	■	■			■	■	■	
NIL-5200	TBA	TBA	■	■	■		■	■	■	■	■			■	■	■	

FEATURES AND BENEFITS

Below is a list of benefits for the 3 main penstock product types illustrated in our catalogue.

CAST IRON PENSTOCKS

- Robust construction
- High impact resistance
- For use with high grit content applications
- All sewage and water applications
- 50-year service life
- Metal to metal sealing faces

COMPOSITE PENSTOCKS

- Materials UV stabilised
- Adjustable pressure pads
- Leakage considerably less than approved standards
- Reduced operating loads
- The door has smooth clean face
- Side wall fixing (no rebate required)
- Request aperture sizes
- Resilient seals

STAINLESS STEEL FABRICATED PENSTOCKS

- Adjustable wedging application
- Reduced operating loads
- Leakage considerably less than approved standards
- Mechanically fixed
- Low maintenance seals fitted door only
- Wall, channel or side wall fixing demountable
- Individually designed to suit each application
- Resilient seals

SPECIFICATIONS FOR PENSTOCKS

NEOM has ISO EN 9001:2000 accreditation and the capability to manufacture a full range of penstocks in accordance with BS7775 or AWWA C501.

PENSTOCK SELECTION GUIDE

TERMINOLOGY

The terminology used in this brochure is defined in BS7775. The corresponding terms used in AWWA 501 are given below for reference.

BS7775	AWWA 501
Penstock	Sluice Gate
Door	Slide
Spindle	Stem
Spindle Nut	Thrust Nut
Spindle Protection Table	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

SELECTION CONSIDERATIONS

When setting out to determine the unit most suited to a particular requirement, the following considerations must be made:

1. Size of gate required.
2. In which direction is the flow of the fluid to be controlled; will it force the door on to or off its sealing face?
3. What is the differential head in metres across the gate in each direction under:
(a) Static conditions. *(b)* Opening and closing conditions.
4. Wall, channel, pipe, or thimble mounting.
5. Method of operation.
6. It is now necessary to select given:
(a) Basic types available. *(b)* Direction of flow and invert sealing arrangement. *(c)* Mounting position.
(d) Fixing details. *(e)* Method of operation. *(f)* Accessories.

DIRECTION OF FLOW AND INVERT SEALING ARRANGEMENT

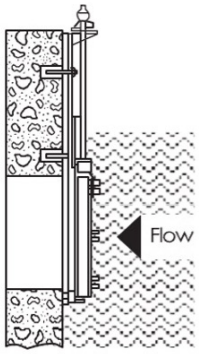
Having selected the basic frame type, it is then necessary to specify one of the following alternatives: -

A) Is the gate to take:

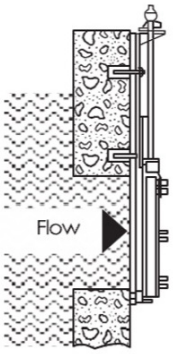
i) On-Seating Head?
Pressure forcing the door onto the frame.

ii) Off-Seating Head?
Pressure forcing the door away from the frame.

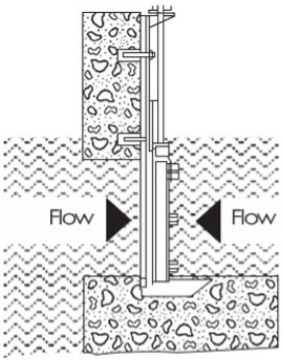
iii) On and Off-Seating Head?
Pressure (Fluid forces can be both ways)



ON-SEATING



OFF-SEATING

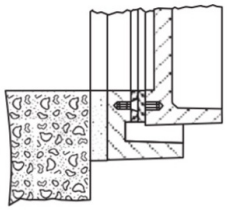


ON OFF-SEATING

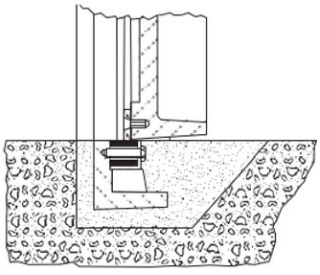
B) Is the gate to have:

i) Chased/Rebated Invert
Standard inverts have bronze facings. Seating faces are very carefully bedded onto the door and frame surfaces, and secured with specially designed, long taper countersunk screws of the same material as the faces. They are finally mated to each other resulting in a tight seal.

ii) Flush Inverts
These are available with a resilient sealing strip to produce a laminar flow, improved hydraulics, efficiency, and a non-fouling invert.



CHASED/REBATED

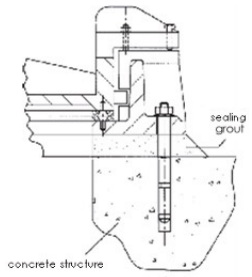


FLUSH INVERT

FIXING METHODS

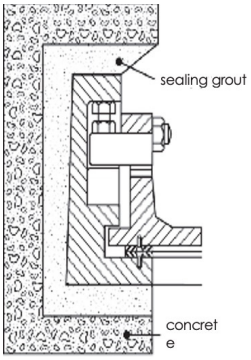
A) WALL MOUNTING

Wall mounted penstocks are fixed to vertical end walls of channels, chambers, or similar structures by means of foundation bolts utilizing a sand/cement non shrink grout to affect a seal between the wall and penstock frame. Foundation bolts can be supplied as an expanding type (as shown), built in type or resin type.



B) CHANNEL MOUNTING

Any Neom standard penstock units can be mounted in a channel. Channel mounted penstocks are fixed into preformed rebates in the sides and inverts of channels by means of a sand/cement non shrink grout, to affect a seal between the rebate and the penstock frame. Wall mounted penstocks can be installed with foundation bolts and grout; however, the rebate will need to be cast large enough to facilitate normal wall mounting procedures and wedge adjustment.



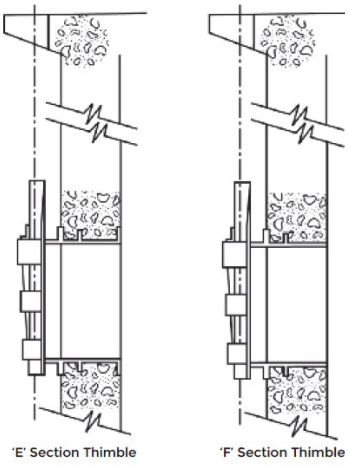
C) WALL THIMBLES

When high off-seating pressure is specified, careful consideration must be given to the method of fixing the penstock to the structure. The most reliable method of attaching a penstock in such circumstances is by use of a wall thimble.

Wall thimble mounting offers the following advantages:

1. Civil construction can proceed prior to delivery of penstock, reducing costs.
2. Considerable keying/anchor area within the concrete structure.
3. Ease of penstock erection and removal for re-siting or cleaning etc.

Iron wall thimbles can be supplied in either ‘E’ or ‘F’ section, suitable for circular or rectangular openings.

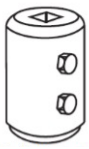


COUPLINGS

There are several methods of connecting sections of spindle together. The type selected will depend upon the application and the duty of the penstock. The most used couplings are illustrated below.

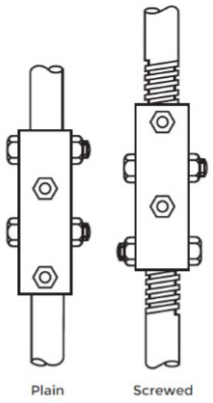
SPINDLE ADAPTER

Manufactured in cast iron, for jointing straight lengths of stem in line. For use with torsional loads only (non-rising stem applications).



MUFF COUPLINGS

Manufactured in the same material as the spindle for joining straight lengths of spindle in-line. For use with both axial and torsional loads (rising and non-rising spindle applications).
Two types of coupling are available:
1) Plain muff coupling. 2) Screwed muff coupling.
The use of a particular type of coupling will depend upon the operating duty and/or the specification.



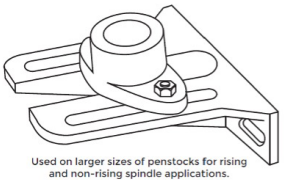
UNIVERSAL JOINT

Manufactured in mild steel or stainless steel, for joining two straight lengths of spindle in different planes. For transmission of torsional loads only (non-rising stem applications). Universal joints are supplied in pairs for a maximum working angle.
Of 35°. Protective neoprene gaiters can be supplied for the retention of lubricants in the joints.

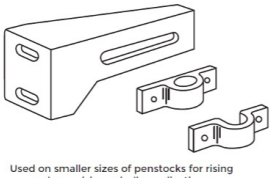
SPINDLE GUIDES

In some cases, unsupported lengths of spindle are subjected to buckling under compression or from lateral thrust by debris or solids. Spindle guides are, therefore, necessary as a means of providing intermediate support. Bolt-on type adjustable guides are manufactured in cast iron, normally plain unmachined, but if required they can be bronze lined.

When considering the centers or vertical spacing of the guide, the l/r (length/radius of gyration of the spindle) should not normally exceed 200.



Used on larger sizes of penstocks for rising and non-rising spindle applications.



Used on smaller sizes of penstocks for rising and non-rising spindle applications.

STAINLESS STEEL FABRICATED PENSTOCK

DESCRIPTION

The Fabricated Stainless-Steel Penstock is a rectangular faced penstock designed to meet the ever-changing fluid handling demands of customers, combining the latest in penstock design and parametric software.

The generic penstock design, which is tailored using parametric software, develops and individualises the penstock to suit specific duty and aperture requirements.

The Fabricated Stainless-Steel Series also offers greatly enhanced levels of customer service, reduced design drawing turnaround, improved reply to enquiries and enhanced delivery performance.

SIZE RANGE

400mm2 up to 3000mm2

MOUNTING

— Wall — Channel — Side Wall — Demountable

MATERIAL SPECIFICATION

FRAME

Open top and full frame versions are available. The frames are manufactured from stainless steel to BS EN 10088: 1955 grades 1.4301 (304) or 1.4401 (316).

DOOR

Design for high impact whilst incorporating a lightweight single skin design with rib reinforcing manufactured in stainless steel to BS EN 10088:1955 grades 1.4301(304) or 1.4401 (316). The number of reinforcing ribs will vary according to the specific duty and size requirements.

SEALING FACES

The sealing arrangements combine the use of resilient and or synthetic materials.

SPINDLE

Rising or non-rising type in stainless steel to BS EN 10088: 1955 grade 1.4401 (316). Extension spindles are in the same material.

WEDGING/PRESSURE PAD ASSEMBLY

An adjustable wedging or pressure pad assembly is included within the design to accommodate specified duties, wear in service, and ensure a positive seal.

INVERT

A flush invert is utilised as standard on the Fabricated Stainless-Steel Series (to ensure a smooth flow with a positive seal and allowing complete drainage at the invert of the penstock.

FRAME YOKE

Frame yokes are fitted when thrust is required to be taken by the frame and positioned to allow removal of the door. The yoke material is the same material as for the frame.

FIXING BOLTS

Can be supplied when requested.

WALL MOUNTED PENSTOCK

Wall mounting Penstocks are fixed to vertical end walls of channels, chambers or similar structures by means of foundation bolts utilising a sand/cement non shrink grout to affect a seal between the wall and penstock frame.

The frame can be manufactured from either galvanized mild steel, painted mild steel or grade 30Li/316 stainless steel, complete with an optional gate in the same material. The head is limited to 4 metres on seating and 4 metres off seating as standard.

CHANNEL MOUNTED PENSTOCK

Any of our standard penstock units can be mounted in a channel. However, the small, medium & large duty range is specifically designed for this purpose.

Channel mounted penstocks are fixed into preformed rebates in the sides and inverts of channels by means of a sand/cement non shrink grout to affect a seal between the rebate and the penstock frame. The frame can be manufactured from either galvanized mild steel, painted mild steel or grade 304/316 stainless steel, complete with an optional gate in the same materials available.

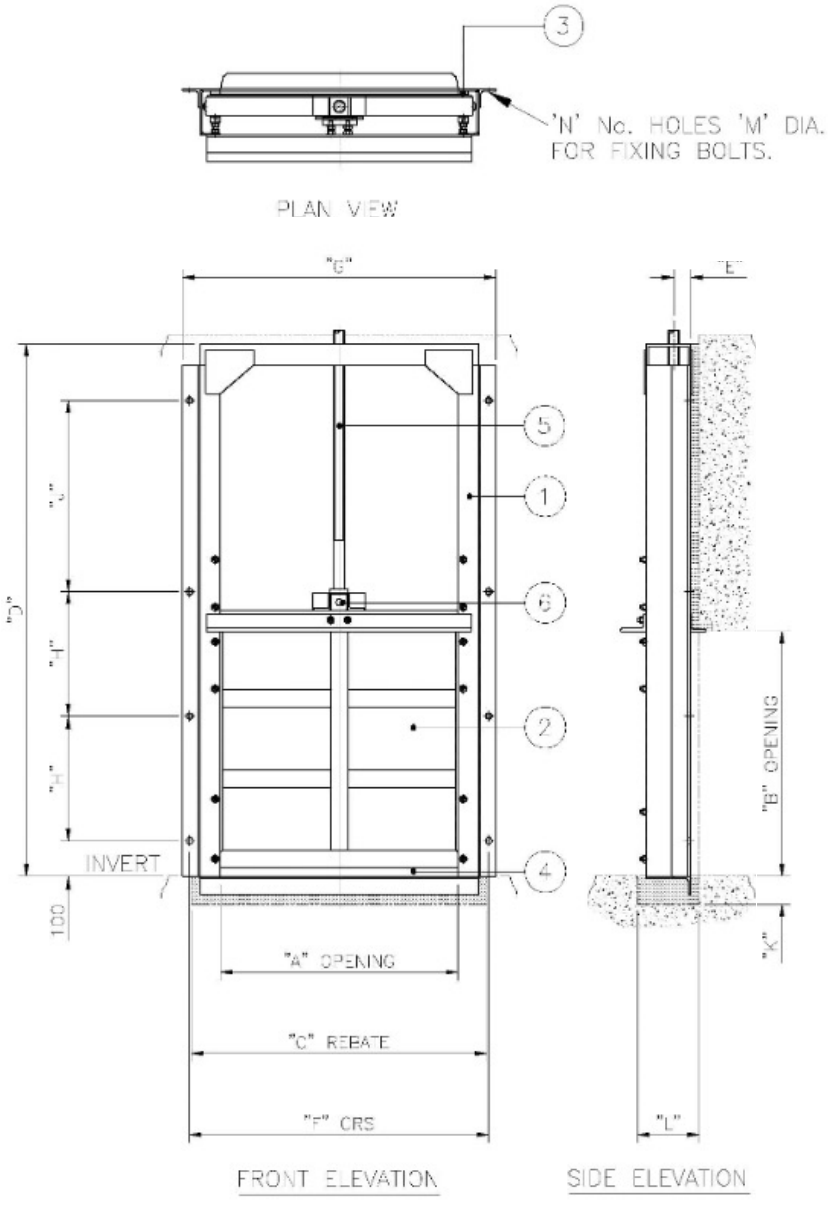
MATERIAL SPECIFICATION FURTHER DETAILS

Item	Material
Frames	Mild Steel, BS 4360 Gr 43A Stainless Steel, BS 970 Gr 304 Stainless Steel, BS 970 Gr 316
Door	Mild Steel, BS 4360 Gr 43A Stainless Steel, BS 970 Gr 304 Stainless Steel, BS 970 Gr 31
Side Seal	Low Friction Polyolefin
Invert Seal	Neoprene
Stem	Stainless Steel, BS 970 Gr 303 Stainless Steel, BS 970 Gr 304 Stainless Steel, BS 970 Gr 316
Fasteners	Stainless Steel, BS 6105, Gr A4

TRADITIONAL WALL MOUNTING PENSTOCK

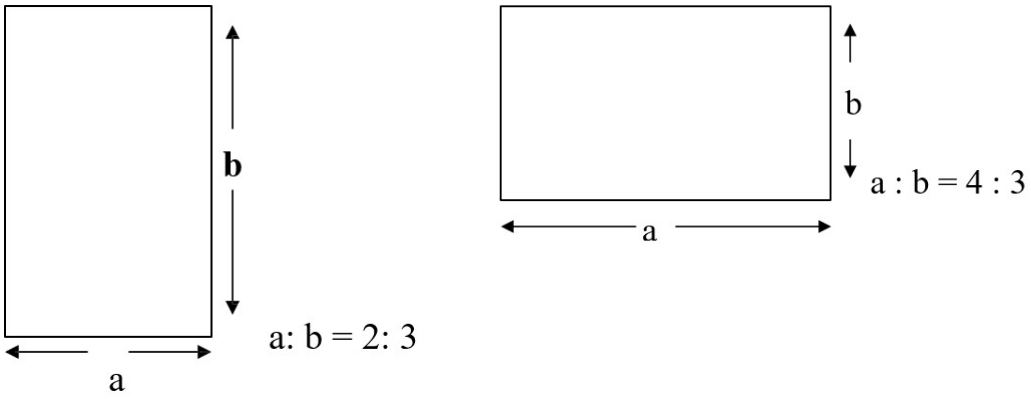
SMALL, MEDIUM AND LARGE RANGE

	Range		
	Small	Medium	Large
A	Opening Width	Opening Width	Opening Width
B	Opening Depth	Opening Depth	Opening Depth
C	A + 120	A + 120	A + 152
D	2B + 130	2B + 130	2B + 190
E	2B + 60	2B + 75	2B + 100
F	A + 120	A + 120	A + 152
G	A + 80	A + 80	A + 102
H	B/2	B/3	B/4
J	B - 200	B - 110	B - 120
K	29	32	49
L	8	10	12
M	18	22	27



Although throughout this publication rectangular penstocks / sluice gates are generally indicated as having a square orifice, in practice many of the units supplied are either wider than they are deep or vice-versa. Therefore, below are the preferred proportions for units of this type: -

For rectangular opening penstocks BS7775 recommended ratio of width to depth should be as follows:



The aperture size and configuration of a penstock is frequently determined by the dimensional proportions of the waterway it is required to control. A penstock is however, a constituent part of the waterway and its hydraulic characteristics cannot always be ignored when calculations are undertaken to determine a system head loss.

The wide-ranging size of gates and the number of constructional variations enable only approximations to be made using empirical formulae.

TECHNICAL DETAILS AND SPECIFICATIONS

Where gates are fully submerged, they generally behave in a manner predicted by the discharge theory for an orifice with typical overall velocity and contraction coefficients of 0.70.

The discharge capacity of the frame aperture at varying stages of opening can therefore be closely approximated from: -

q = 0.7A 2gH where q = Discharge rate – m3/sec A = Aperture area – m2
H = head over the aperture centerline-m G = 9.81 m/s2

When undertaking hydraulic calculations, standard formulae frequently express relationships in terms of diameter. To extend the use of these formulae to penstocks with square or rectangular openings, it is necessary to derive an equivalent hydraulic diameter.

This can be established by relating the perimeter of the aperture with the cross-sectional area.
For a fully submerged aperture the equivalent hydraulic diameter can be defined from: -

$$dH = \frac{2wh}{w + h}$$

A penstock running part filled will have an equivalent diameter in hydraulic terms of:-

dH = 4wh 2h + w Where dH = the equivalent hydraulic diameter w = aperture width
H = depth of flow passing through the aperture.

When it is required to relate a penstock to an equivalent length of pipework for integration into an overall hydraulic calculation this can be found from: -

Le = F.dH Where Le = the equivalent length of pipework dH = the hydraulic diameter

Door Setting	*Open*	*¾ open*	*½ open*	*¼ open*
F. factor	*6*	*40*	*200*	*800*

F =the factor

SIZE & CHARACTERISTICS

Weir Penstocks behave generally in their discharge capability as a rectangular weir with partial end contractions, the extent of contraction being influenced by the civil engineering design of the up-stream port being controlled. A close approximation can be found from: -

Q = 1.73 WH1.5
Where Q = Discharge rate – m 3/sec W= Width of opening – m H= head over weir – m

A free fall over the weir in the order of 75mm from its lowest setting to the downstream top water level and an approach upstream on each side of the weir not less than four times the maximum depth of flow expected to pass over the weir is recommended.

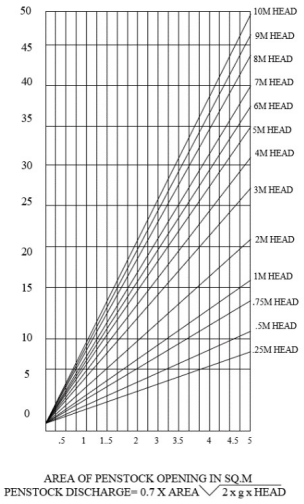
LEAKAGE

NEOM Ltd penstocks / sluice gates will be virtually drop-tight at their working pressure if installation has been carried out carefully.

Units subjected to seating pressure are expected to seal tighter than those used for off-seating duties; a common question voiced by engineers is “What amount of leakage should we expect, or should we specify as a maximum for penstocks / sluice gates?”

Such a question is difficult to answer directly, in that the responsibility lies primarily with the installation contractor and not the manufacturer. Present day designs and manufacturing procedures produce units which are virtually drop- tight, however distortion of the door frame at the time of installation is the determining factor.

An average criterion for leakage would be: -



CONVENTIONAL PENSTOCKS

ON-SEATING DUTY

— 1.25 litres/minute/seal perimeter (meters)

OFF-SEATING DUTY

— Up to 6M head 2.5litres/minute/seal perimeter (metres)

— Up to 9M head-3.0 litres/minute/seal perimeter (metres)

— Up to 12M head-3.75 litres/minute/seal perimeter (metres

— Up to 15M head-4.50 litres/minute/seal perimeter (metres)

— Leakage rates for off-seating duty over 15M will be advised on request

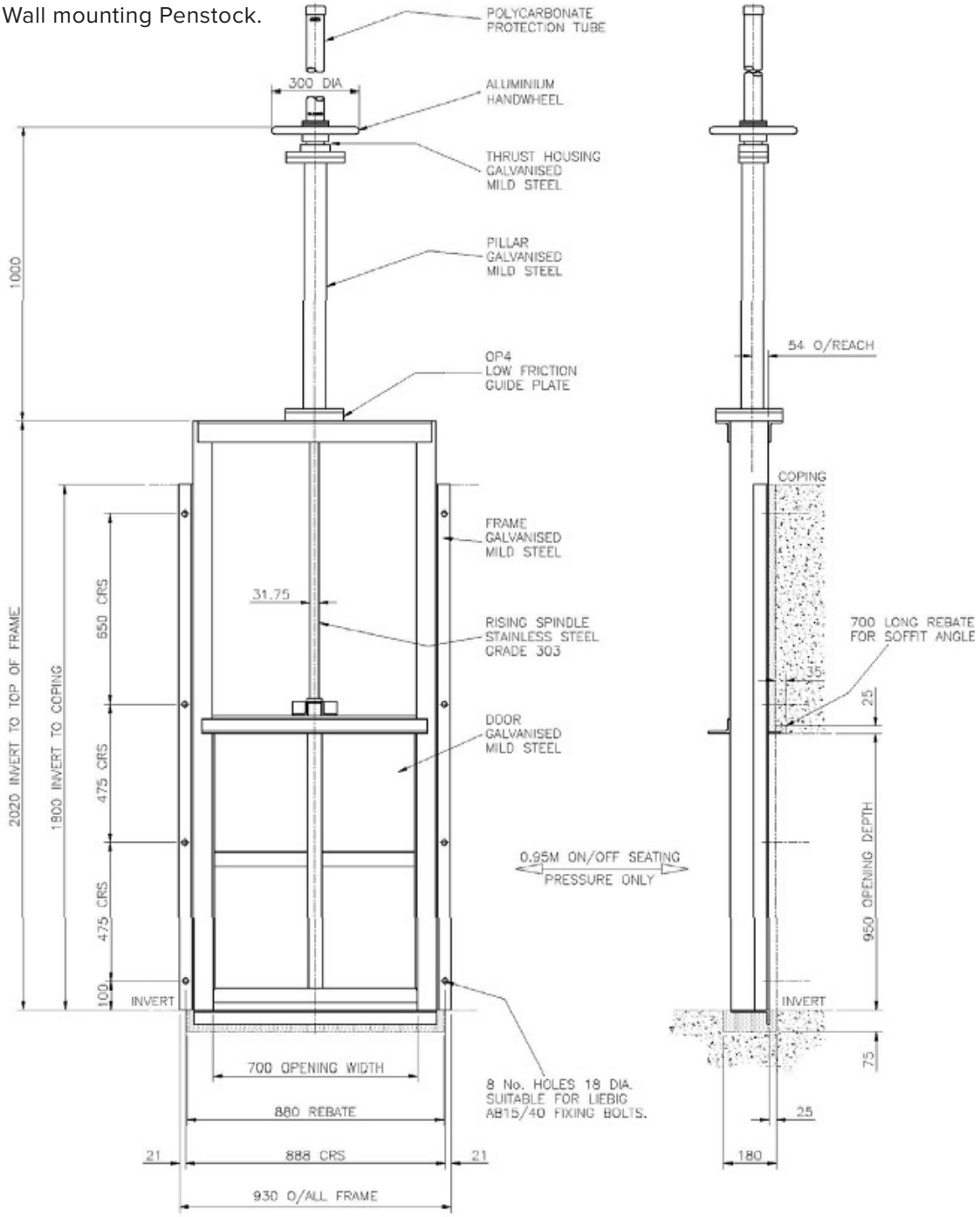
The above figures are based on the rates indicated in the BS7775 Standard. **NEOM** Ltd penstocks give a tighter seal than conventional metal seated penstocks if installation has been carried out carefully.

An average criterion would be 0.33 litres/minute/seal perimeter (metres).

WALL MOUNTING PENSTOCK

STANDARD DUTY RANGE

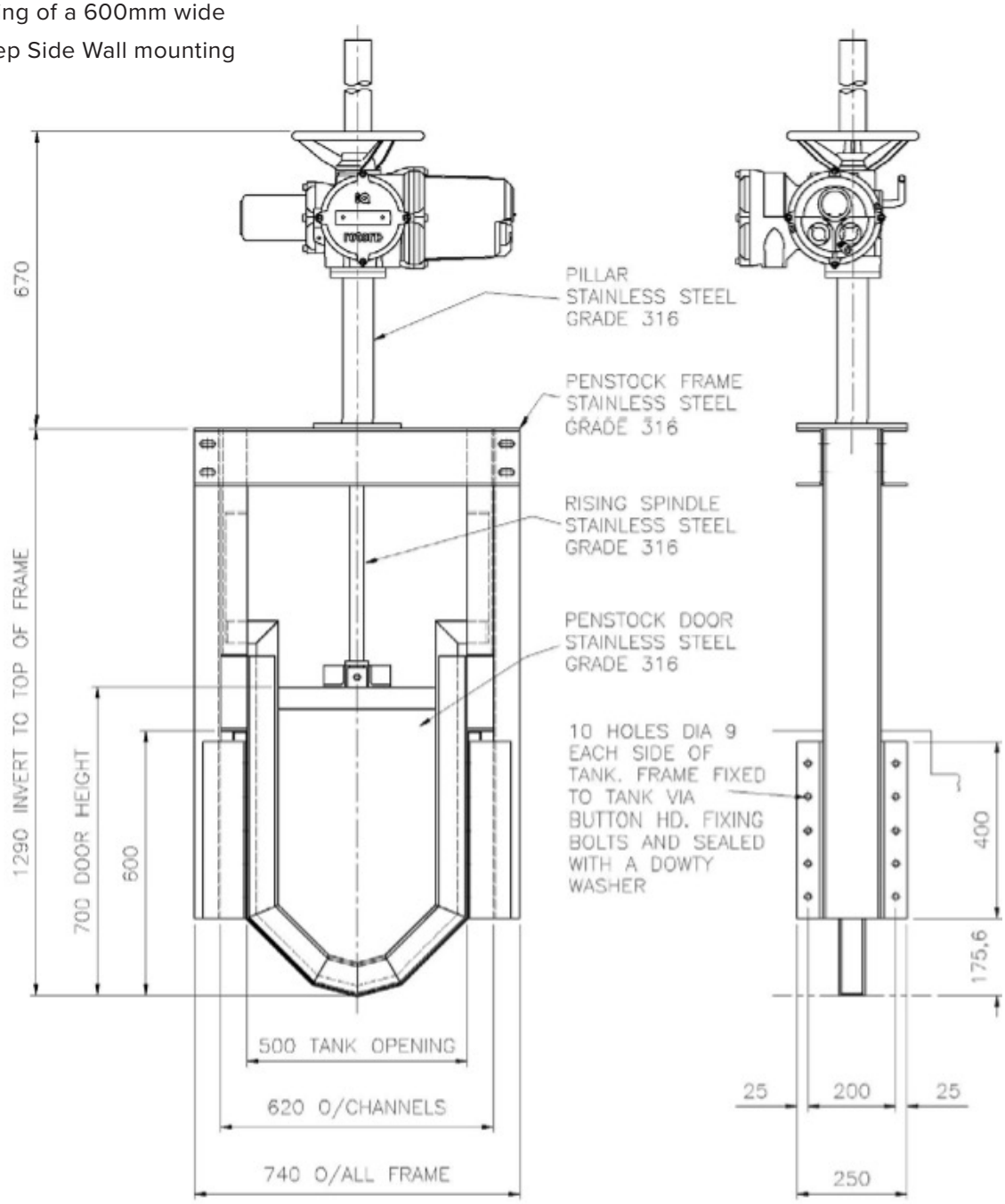
Typical Drawing of a 700mm wide x
950mm deep Wall mounting Penstock.



SPECIAL WALL MOUNTING PENSTOCK

STANDARD DUTY RANGE

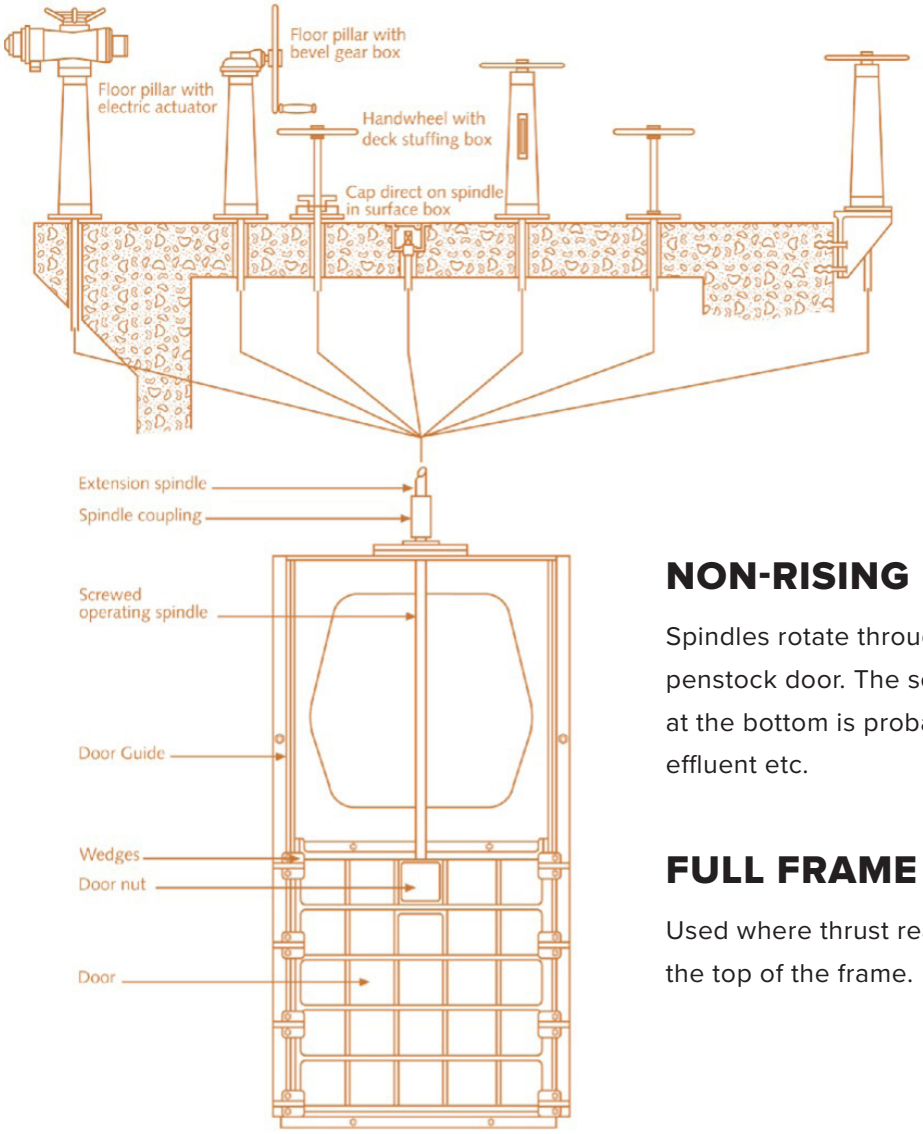
Typical Drawing of a 600mm wide x 700mm deep Side Wall mounting Penstock



OPERATING GEAR

NON-RISING EXTENSION SYSTEMS

- Remote operation
- Thrust direct on frame
- Non-rising extension systems



NON-RISING

Spindles rotate through a nonferrous nut in the penstock door. The screwed portion of the spindle at the bottom is probably immersed in the water/ effluent etc.

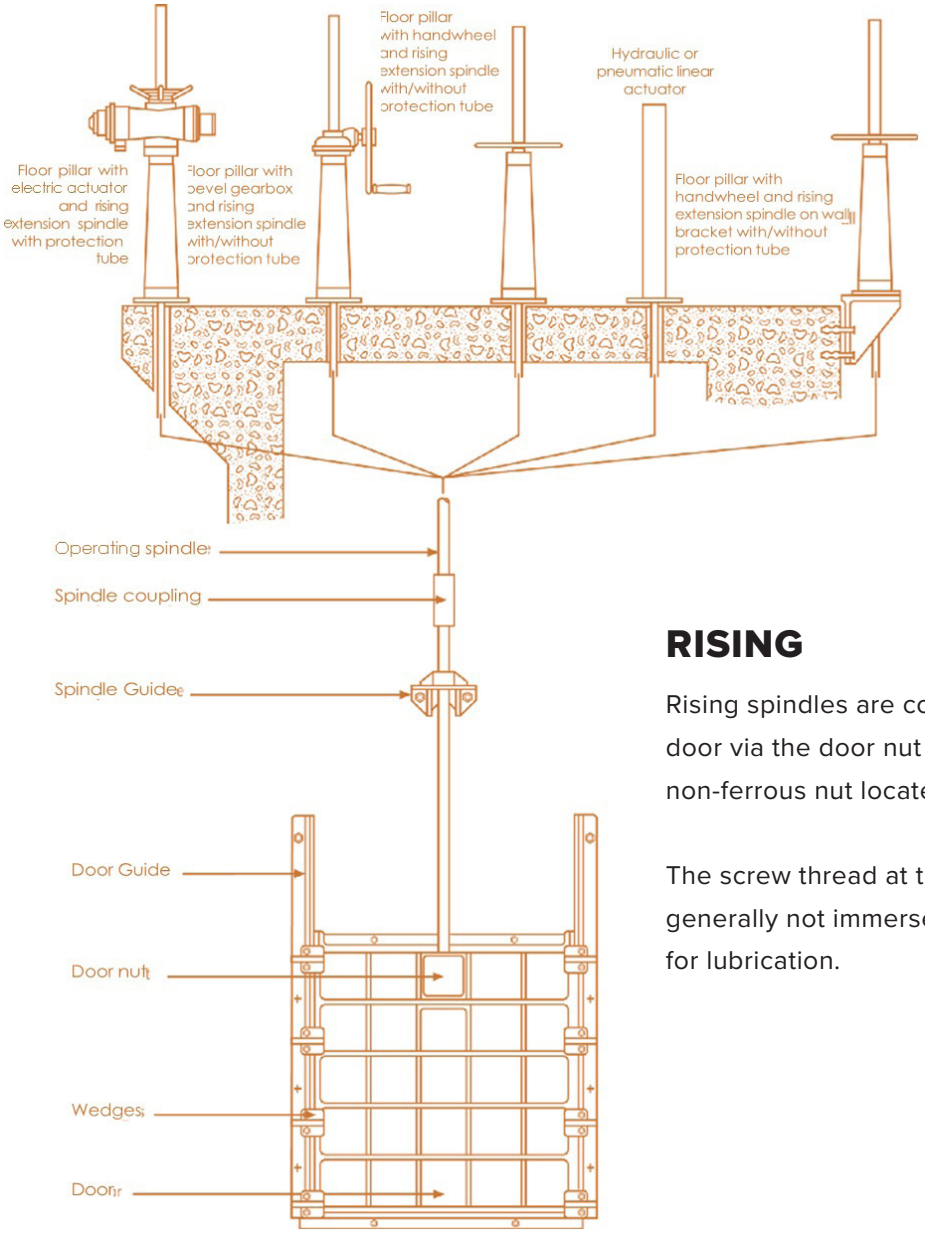
FULL FRAME

Used where thrust reaction is accommodated at the top of the frame.

OPERATING GEAR

RISING EXTENSION SYSTEMS

- Remote operation
- Thrust remote from frame



RISING

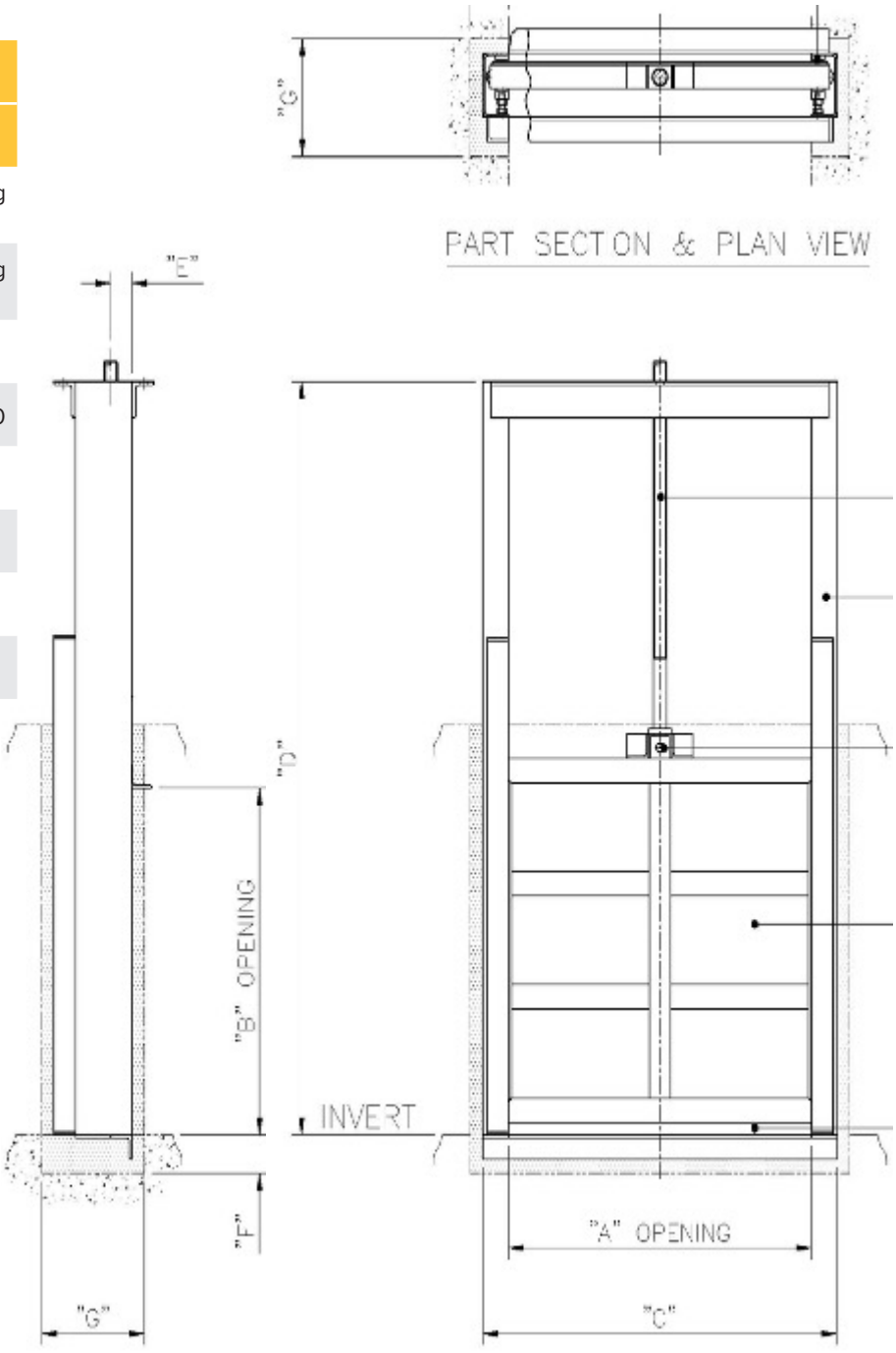
Rising spindles are connected to the penstock door via the door nut and work through a revolving non-ferrous nut located in the operating gear.

The screw thread at the top of the spindle is generally not immersed and is readily accessible for lubrication.

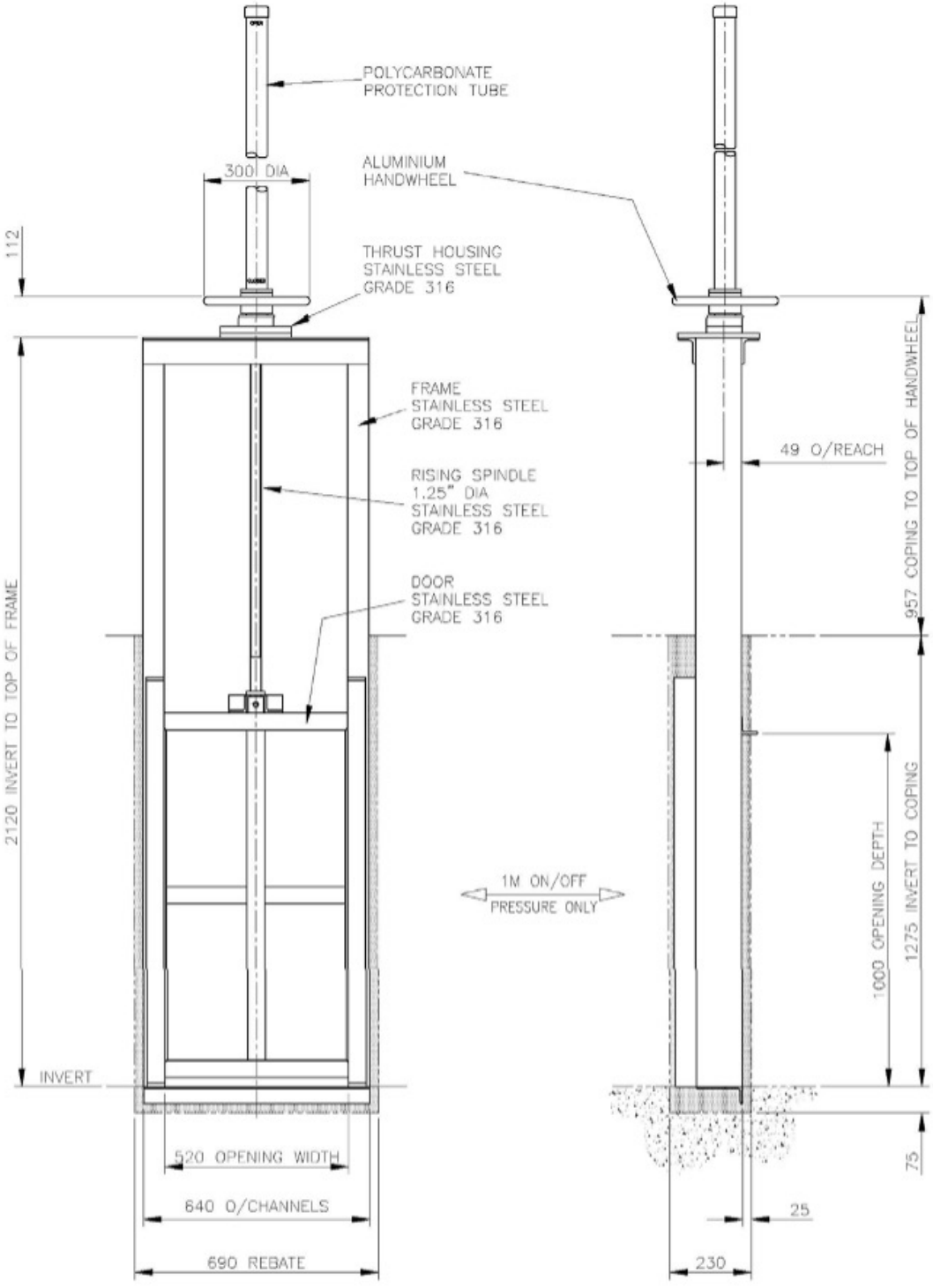
CHANNEL MOUNTED PENSTOCK

SMALL, MEDIUM AND LARGE RANGE

	Range		
	Small	Medium	Large
A	Opening Width	Opening Width	Opening Width
B	Opening Depth	Opening Depth	Opening Depth
C	A + 120	A + 120	A + 152
D	2B + 120	2B + 140	2B + 180
E	49	53	63
F	85	85	105
G	230	240	305
H	85	85	100



CHANNEL MOUNTED PENSTOCK



STEEL FRAME & STEEL DOOR

The primary application of flap valves is for surface water drainage associated with rivers, estuaries, and sea water outfalls to prevent reverse flow conditions. Flap valves can be utilised on final effluent outfalls for sewage treatment plant to prevent flood damage within the works.

The flap valves should be positioned on the outfall structure to avoid the build-up of debris around the invert area which could prevent the valve operating correctly. Sufficient ‘fall away’ should be provided between the invert of the flap valve and the base of the outfall structure.

Flap valve application on sea water outfalls should be given careful consideration due to turbulence of flow across the flap, particularly when severe wave action is involved, resulting in dislocation of the flap relative to the seats. Wherever possible the flap valve should be located in a shielded position to minimise the effects of severe wave action. In many cases the end user preference is a heavy-duty door with a mechanical hinge to give maximum flow.

The steel frame and steel door therefore satisfy this requirement giving a reasonable cracking head and low head loss through the flap itself, during operation. Subject to the client’s needs and environmental conditions the selection of material can be mixed. The material available for this design is galvanised mild steel, painted mild steel and 304 / 316 grade stainless steel.

MATERIAL SPECIFICATION

All assemblies are purpose designed to suit customers' requirements.

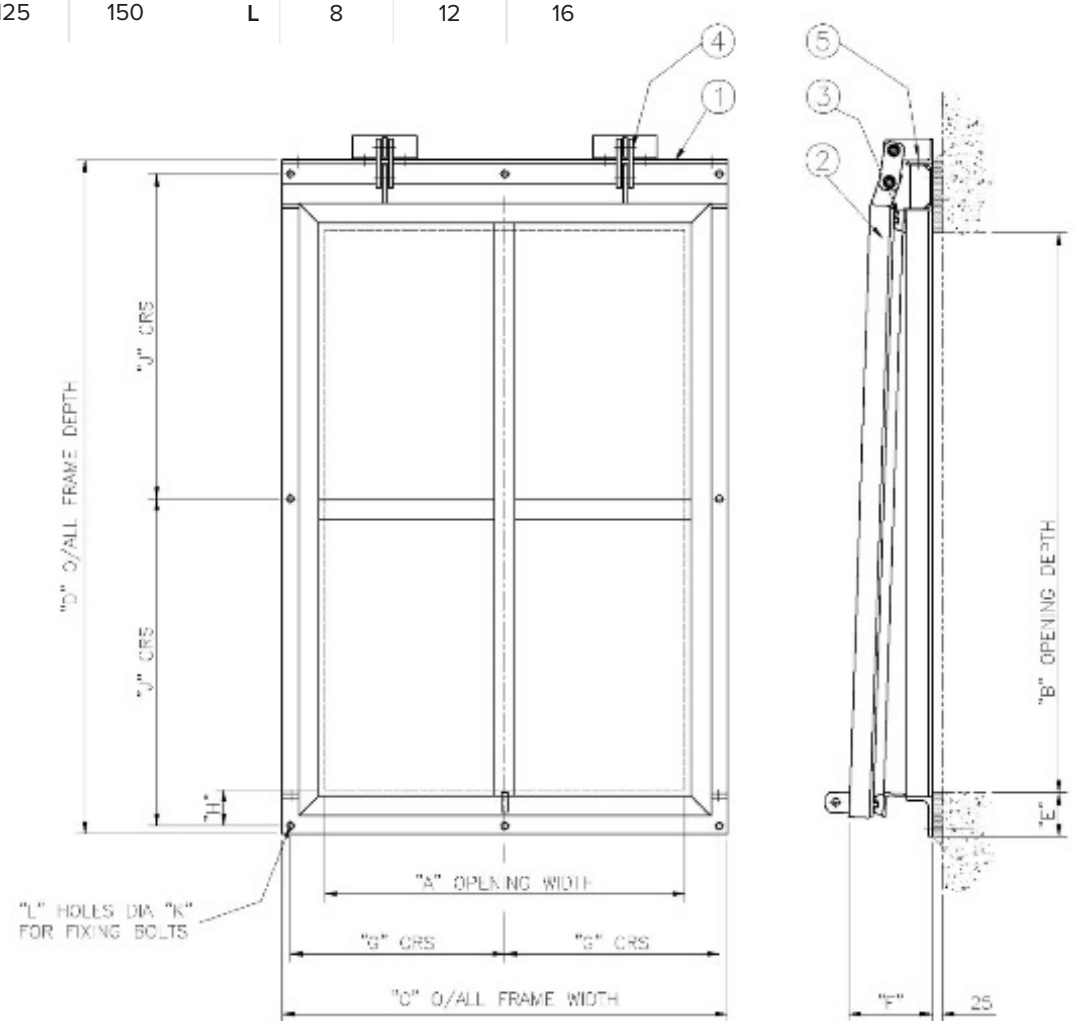
Requirement	Description
Size Range	Any width from 400 mm to 2000 mm; larger sizes can be accommodated depending on pressure and duty
Water Head	Suitable for static pressures up to 6 metres on seating. This can be accommodated in both water and sewage
Mounting	Wall
Frames	Mild Steel, BS 4360 Gr 43A Stainless Steel, BS 970 Gr 304 Stainless Steel, BS 970 Gr 316
Door	Mild Steel, BS 4360 Gr 43A Stainless Steel, BS 970 Gr 304 Stainless Steel, BS 970 Gr 316
Seal	Neoprene
Hinge Pins	Stainless Steel, BS 970 Gr 316
Fasteners	Stainless Steel, BS 6105, Gr A4

RECTANGULAR/SQUARE FLAP VALVES

STEEL FRAME & STEEL DOOR

	Range		
	Small	Medium	Large
A	Width	Width	Width
B	Depth	Depth	Depth
C	A + 212	A + 270	A + 320
D	B + 295	B + 352	B + 377
E	100	125	150

	Range		
	Small	Medium	Large
F	270	275	320
G/J	SUBJECT TO SIZE SELECTION		
H	80	95	120
K	17	17	17
L	8	12	16



LOSS OF HEAD THROUGH FLAP GATES

Tests conducted on flap gates show that the loss of head due to the flap riding on the water is very small compared with other losses in the hydraulic structure. Of course, entrance loss is usually considerably more critical than loss at the flap gate on the outlet end of conduit.

The hydraulic laboratory of the State University of Iowa conducted a series of tests some years ago to determine the number of head lost by water discharging through rectangular Flap Gates (Model 10C). The gates 16, 24 and 30 inches in diameter were supplied from commercial stock.

The following passage is excepted from the report of Professor Floyd A. Nagler, associate professor of Mechanics and Hydraulics, who supervised the investigation.

Based on these experiments the following empirical formula was derived to express the loss in head through rectangular gates of varying sizes and with different velocities of flow.

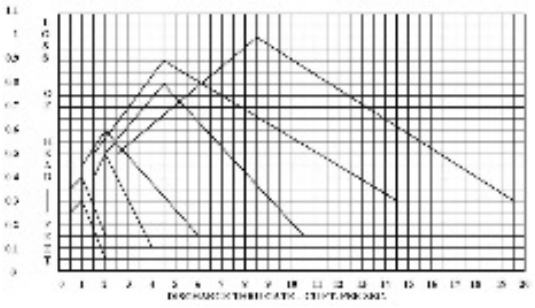
- *L - Loss of head in feet*
- *V - Velocity of flow through gate in feet per second*
- *D - Diameter of outlet in feet*
- *E - Base of natural logarithms. (2.7183)*

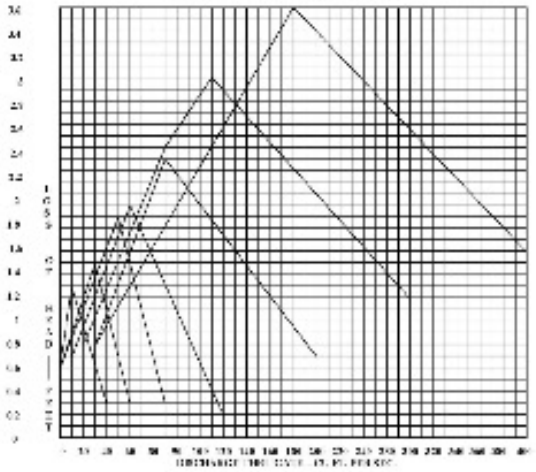
$$L = \frac{4V}{G}^{2} \times E^{\left[\frac{-1.15V}{\oplus D}\right]}$$

It may be concluded from these experiments that the rectangular gate in its hydraulic characteristics is all that the manufacturers have claimed for it.

The small loss in head obtained through these gates demonstrates that their installation has but little effect on the discharged capacity of drainage outlets.

Medium and heavy-duty flap gates have heavier flaps or covers than the gate model tested. As a result, head losses through these gates may be slightly more than those indicated by the test.





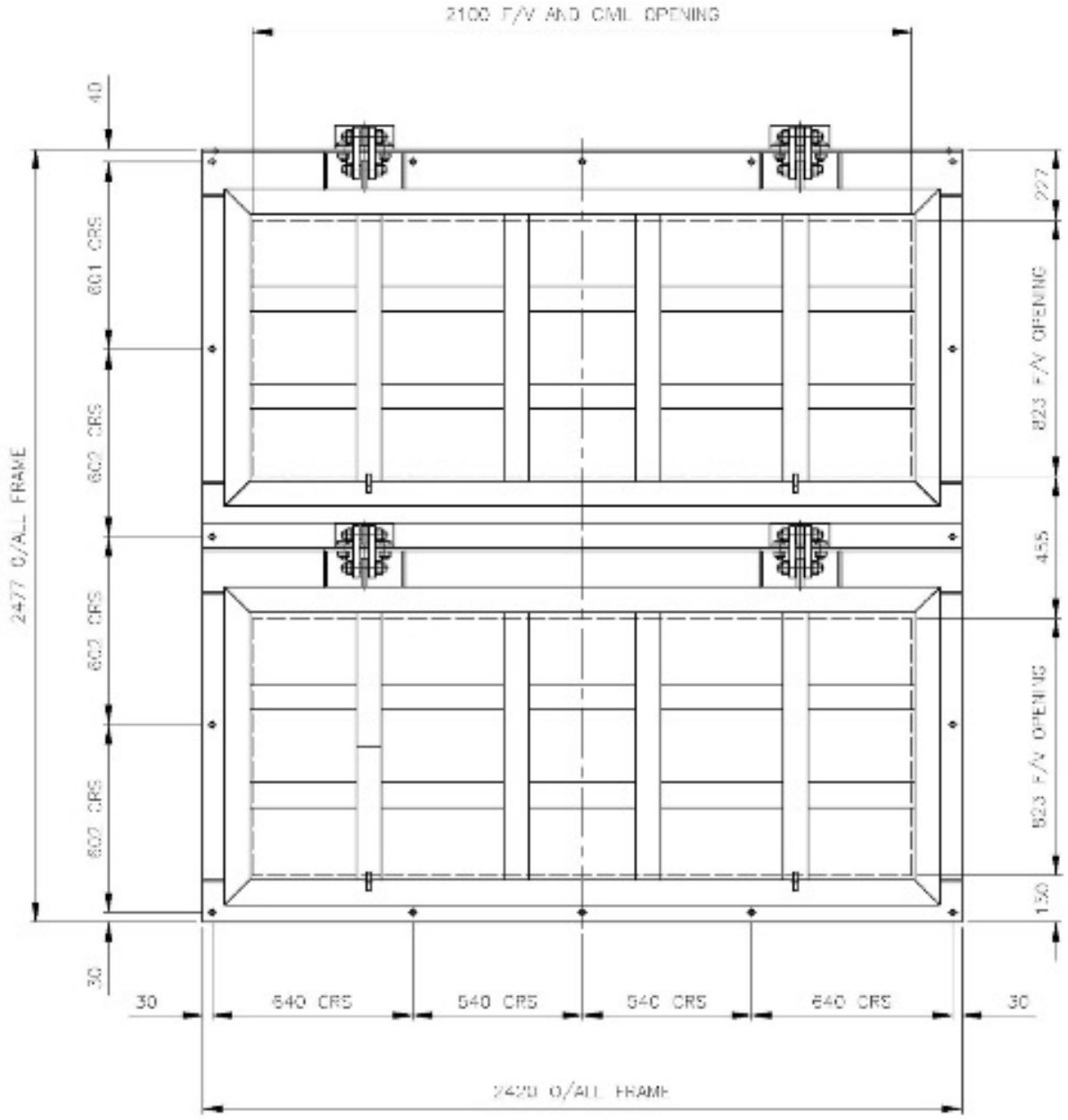
DIMENSIONS

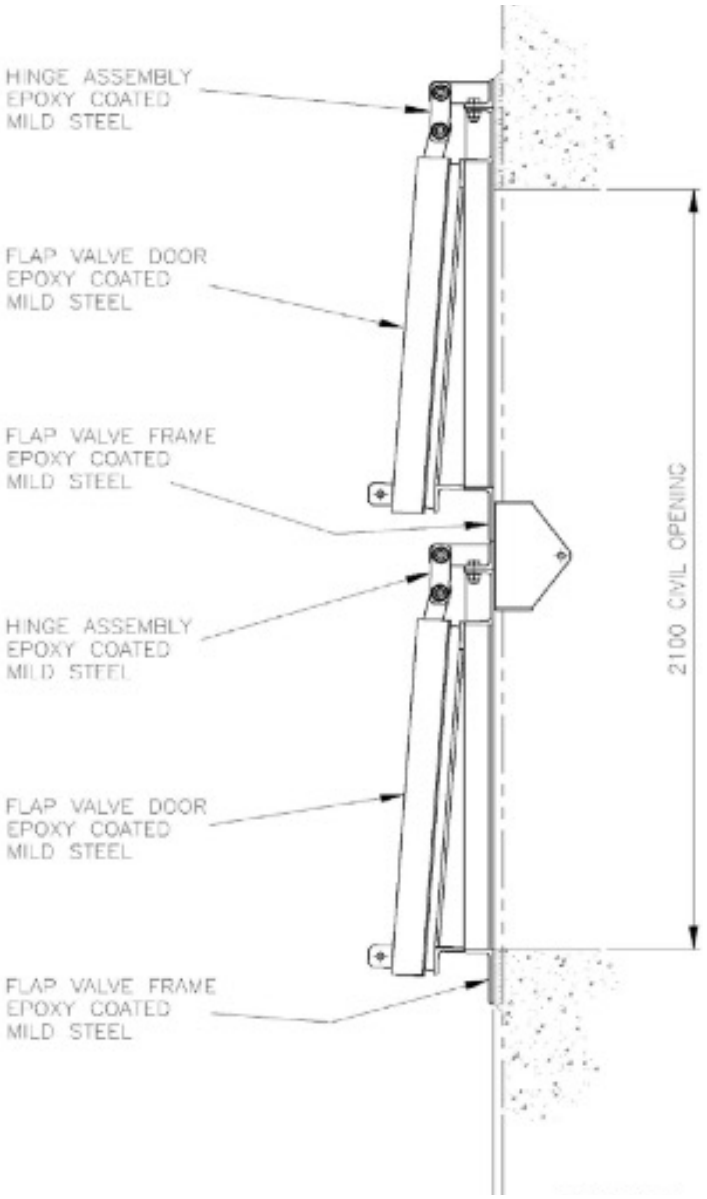
Width	Depth	Cracking Head (mm)	Head Loss (mm)
500	500	31	95
600	600	56	103
700	700	64	110
800	800	69	113
900	900	73	115
1000	1000	90	127
1100	1100	93	130
1200	1200	96	132
1300	1300	98	134
1400	1400	99	135
1500	1500	101	136
1600	1600	109	141
1700	1700	119	148
1800	1800	126	153
1900	1900	133	158
2000	2000	138	162

RECTANGULAR FLAP VALVES

STEEL FRAME & STEEL DOOR

Typical Drawing only of a Rectangular Fabricated Flap Valve Double Door Type.
Painted Mild Steel Frame and Door. Size 2100 x 2100




HINGE ASSEMBLY
EPOXY COATED
MILD STEEL
FLAP VALVE DOOR
EPOXY COATED
MILD STEEL
FLAP VALVE FRAME
EPOXY COATED
MILD STEEL
HINGE ASSEMBLY
EPOXY COATED
MILD STEEL
FLAP VALVE DOOR
EPOXY COATED
MILD STEEL
FLAP VALVE FRAME
EPOXY COATED
MILD STEEL
2100 CIVIL OPENING

SERVICES

Installation, Maintenance and Refurbishment of all makes and models of flow control equipment.

- Safeguard your capital investment
- Reduce your overall operating costs
- Maintain the performance of your capital equipment
- Improve your planning and financial control

We offer a full installation and commissioning service to ensure that all installations are highly accurate and free from distortions. This allows our customers to experience the true durability, strength, and long-term performance of our products.

INSTALLATION

SITE SURVEYS

To provide accurate specification of the most appropriate and cost-effective equipment.

INSTALLATION AND COMMISSIONING

Ensure the correct installation and commissioning of all flow control products including:

- Penstocks
- Stoplogs

MANAGEMENT

Full project management from specification to commissioning.

SITE SUPERVISION – WORLDWIDE

Supervision of the client's own labour to ensure correct installation of equipment.

MAINTENANCE

RISK ASSESSMENT

Ensure compliance with Health and Safety Legislation and suitable safety measures are put in place for ongoing maintenance.

SERVICE PROGRAMMES

A range of service programmes designed to suit your specific requirements.

BREAKDOWN

An emergency service to deal with an unexpected mechanical breakdown of equipment.

Of course, once installed we also understand that correct maintenance can further optimise our customers' initial investment, minimise their overall operating costs, and ensure correct long-term performance; which is why we also offer tailored maintenance programmes which are designed to specifically meet our customers' operational and service needs.

Our staff are all trained to the highest level, with all relevant certification, and all our services are covered by our BS EN ISO 9001:2008 quality certification.

We have products still in practical working order after over 100 years of continuous service, as well as an archive of project designs and records from the very earliest days of the Company; all of which means that we can supply the correct spares and services to equipment of all ages.

REFURBISHMENT

SITE SURVEYS

To ensure we specify the most appropriate and cost-effective refurbishment of existing equipment.

REFURBISHMENT

We have an extensive archive of information going back over many years so we can ensure that all refurbishment of flow control equipment is carried out correctly using OEM parts.

PROJECT MANAGEMENT

Full project management from specification to commissioning of refurbished equipment.

ANCILLARY EQUIPMENT

The mechanical refurbishment of ancillary equipment on treatment plants and other sites.

SPARES

EMERGENCY SPARES

A range of standard spares for an emergency breakdown dispatched within 48 hours.

NEL CERTIFIED

Quality spares manufactured under our BS EN ISO 9001:2008 system to guarantee. From enquiry to commissioning, our comprehensive service includes:

New Product Installation

- On-site services
- In-house CAD, CNC, and fabrication
- Installation and commissioning
- ISO9001 2008
- Site Survey

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