Kejuruteraan Trisuria

KT
PENSTOCK SERIES

WATER CONTROL GATE

KT Penstock are widely used in water and waste water works project as to water control and discharge system.

TÜV NORD (Malaysia) Sdn. Bhd. ISO 9001

MS No.: 05 100 14026

STANDARDS MALAYSIA ACCREDITED CERTIFICATION BODY

MS ISO/IEC 17021 : 2011
QS 16122006 CB 05

02. WHY CUSTOMER CHOOSE KT PENSTOCK

The company is acknowledge as flow control gate specialist leading in design and manufacture of all kinds of gates for water and waste water application. KT range of products can be easily found in many water and waste water projects locally and also many water works in SEA and Asia Pacific countries.

Why KT Penstock

1. Reputation

We hold good reputation in many countries for good supplier, well engineered and high quality products.

2. Service

Our team of customer service will provide the most professional help and effective solution to the customer during design, equipment selection, delivery advised and also after sale service.

3. Range of products

Unique size range available in cast iron and stainless steel penstock. Customise size also available upon request. Various flow control equipments for water works application such as stop log, roller gate, flap valve and floodgate.

4. Quality

Our product exceed the British (BS7775:05) and American (AWWA 560) standard requirement. All products are manufactured under QMS ISO9001:2015 certified.

5. Delivery

Our in-house tooling center giving us full support on delivered the various size of casting penstock mould make us not only provide fast delivery to our standard range of products size, we do able to meet the fastrack delivery request on various customise size of penstock.

6. Engineering

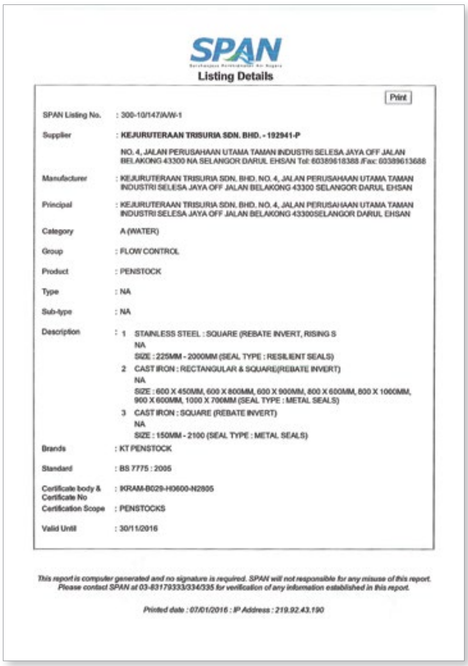
We not only sell you the products. We sell you with our solution. We provide product information, design drawing, technical information for your design clarification and submission. We also design and build the special flow control gate for you special requirement.

7. Reliable Products

From the pass 20 years experience, the reliable of our KT Penstock gives you peace of mind regarding design application, service life and maintenance. Most of our products are still inservice and in good condition.

8. Price

Our products are competitively priced and represent excellent over life time value for money.



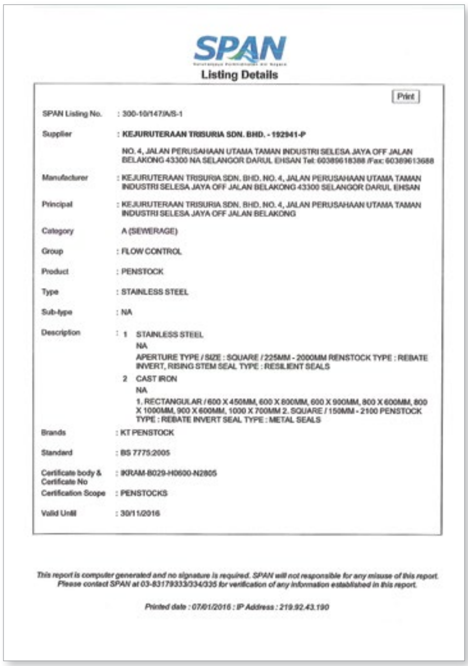
SPAN
Listing Details

SPAN Listing No.	: 300-10/147/A/W-1
Supplier	: KEJURUTERAAN TRISURIA SDN. BHD. - 192941-P NO. 4, JALAN PERUSAHAAN UTAMA TAMAN INDUSTRI SELESA JAYA OFF JALAN BELAKONG 43300 NA SELANGOR DARUL EHSAN Tel: 60389618388 /Fax: 60389613688
Manufacturer	: KEJURUTERAAN TRISURIA SDN. BHD. NO. 4, JALAN PERUSAHAAN UTAMA TAMAN INDUSTRI SELESA JAYA OFF JALAN BELAKONG 43300 SELANGOR DARUL EHSAN
Principal	: KEJURUTERAAN TRISURIA SDN. BHD. NO. 4, JALAN PERUSAHAAN UTAMA TAMAN INDUSTRI SELESA JAYA OFF JALAN BELAKONG 43300SELANGOR DARUL EHSAN
Category	A (WATER)
Group	: FLOW CONTROL
Product	: PENSTOCK
Type	: NA
Sub-type	: NA
Description	: 1 STAINLESS STEEL : SQUARE (REBATE INVERT, RISING S NA SIZE : 225MM - 2000MM (SEAL TYPE : RESILIENT SEALS) 2 CAST IRON : RECTANGULAR & SQUARE(REBATE INVERT) NA SIZE : 600 X 450MM, 600 X 800MM, 600 X 900MM, 800 X 600MM, 800 X 1000MM, 900 X 600MM, 1000 X 700MM (SEAL TYPE : METAL SEALS) 3 CAST IRON : SQUARE (REBATE INVERT) NA SIZE : 150MM - 2100 (SEAL TYPE : METAL SEALS)
Brands	: KT PENSTOCK
Standard	: BS 7775 : 2005
Certificate body & Certificate No	: IKRAM-B029-H0600-N2805
Certification Scope	: PENSTOCKS
Valid Until	: 30/11/2016

This report is computer generated and no signature is required. SPAN will not responsible for any misuse of this report. Please contact SPAN at 03-83179333/334/335 for verification of any information established in this report.

Printed date : 07/01/2016 : IP Address : 219.92.43.190

SPAN Certificate (water)



SPAN
Listing Details

SPAN Listing No.	: 300-10/147/A/S-1
Supplier	: KEJURUTERAAN TRISURIA SDN. BHD. - 192941-P NO. 4, JALAN PERUSAHAAN UTAMA TAMAN INDUSTRI SELESA JAYA OFF JALAN BELAKONG 43300 NA SELANGOR DARUL EHSAN Tel: 60389618388 /Fax: 60389613688
Manufacturer	: KEJURUTERAAN TRISURIA SDN. BHD. NO. 4, JALAN PERUSAHAAN UTAMA TAMAN INDUSTRI SELESA JAYA OFF JALAN BELAKONG 43300 SELANGOR DARUL EHSAN
Principal	: KEJURUTERAAN TRISURIA SDN. BHD. NO. 4, JALAN PERUSAHAAN UTAMA TAMAN INDUSTRI SELESA JAYA OFF JALAN BELAKONG
Category	A (SEWERAGE)
Group	: FLOW CONTROL
Product	: PENSTOCK
Type	: STAINLESS STEEL
Sub-type	: NA
Description	: 1 STAINLESS STEEL NA APERTURE TYPE / SIZE : SQUARE / 225MM - 2000MM RENSTOCK TYPE : REBATE INVERT, RISING STEM SEAL TYPE : RESILIENT SEALS 2 CAST IRON NA 1. RECTANGULAR / 600 X 450MM, 600 X 800MM, 600 X 900MM, 800 X 600MM, 800 X 1000MM, 900 X 600MM, 1000 X 700MM 2. SQUARE / 150MM - 2100 PENSTOCK TYPE : REBATE INVERT SEAL TYPE : METAL SEALS
Brands	: KT PENSTOCK
Standard	: BS 7775:2005
Certificate body & Certificate No	: IKRAM-B029-H0600-N2805
Certification Scope	: PENSTOCKS
Valid Until	: 30/11/2016

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Printed date : 07/01/2016 : IP Address : 219.92.43.190

SPAN Certificate (sewage)

CERTIFICATE TÜV NORD

Management System as per ISO 9001 : 2000

In accordance with TÜV NORD CERT procedures, it is hereby certified that

KEJURUTERAAN TRISURIA SDN. BHD. (192941-P)

(HQ) No.4, Jalan Perusahaan Utama,
Taman Industri Selesa Jaya,
Off Jalan Balakong,
43300 Selangor Darul Ehsan, Malaysia
(Site 1) No.5&7, Jalan Taming Empat,
Taman Taming Jaya,
Off Jalan Balakong,
43300 Selangor Darul Ehsan, Malaysia

applies a management system in line with the above standard for the following scope

Provision of Metal Stamping, Design and Manufacture of Penstock

Certificate Registration No. 44 100 082409
Audit Report No. 2.5-4590/2008

Valid until 2011-07-29
Initial Certification 2008-07-30

Certification Body at TÜV NORD CERT GmbH

Hong Kong, 2008-07-30

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

TÜV NORD CERT GmbH Langemarckstrasse 20 D - 45141 Essen www.tuev-nord-cert.com

ISO 9001:2000
Quality Management Standard

IKRAM QA CERTIFICATION
Certification Scheme Type 5

K-MARK
Product Certification Mark

PRODUCT CERTIFICATE OF CONFORMITY

This certificate has been approved and issued in compliance with IKRAM QA GUIDE 1

Name and Address of Certificate Holder

KEJURUTERAAN TRISURIA SDN. BHD., 4, Jalan Perusahaan Utama, Tmn. Ind. Selesa Jaya, Off Jln. Balakong, 43300 Balakong, Selangor Darul Ehsan, Malaysia.

Status Of Certificate Holder : Manufacturer

It is hereby certified that the product as detailed in this certificate has satisfactorily complied with the requirements of the appropriate Product Standard(s).

Particulars of Product

Product Name	Product Standard(s)
Penstocks	BS 7775 : 2005
Product Descriptions	
Product descriptions shall refer to ANNEX N2805 / 1 of 1	
Brand	Country of Origin
KT	MALAYSIA
Name and Address of Manufacturer	
KEJURUTERAAN TRISURIA SDN. BHD., 4, Jalan Perusahaan Utama, Tmn. Ind. Selesa Jaya, Off Jln. Balakong, 43300 Balakong, Selangor Darul Ehsan, Malaysia.	

The use of this certificate is subjected to the terms and conditions of certification. This certificate remains the property of IKRAM QA SERVICES SDN. BHD. and shall be returned on request.

Certificate issued by
IKRAM QA SERVICES SDN. BHD.

AZMAN BIN IDRIS, Director

Chairman

Certificate number :	Date of original issue :	Date of renewal/modification(*) :	Expiry date :
IKRAM-B029-H0600-N2805	29.10.2005	21.11.2016(P3)*	30.11.2017

IKRAM QA Services Sdn. Bhd.

Annex No.: N2805 / 1 of 1

ANNEX
TO
PRODUCT CERTIFICATE OF CONFORMITY
(This annex is subjected to the same terms and conditions of the issued Certificate)

… shall be read together with Certificate No. : IKRAM-B029-H0600-N2805
…ficate Holder : KEJURUTERAAN TRISURIA SDN. BHD.

Stainless Steel	Grey Cast Iron
… : Square	Aperture Type : Rectangular and Square
… 225mm x 225mm, 250mm x 250mm, … x 300mm, 350mm x 350mm, … x 400mm, 450mm x 450mm, … x 500mm, 600mm x 600mm, … x 700mm, 800mm x 800mm, … x 900mm, 1000mm x 1000mm, … x 1100mm, 1200mm x 1200mm, … x 1300mm, 1400mm x 1400mm, … x 1500mm, 1600mm x 1600mm, … x 1700mm, 1800mm x 1800mm, … x 1900mm, 2000mm x 2000mm	Rectangular Size : 600mm x 450mm, 600mm x 800mm, 600mm x 900mm, 800mm x 600mm, 800mm x 1000mm, 900mm x 600mm, 1000mm x 700mm Square Size : 150mm x 150mm, 200mm x 200mm, 225mm x 225mm, 250mm x 250mm, 300mm x 300mm, 350mm x 350mm, 400mm x 400mm, 450mm x 450mm, 500mm x 500mm, 600mm x 600mm, 700mm x 700mm, 800mm x 800mm, 900mm x 900mm, 1000mm x 1000mm, 1100mm x 1100mm, 1200mm x 1200mm, 1300mm x 1300mm, 1400mm x 1400mm, 1500mm x 1500mm, 1600mm x 1600mm, 1700mm x 1700mm, 1800mm x 1800mm, 1900mm x 1900mm, 2000mm x 2000mm, 2100mm x 2100mm
… : Rebate Invert, Rising Stem …ilient Seals … : 1.4301 (304), 1.4401 (316)	Penstock Type : Rebate Invert Seal Type : Metal Seals Material Grade : EN-GJL-250

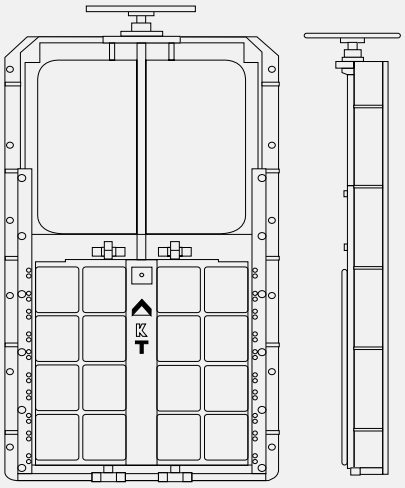
Certificate issued by
IKRAM QA SERVICES SDN. BHD.

IKRAM (IQCI)
Product Certification (Penstock)

04. PENSTOCK GENERAL INFORMATION

Penstock

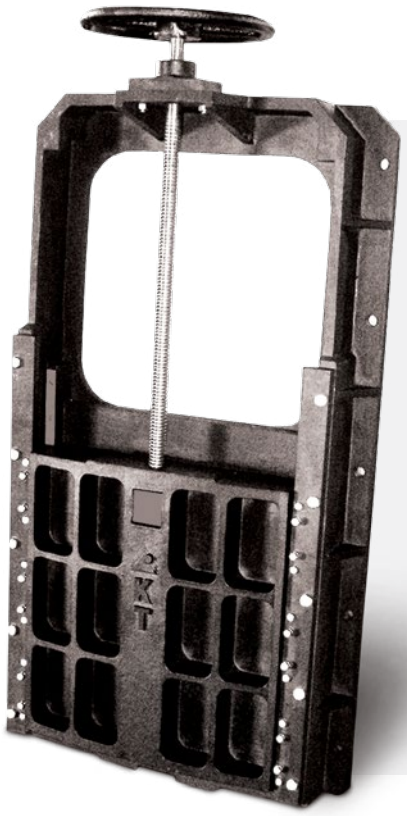
A product used for flow or level control of liquid by it sliding gate opening through a machined spindle, which move along the aperture opening of a frame. It is constructed on high duty cast iron or ductile iron, main structure with stainless steel stem, fasteners and bronze seals to high quality finishing and suitable for water management related applications.



CATEGORY	SERIES	DETAIL	STANDARD SIZE RANGE (mm)	WATER HEAD (mm)		APPLICATION					
				Seating	Unseating	Sewage Treatment	Water Treatment	Food Control	Industrial	Drainage	Hydro Dam
Heavy Duty Penstock	Cast Steel	Square	200 x 200 to 2350 x 2350	15	10	✓	✓	✓	✓	✓	✓
	Cast Iron	Rectangular	from 200 to 2350*	15	10	✓	✓	✓	✓	✓	✓
	Ductile Iron	Round	Ø200 to Ø2350	15	10	✓	✓	✓	✓	✓	✓
Fabricated Penstock	Mild Steel Carbon Steel	MS or CS	from 200 to 2350**	10	10			✓	✓	✓	
	SUS 304 SUS 316	SS	from 200 to 2350**	10	10	✓	✓	✓	✓	✓	✓
Stop Log	Mild Steel SUS 304 SUS 316	-	up to 5000mm	15	10	✓	✓	✓		✓	
Stop Gate	Mild Steel SUS 304 SUS 316 AL	-	up to 2000mm	10	10	✓	✓		✓		

* Note: Customization sizes also available uo to 2350mm width and 5000mm height

**Note: Other sizes available upon request.



Quality Made In Malaysia Penstocks Or Sluice Gates For Waterworks, Sewage Management, Irrigation And Dam Projects

General

The KT heavy duty penstock were constructed of heavy duty cast iron or ductile iron main structure with stainless steel stem and fasteners, bronze sealing surface for high quality water sealing performance and suitable uses for most water management related applications. The products design and the allowable leakage rate is standard compliance with BS 7775:2005 standard requirement and equivalence to AWWA C-560:14.

Features And Advantages

Cast Iron or Ductile Iron Penstocks:

- **Heavy duty structural design**
- **High impact resistance**
- **Durable metal sealing faces**
- **Adjustable seating wedges application**
- **All sewage and water applications**
- **More than 30 years service life design**

Frame and Gate

The frame and gate are casted by cast iron or ductile iron material with rigid construction design against all possibility loading and impact. The frames are design for several different applications include standard flat back, spigot frame (#1), weir type, channel mounted and flush bottom. The aperture sizes can be square, round and rectangular. Gate is design as in single piece casting structural to minimum 5 times of safety factor against structural failure. High solid epoxy finish is applied to prevent corrosion to the structural. Penstock for special application can also be custom made.

Seating & Wedges

All seating faces are use with bronze or gunmetal and having it's good surface contact to achieve water tightening. Seating face gaping allowable is less than 0.1mm. The side wedges (#2), top and bottom wedges are taper machined to give maximum contact face and wedge action. Top and bottom wedges devices are required for all OFF seating penstock. All wedges are design for easy adjustment to achieve better water tightened.

Spindle

KT penstock provides rising and non-rising stem based on customer requirement. Gunmetal thrust nut are used for better thrust movement. Extension stem is given in various lengths as for various site elevations.

Spindle Nut

Manufactured from gunmetal material for Rising and Non-Rising stem applications.

Clamping Bar

Manufactured from cast iron material. Attach adjustable side wedges as pressure bar along the side of the frame as pressure adjuster toward water pressure and leakages control.

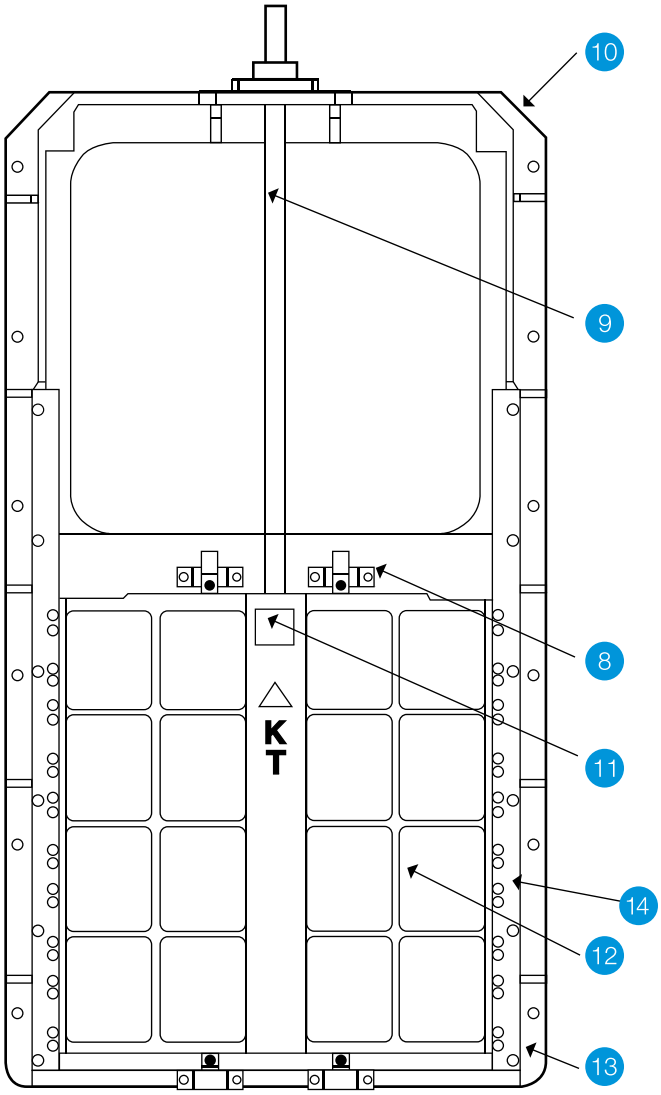
Other Accessories

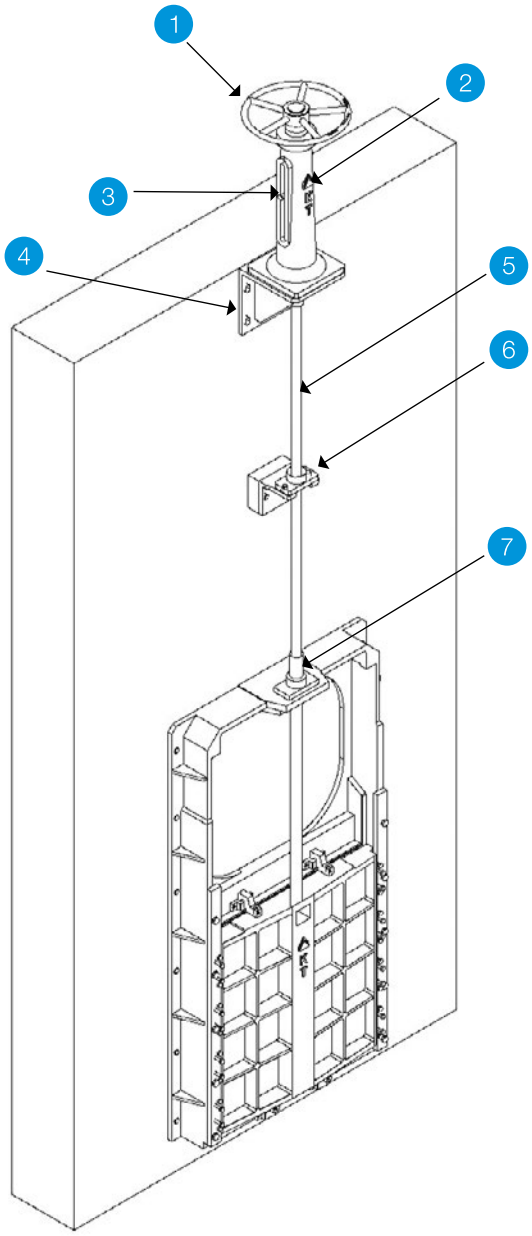
STEM GUIDE is main for guiding the stem. It is casted in cast iron. Stem guide spacing shall not exceed l/r ratio of 200.

MUFF COUPLE is casted by stainless steel and used as join for extension stem between penstock and headstock.

HEADSTOCK WALL BRACKET is casted by cast iron. It is mounted direct to the floor slab for headstock side wall mounting. Used together with headstock as operating pedestal to penstock in manual or motorize operation.

06. TYPICAL PENSTOCK & ACCESSORIES

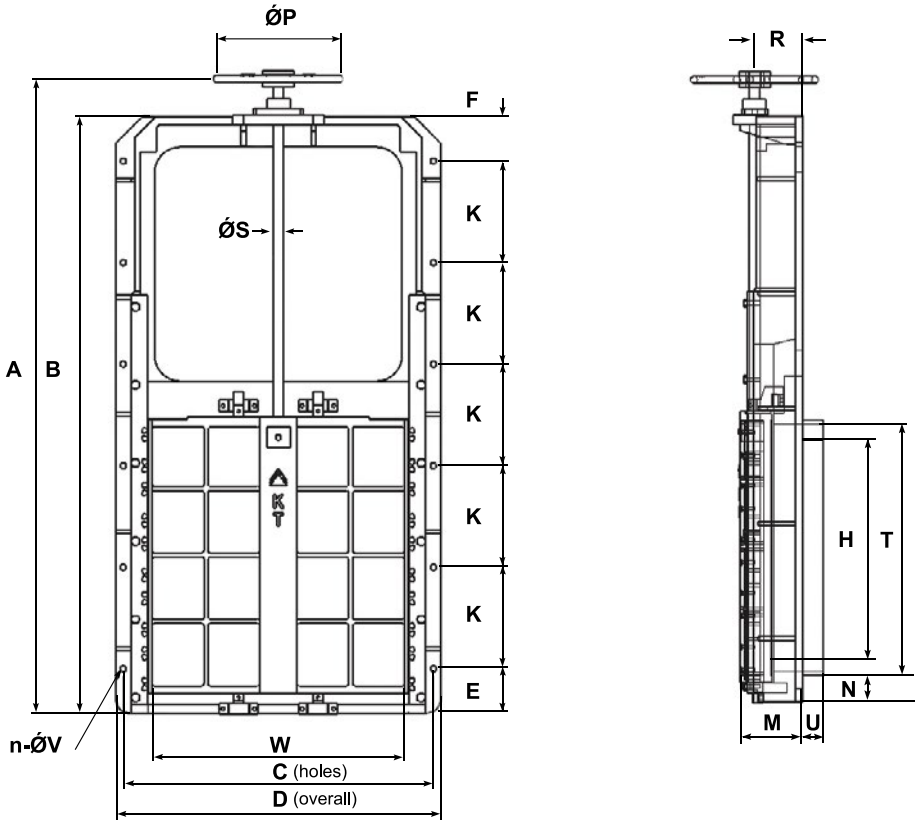




No.	Identification	No.	Identification
1	Handwheel	8	Off Seat Wedge Device
2	Headstock	9	Spindle
3	Opening Indicator	10	Yoke
4	Headstock Wall Bracket	11	Thrust Nut
5	Ext. Stem	12	Gate
6	Stem Guide c/w Wall Bracket	13	Frame
7	Muff Coupling	14	Clamping Bar

Corresponding Terms Between BS7775 and AWWA C560

BS7775	AWWA C560
Penstock	Sluice Gate
Door	Slide
Spindle	Stem
Spindle Protection Tube	Stem Cover
Metal Seal	Sealing Face
Resilant Seal	Seal
Off-Seating Head	Unseating Head
Head Measured From Invert Of Appeture	Head Measured From Centerline Of Appeture

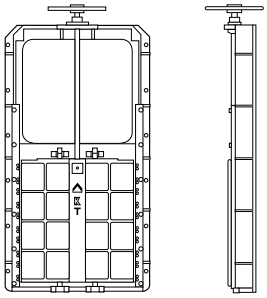


SIZE		A	B	C	D	E	F	K	n	M	N	P	R	S	V	*T	*U	Weight (kg)
W	H																	
200	200	675	555	320	348	58	57	220 x 2	6	89	58	320	66	M22	16	222	42	33
225	225	740	620	345	380	90	98	216 x 2	6	91	60	320	67	M22	16	247	42	39
250	250	765	645	375	410	68	68	255 x 2	6	93	60	320	68	M22	16	272	42	55
300	300	920	800	450	480	70	70	220 x 3	8	112	65	320	82	M25	19	322	44	72
350	350	1020	900	490	520	98	98	235 x 3	8	140	66	320	103	M25	19	374	44	109
400	400	1145	1025	550	585	98	102	275 x 3	8	139	82	320	105	M28	19	424	45	142
450	450	1225	1105	600	645	103	102	300 x 3	8	141	68	320	106	M28	19	474	45	162
500	500	1369	1249	650	695	98	111	260 x 4	10	159	66	320	117	M28	19	524	47	220
600	600	1587	1462	770	825	81	141	310 x 4	10	159	81	400	120	M35	24	626	49	268
700	700	1793	1668	885	940	128	115	285 x 5	12	174	91	400	133	M35	24	726	52	396
800	800	2007	1872	990	1045	124	124	325 x 5	12	189	80	400	142	M35	24	828	54	489
900	900	2201	2076	1090	1145	163	163	350 x 5	12	199	87	400	149	M38	24	928	57	564
1000	1000	2415	2290	1190	1245	170	170	390 x 5	12	239	102	500	179	M41	24	1030	59	840
1100	1100	2630	2505	1305	1365	173	172	360 x 6	14	219	107	500	157	M41	24	1130	61	1011
1200	1200	2830	2700	1420	1470	160	140	400 x 6	14	244	108	500	179	M45	24	1230	63	1150
1300	1300	3040	2910	1520	1570	156	304	350 x 7	16	250	108	500	184	M45	28	1332	65	1350
1400	1400	3265	3115	1620	1690	160	160	350 x 8	18	259	103	500	189	M48	28	1432	67	1550
1500	1500	3465	3314	1730	1800	180	174	370 x 8	18	269	108	500	195	M54	28	1534	69	2200
1600	1600	3670	3514	1830	1900	185	179	350 x 9	20	274	108	500	187	M54	28	1634	71	2300
1700	1700	3875	3730	1930	2005	185	215	370 x 9	22	274	108	500	187	M54	28	1736	73	2400
1800	1800	4079	3926	2040	2105	100	220	360 x 10	22	274	108	500	187	M54	28	1836	75	2500
1900	1900	4285	4140	2150	2250	160	280	370 x 10	24	359	129	500	244	M60	28	1938	77	3500
2000	2000	4490	4343	2270	2350	190	354	380 x 10	24	359	129	500	244	M60	28	2038	79	4500

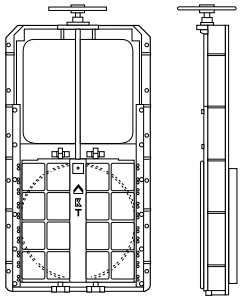
Note: Customization sizes also available up to 2350mm width and 5000mm height

*For Spigot type only

08. TYPE OF CAST IRON & DUCTILE IRON PENSTOCK/ SLUICE GATE



Standard Flat Back



Spigot Back

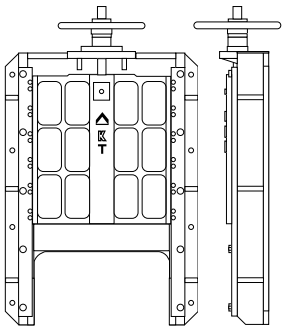
STANDARD FLAT BACK PENSTOCK & SPIGOT TYPE

This is the most popular heavy duty type of penstock used in wide variety of water work application as water treatment project and flood control project.

KT Penstock has provides penstock which casting with iron, ductile iron and cast steel design under BS 7775:05 specification. This type of penstock can be used in on seating and off seating water pressure direction with rising or non-rising stem option.

Spigot back of penstock is design for easy install and preventing the misalign of the aperture fitting. It is also suitable for high off seating water pressure application to prevent water leakage from wall grounding when there are under high water pressure condition.

Thimble mounted penstock is design to be used as permits gate to be relocated, removed for service or gate replacement. It eliminate the need of cast-in-anchors and grounding behind the gate to make the installation works more easier. The gate can be removed and installed again without disturbing concrete and preventing gate distortion. Wall thimble mounted penstock also highly recommended when high off seating water pressure is specified.

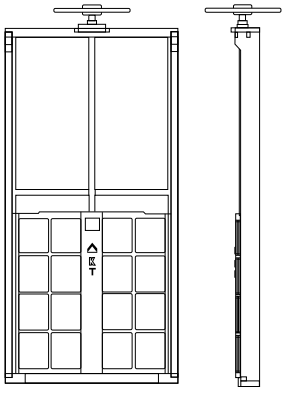


Weir Gate

WEIR GATE / DOWN OPEN PENSTOCK

KT weir gate is design for water level controlling application. It also can be used in water distribution, drainage and other places for flow and level controlling. KT weir gate are available in cast iron, ductile iron and other fabrication types. The size is available in square and rectangular opening.

Generally, there are 3 sides of sealing face for the weir gate design as the water is allow for overflow at the top sealing face. However, 4 sides seating face is available upon request. Weir leakage allowable is fulfill the BS 7775:05 specification requirement.

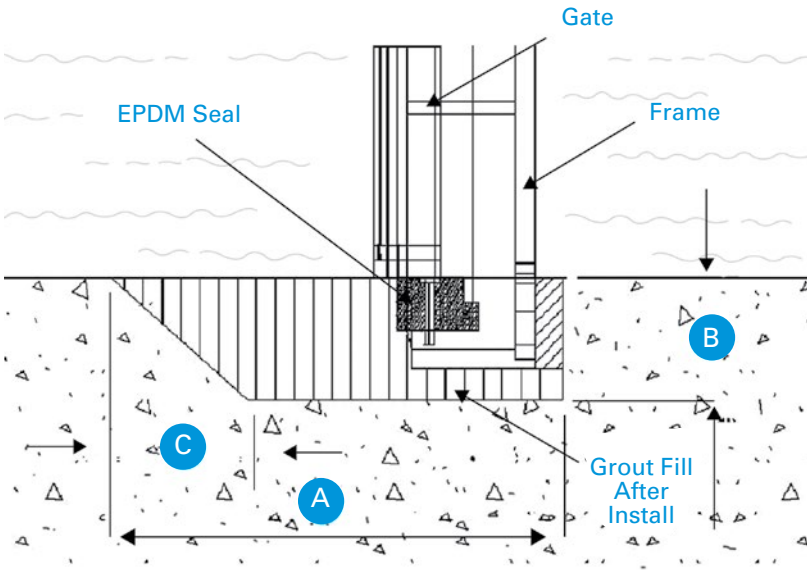


Channel Penstock

CHANNEL PENSTOCK

KT channel penstock available in cast iron / ductile iron casting and other material fabrication type. Channel penstock is mount between the two side channel groove without mounting to the wall. It is used for channel water flow direction or for water distribution control purposed. It allows the overflow on top of the gate. The channel penstock available in square and rectangular size.

The channel penstock having the good design water head leakage acceptable to BS 7775:05 specification. Channel penstock can used in on and off seating with rising and non-rising stem optional. All the sealing surface and the assembly hardware is used corrosion resistant material.



FLUSH BOTTOM PENSTOCK

Flush bottom penstock design is used whenever a continuous smooth opening is desirable. Typical installations include waste water setting tanks, aeration tanks, sedimentation and flocculation basins.

The advantage of this penstock is to prevent the rubbish stay or block at the slot between the bottom of the penstock and the mounted wall. This is used for preventing the gate operation stuck and water leakage cause by the stuck at the bottom gapping.

This penstock is providing a flat plane across the bottom of frame while the gate is open by using EPDM seal. The seal is mounted to the frame with stronger support by corrosion resistant fasteners. The EPDM seal is design for easy replaceable without dismantle the frame. Bottom wedges will not used on the flush bottom closure.

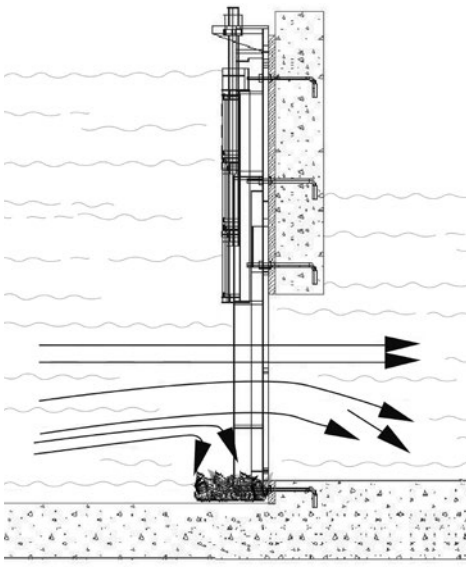
Recommended Installation For Flush Bottom Penstock

CI Penstock

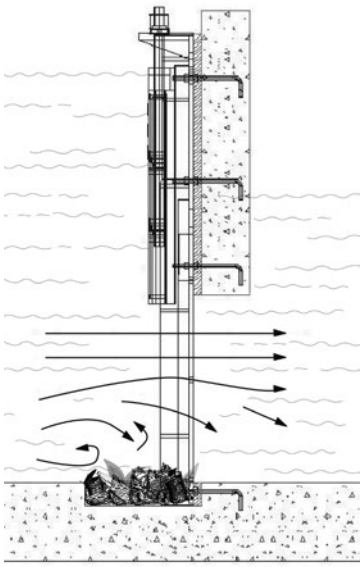
Penstock Size / mm	A	B	C
225 - 600	360	220	80
700 - 1000	500	250	90
1100- 1600	600	280	110
1700 - 2000	680	300	140

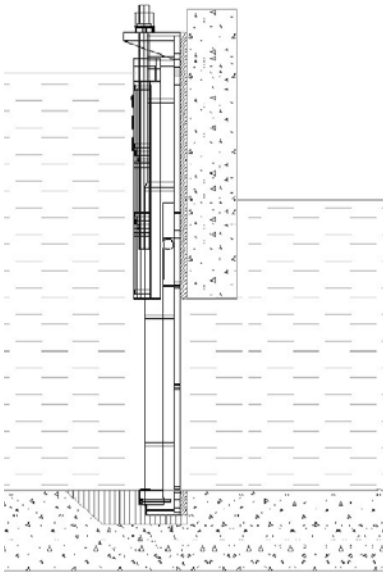
Stainless Steel Penstock

Penstock Size	A	B	C
200 - 500	200	100	50
600 - 900	260	150	70
1000 - 1400	370	200	90
1500 - 2000	380	230	100



Rubbish Blocking Problem



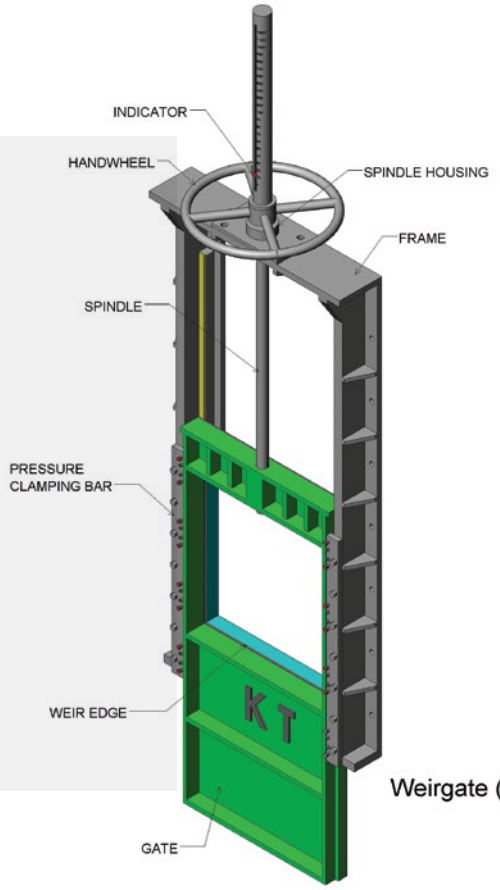


Solution of Flush Bottom Penstock

10. CAST IRON & DUCTILE IRON WEIR GATE (NON OBSTRUCTED TYPE)

General

- Weir gate are usually used in most of the water works project for accurate regulated of flow or water level control application.
- Size of weir gate is available in both square and rectangular aperture, the size range and dimension detail available on request.
- Non obstructed type of Weir gate gave you better flow measurement and less wearing of spindle due to the spindle is attach to the horizontal beam of the gate does not obstruct the water flow over the weir edge. Spindle is always free from the water.



Weirgate (Open)

Frame and Gate

The frame and gate are casted by Cast Iron(G-250) or Ductile Iron (G-500) for wall or thimble mounting application. The sealing face is fixed securely either in 3 sides or 4 sides sealing depend of the flow control requirement.

The gate is design as down open operation concept where moving the gate upward will increase the water control level or decrease the flow rate of water. The gate sealing face as standard is machined Cast Iron body. However, upon request, the gate can be fully saced with sealing plate to enhance the accuracy of control and service life.

Sealing Faces

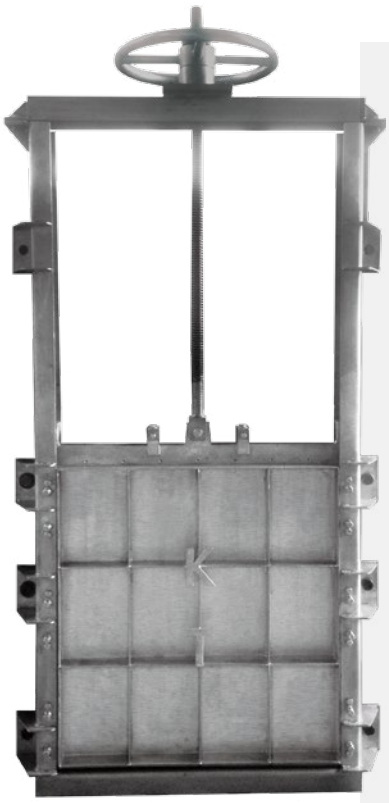
Phosphor bonze sealing face to BS EN 12163 as the standard material, secure properly to the frame by taper countersunk screw. For gate sealing face Cast Iron is the standard material or stainless steel plate to BS EN 10088 (SUS304 or SUS316) upon request.

Pressure Clamping Bar

Cast iron pressure clamping bar attach with adjustable Gunmetal wedges are secured at two side of the frame for guiding and pressured the gate along the operation track. It shall be machined in flat to make sure the water tightened in any position of the gate.

Door Nut

Manufactured from Gunmetal (LG2) to BS EN 1982 for Non-Rising stem or Cast Iron to BS EN 1561 for Rising stem design.



General

KT Penstock also provide fabricated Stainless Steel Penstock/Slide gate where it is suitable for most of the water works application. Stainless Steel Penstock is design for non-corrosive water treatment facilities, sewage treatment plants, water diversion projects, drainage and many other fluid control applications. Generally, the penstock is design for medium water head application with very low leakage rate requirements. EPDM resilient rubber seals are used to provide the highest efficiency leakage control and long service life duty cycle. The penstock design is tailored using our engineering software to suit specific duty and aperture requirements. The design is accordance to BS7775:05 specification which also meet the requirement of AWWA C561:14 standard.

Features and Advantages

- Supreme water leakage control
- Adjustable seating wedges application
- Wall, channel and side wall mounting methods
- Flexible aperture size design to various application
- Used of corrosion resistance materials
- Special request for zero (0) water leakage available upon request up to 6.0m head pressure with penstock size below 1000mm width

Frame and Gate

The frame and gate is fabricated by either SUS304 or SUS316 stainless steel material. The penstocks come with standard flat back wall mounted or spigot frame with square or rectangular aperture opening. Frame seating face is machined with tight flatness requirement for the best leakage control. The gate is design for minimum 5 times of safety factor against the structure failure under maximum water pressure. It consist of skin plate welded with reinforce structural rib to enhance the design strength requirement. The gate seal is mounted to the machined gate surface with clamping bar and bolts for easy maintenance and replacement. Penstock for special application can also been custom made.

Top Frame (Yoke)

Top frame of the penstock are fitted to handle the thrust load for movement of the gate. Top frame is tailored design to suit the thrust load request for any individual penstock application. It shall be same material to the frame.

Seating

All seating faces are seal by EPDM runner seal for lowest leakage and higher service life requirement. EPDM material having the good resistant to chemical and water temperature also very stable in most of the submerge water application. The T-seal design gave the full clamping support to the seal to perfectly secure it to the gate during operation. This is to prevent the seal distortion and twisted during sliding against the frame under pressurized from the water head pressure. This design also will maximize the seal service life compare to other seal design.

Spindle

KT Penstock provide stainless steel rising or non-rising spindle with the extension optional. The extension stem shall be the same material with the penstock spindle. Gunmetal is used as the spindle nut for better thrust movement.

Side Wedges

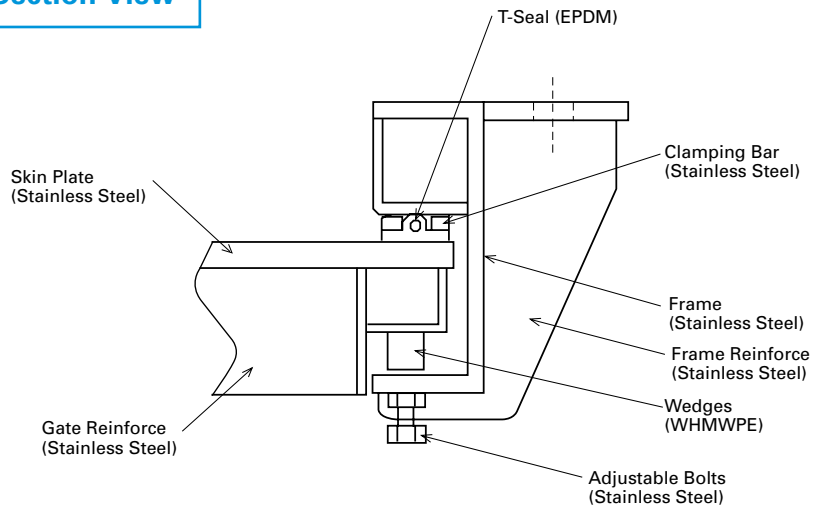
Side wedges is made by UHMWPE material for low friction high service life requirement. It attach to the adjustable bolts for minor adjustment to get better leakage and gate movement control after penstock installation.

Other Accessories

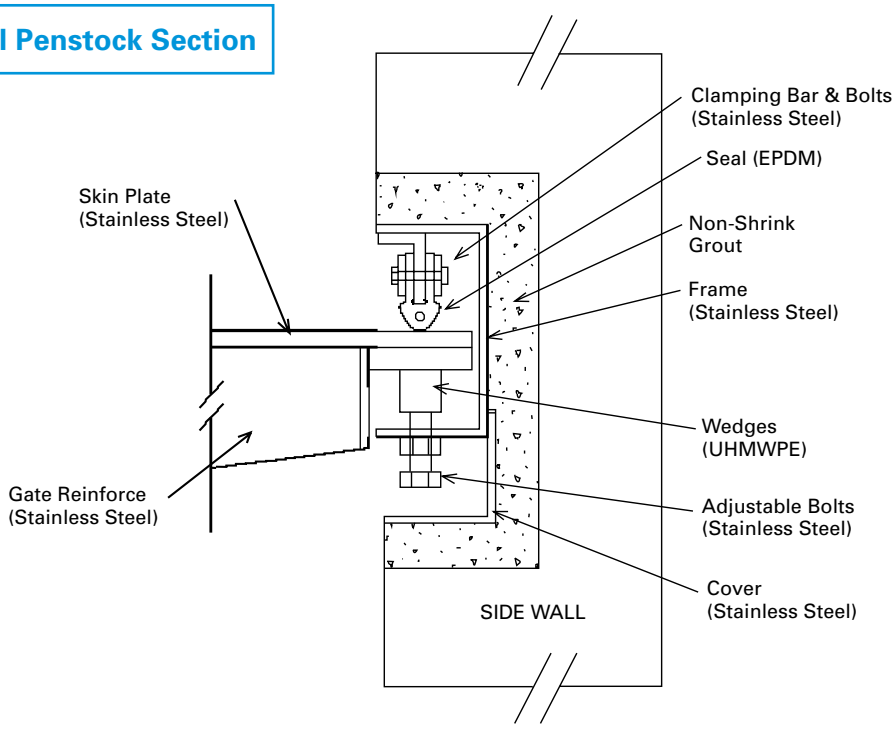
STEM GUIDE with WALL BRACKET	is fabricated by SUS304 or SUS316 and adjustable. The stem guide spacing shall not exceed l/r ratio of 200.
MUFF COUPLE	is casted by stainless steel and joint by locking stainless steel bolts & nuts to joint between ext. spindle to penstock and headstock.
FIXING BOLTS	can be supply upon request.

12. SERIES SS304 AND SS316 PENSTOCK

SS Penstock Section View



SS Channel Penstock Section



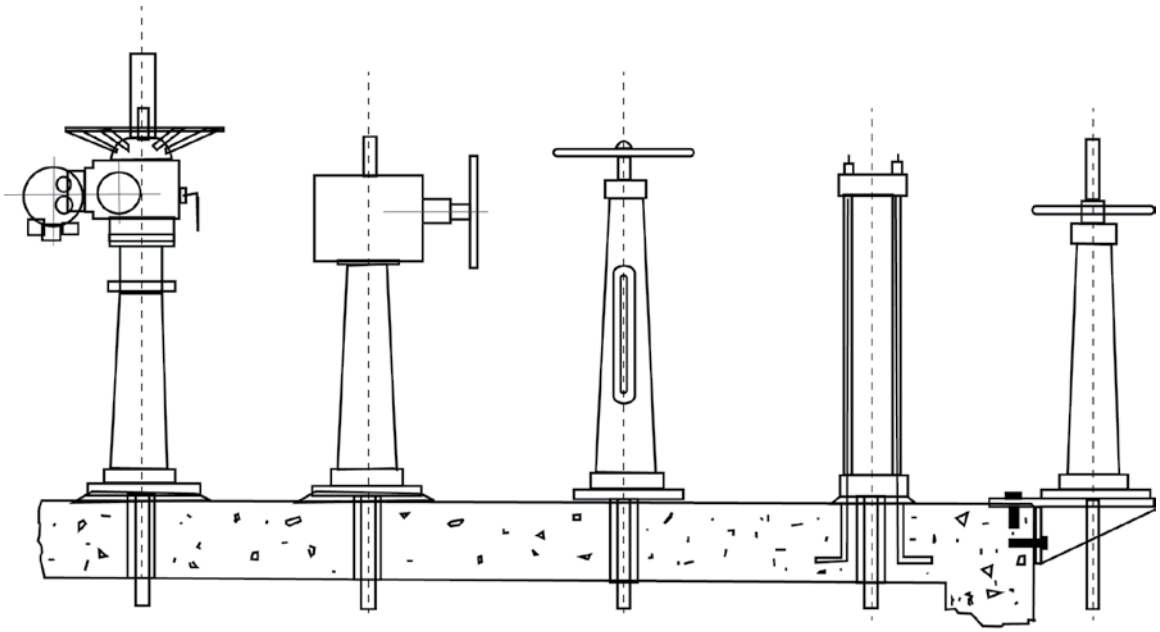
DESIGN ADVANTAGE

T-Seal	Best seal clamping for better water tightening and long service life
EPDM Seal	Best chemical, ozone and water resistant
Clamping Bar	Easy dismantle for seal replacement
Heavy Duty Gate	Design for minimum defection for rigid and lasting application
Tapered Seating Face	Increase seal service life and reduce gate operation force
Adjustable Wedges	Site adjusting for better leakage and gate movement setting
Seal On Gate Design	Easy replacement of seal without dismantling the frame

PART	TYPES			
	CI Series	DI Series	SS Series	CS Series
Frame	Cast Iron BS EN 1561:97	Ductile Iron BS EN 1563:97	1.4301 & 1.4401 SUS 304 & SUS 316 BS EN 10088-3:2005	Carbon Steel BS 4-1: 2005, BS EN 1993-1-5:2006, BS 1449
Gate	Cast Iron BS EN 1561:97	Ductile Iron BS EN 1563:97	SUS 304 & SUS 316 BS EN 10088-3:2005	Carbon Steel BS 4-1: 2005, BS EN 1993-1-5:2006, BS 1449
Seating Faces	Phosphor Bronze (PB102) BS EN 12163:98	Phosphor Bronze (PB102) BS EN 12163:98	EPDM MS 672:99	EPDM MS 672:99
Spindle & Ext. stem	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 & SUS 316 BS EN 10088-3:2005
Thrust Nut	Gunmetal BS EN 1982:2008	Gunmetal BS EN 1982:2008	Gunmetal BS EN 1982:2008	Gunmetal BS EN 1982:2008
Handwheel	Cast Iron BS EN 1561:97	Cast Iron BS EN 1561:97	Cast Iron BS EN 1561:97	Carbon Steel BS 4-1: 2005, BS EN 1993-1-5:2006, BS 1449
Headstock	Cast Iron BS EN 1561:97	Cast Iron BS EN 1561:97	Cast Iron BS EN 1561:97 OR SUS 304 & SUS 316 BS EN 10088-3:2005	Carbon Steel BS 4-1: 2005, BS EN 1993-1-5:2006, BS 1449
Muff Coupling	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 BS EN 10088-3:2005
Headstock Bracket	Cast Iron BS EN 1561:97	Cast Iron BS EN 1561:97	SUS 304 & SUS 316 BS EN 10088-3:2005	Carbon Steel BS 4-1: 2005, BS EN 1993-1-5:2006, BS 1449
Stem Guide	Cast Iron BS EN 1561:97	Cast Iron BS EN 1561:97	SUS 304 & SUS 316 BS EN 10088-3:2005	Carbon Steel BS 4-1: 2005, BS EN 1993-1-5:2006, BS 1449
Wedges	Gunmetal BS EN 1982:2008	Gunmetal BS EN 1982:2008	ASTM 06712 UHMWPE	Cast Iron BS EN 1561:97 Gunmetal BS EN 1982:2008
Fasteners	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 & SUS 316 BS EN 10088-3:2005	SUS 304 BS EN 10088-3:2005

Material Property	Cast Iron	Ductile Iron	SUS 304	SUS 316	Carbon Steel
Yeild Strength (N/mm2)	50	320	230	240	350
Tensile Strength (N/mm2)	250	500	490	510	650
Elongation (%)	1-2	7	40	40	20
Hardness (HB)	210 max	170 - 241	183	183	190 - 210
Density (kg/m3)	7200	7080	8000	8000	7800
Corrosion Resistance	3	3	10	10	5

14. HEADSTOCK OPTIONS



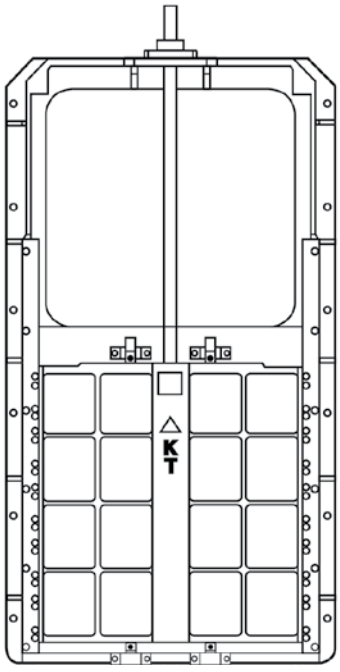
(Rising/ Non-Rising)
Electric motorized headstock

(Rising/ Non-Rising)
Manual gear box headstock

(Non-Rising)
Direct manual headstock with indicator

Pneumatically/ hydraulically activated headstock

(Rising)
Direct manual headstock without indicator



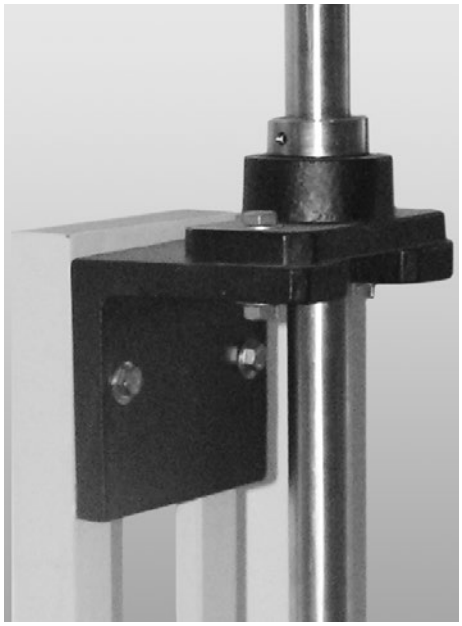
Headstocks cone is a variety of formats. Depending on the end-users requirement, special custom-designed headstocks or gate opening mechanisms can also be manufactured. KT has standard headstock range to choose from:

- Electric motorized
- Pneumatically/ hydraulically activated
- Manual gearbox
- Direct manual with indicator
- Direct manual without indicator
- Direct manual mild steel epoxy coating stem cover with indicator

HEADSTOCK

- Cast iron rigid body and handwheel for purposes
- Sufficient operation height for good torque applies for penstock operating
- Accurately machined bronze nut with rising and non-rising feature
- Heavy duty pedestals or base plate with solid base support to prevent twisting and shearing
- Indication plate for penstocks opening indicaition

STEM GUIDES



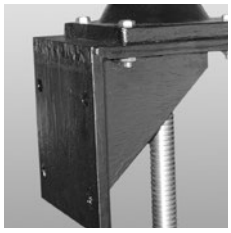
- Cast iron or stainless steel SUS304 or SUS316
- High solid epoxy painting
- Reach adjustable
- For stems sized 19mm to 63mm
- Stem guide recommended spacing is showed below:

Spindle Diameter		Spacing between Stem Guide (mm)
inches (“)	millimeters (mm)	
¾”	19	950
⅞”	22	1100
1”	25	1250
1⅛”	28	1400
1¼”	32	1600
1½”	38	1900
1⅝”	41	2050
1¾”	44	2200
2”	50	2500
2¼”	57	2850
2½”	63	3150

MUFF COUPLING

- Stainless steel SUS304 or SUS316 casting
- Stainless steel bolted locked connection
- Used while the headstock and ext. stem is required

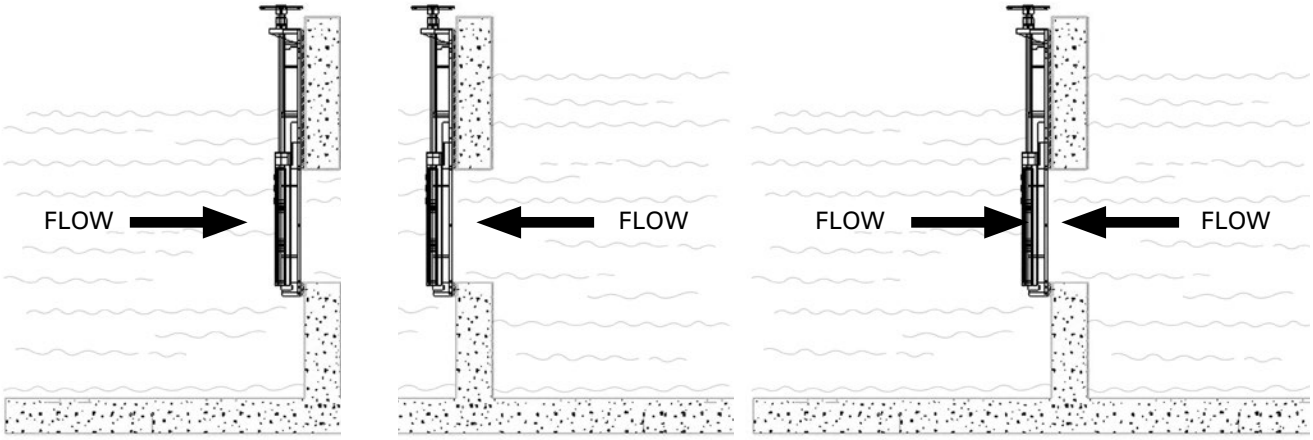
HEADSTOCK BRACKET MOUNTING



- Heavy cast iron structural
- Mounted headstock to the floor for most actuator application
- Oblong hole for installation adjustable feature
- Sufficient strength for forces during penstock operating

16. PENSTOCK OPERATION

Type of Penstock's Operations



On Seating Pressure

- Pressure forcing the door onto the frame

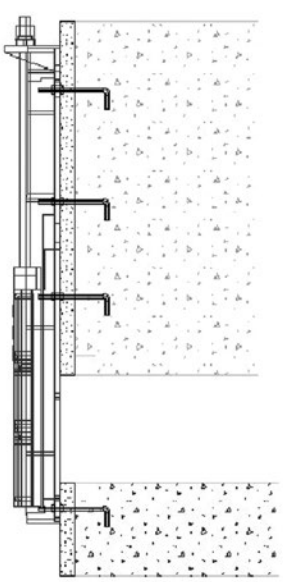
Off Seating Pressure

- Pressure forcing the door away from the frame

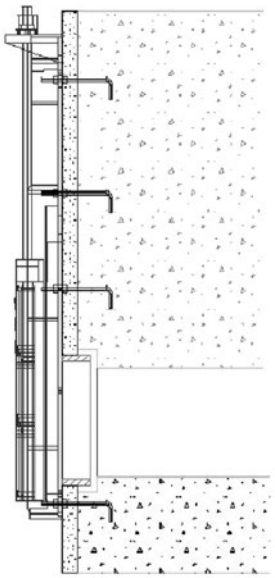
On/Off Seating Pressure

- Pressure action from both sides

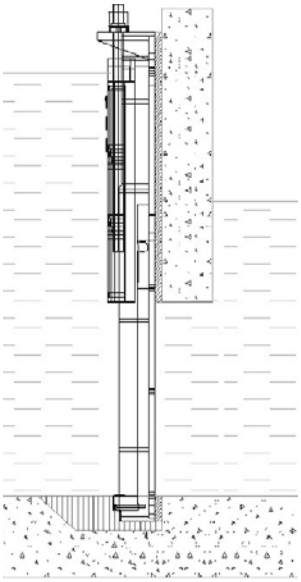
Type of Penstock's Mounted Method



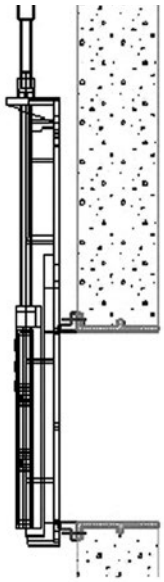
Wall Mounted By Flat Black Type



Wall Mounted By Spigot Type



Flush Bottom Mounted Method



Thimble or Pipe Flanging Mounted Method

KT MS PENSTOCK (INTAKE GATE)

Design Feature

KT heavy duty slide gates are manufactured for a wide variety of applications including:

- Sewage treatment plant
- Water treatment facilities
- Water diversion project
- Drainage and flood control
- Water level and spillway control for reservoir and canal system

KT heavy duty slide gates are available in either overflow or breast wall types. It is designed to be engineered to take high water pressure from both slides of the gate.

The structural is designed and calculated such the way to prevent any damage possibly caused by high dynamic hydrostatic force.

The adjustable side wedges design is useful when any misalignment if the gate during installation.

The installing of EPDM seal is special design for easy replacement. It is heavy duty P or T types of seal design which apply to high lifetime application.

Twin shaft lifting spindle is available for largest width gate to suit for smooth lifting requirement.

KT FLAP VALVE

Description

KT flap valve is usually attached to an end wall or cross culvert on the tidal side of a causeway or dike. The flap valve is hinged to the top of the frame to let the gate free moving depending on the 2 side pressure differences. The flap valve closed itself by the gate weight and it was tightening by the front water pressure is higher than back pressure to close the water flow out of the opening. This is happen when the front water level is higher. However, when the front water level is become low, the back pressure water will push the gate open and discharge water from the opening.

Applications

- To control water back flow application
- For tidal wetlands preservation and restoration
- Restores tidal flushing of marshes without flooding of upland property behind dikes and levees
- Restoration of estuarine plants, fish, shellfish, waterfowl & wildlife
- Deepening of downstream channels resulting in improved navigation

PART	MATERIAL
Body of gate and frame	PVC / Stainless steel 304 or 316/ alumminium alloy / HDPE
Body of mounting flange	PVC / Stainless steel 304 or 316
Seal	EPDM seal
Hinge	Stainless steel 306 or 316
Bush	Bronze bush

18. OTHER WATER CONTROL GATE

KT STOP LOGS

Descriptions

- KT stop logs are designed to control flows in open channel.
- Side and bottom EPDM seals are generally incorporated into each logs to provide low leakage requirements.
- KT stop logs are designed for few application:
  - Control the water flow at upstream to the downstream as the method of preventing flood at downstream area.
  - To control the water level "weir" for river, lake, pond and other water works project.
  - As temporary water stopping device to stop the intake water flow into the plant during maintenence.
- Clamping bar are used to clamp the seal. It can be easily dismantle during seal replacement.
- Lifting device shall be used to load/ remove the stop logs from the embedded frame. It is used to control the water level and flow by adding or deducting the number of logs used.
- Basically, logs are placed and removed by a log lifting device and overhead crane.

Applications

KT stop logs are designed for the general uses in waterworks.

- Sewage treatment
- Irrigation
- Water treatment
- Industrial
- Flood control
- Hydro power

Part	Material
Frame and Log	Mild steel, stainless steel (SUS 304, SUS 316)
Seal	EPDM seals
Guide	Mild Steel, stainless steel SUS 304, SUS 316)
Lifting Device	Stainless steel or mild steel
Fasteners	SUS 304, SUS 316

KT STOP GATE

Descriptions

KT stop gate is a simple manual operated gate suitable used to reduce the water flow at open channel. It is light, easy operated and less maintenance required. The size of the gate can be customize upon customer request.

- Water resistant
- Low leakage
- No maintenance
- Easy operation

Applications

KT stop gate are suitable used in:

- Sewage treatment
- Irrigation
- Water treatment
- Industrial

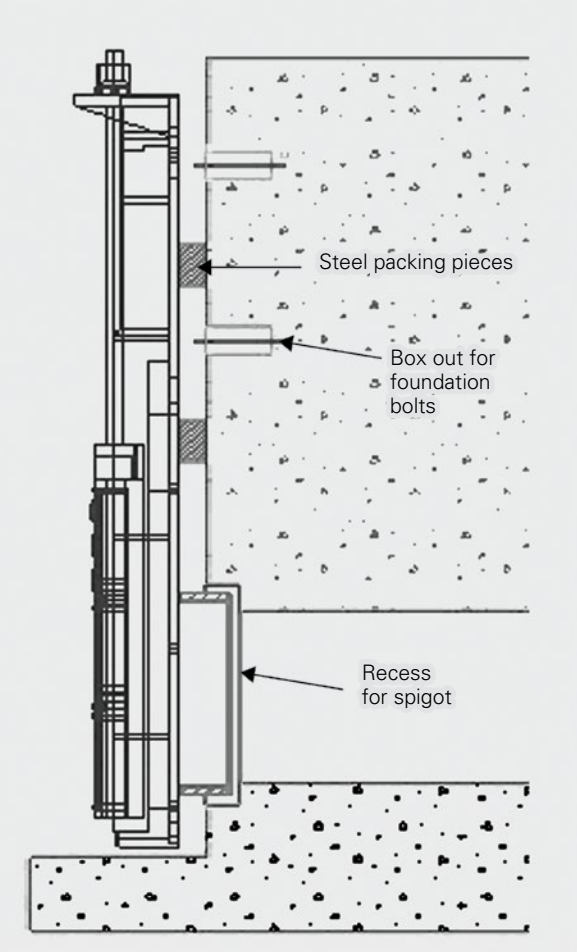
Part	Material
Frame and Log	Mild steel, stainless steel (SUS 304, SUS 316), aluminium alloy
Seal	EPDM or PVC seals
Guide	Mild Steel, stainless steel SUS 304, SUS 316), Al
External Handle	SUS 304, SUS 316
Fasteners	Steel or stainless steel

PENSTOCK RECEIVING

- Check penstock parts and the accessories immediately after received on site.
- Penstock is a precision machinery equipment items that request good handling and storage methods. Improper storage and handling can cause poor performance of the penstock and cause malfunction.
- During penstock handling, penstock must be lift vertically by lifting lug or proper lifting belt at the top of the penstock frame. Gate shall be in closed condition during lifting. Lifting penstock in horizontal mode is not recommended.
- Penstock must store in clean and dry environment and covered from sunlight to prevent colour distortion. During storage, penstock shall lay horizontally with full length support the frame to prevent it twisted or distort. Do not stock any heavy items on top od the penstock body.
- DO NOT DISASSEMBLY the gate from the frame in any time during lifting, storage and installation. Do not paint bronze and stainless steel surface.

EXISTING HEADWALL INSTALLATION METHOD

- Box out the concrete foundation bolt and spigot end where applicable on request.
- Mark the centre line of the appeture onto the template, after that mark the frame bolt hole and then drill the hole from where it's mark.
- Then, fix the J bolt to the drilling position and then mount the template into position by aligning the vertical and horizontal leveling.
- When the template position is correct, fill the box out pocket with non-shrink grout until it fully cure.
- When the grout is fully cure, remove the template and penstock can be installed. Before mounting, a steel packing piece insert to all the bolt. These space allowance is for sealing purposs. When tightening of the bolts and nuts, special care to avoid over tightening of the nuts and best if apply even tighten force.
- After penstock has been mounted, check the alignment before sealing the penstock wall gap. Check the door and frame faces with feeler gauge. Double check the bolts and nuts to make sure that the tightening is not over tight causing strain to the penstock frame. Finally, penstock frame gap can be sealed after finish the above checking procedurals. If all the recommended installation method are following, the penstock should be operate correctly without leakage problems.



20. PENSTOCK INSTALLATION METHOD

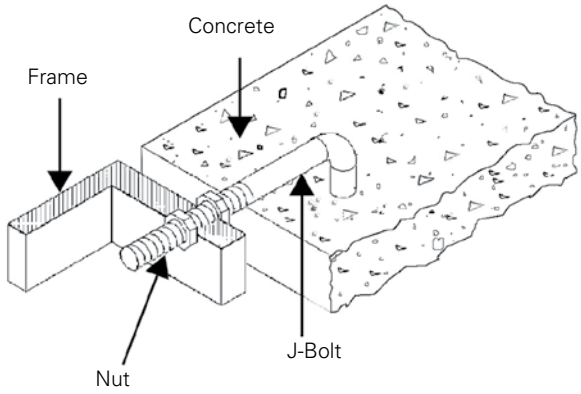


Figure #1

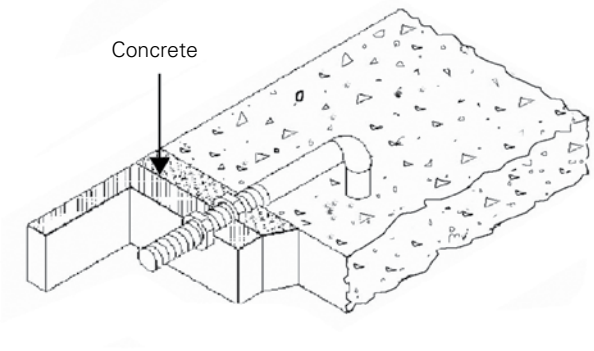


Figure #2

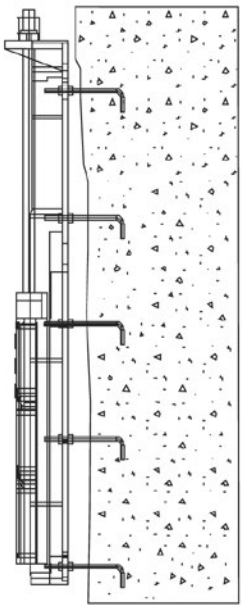


Figure #3

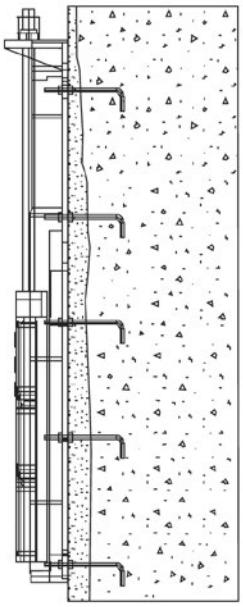


Figure #4

NEW HEADWALL INSTALLATION METHOD

- Secure all anchor bolts in proper position in the forms, check the size, projection and alignments to conform to requirements show in our illustration. Do not mount penstock to misaligned bolts.
- Each bolt has been provided with 2 nuts for proper mounting of penstock. In setting the forms, provide a recess around the perimeter of the gate. Allowing easy adjustment of the back nut and make sure the sufficient grout space must be left for adjustment of the back nut.
- After concrete has been poured and form has been stripped, place one nut on the anchor bolt. Place the completely assembly penstock into position carefully. Place the second nut on the anchor bolt and bring bolt nuts into finger-tight contact with the penstock's frame, aligning is as necessary. Figure #1.
- Check the clearance between gate and frame by the 0.1mm feeler gauge. If find out some gaps, check to see if penstock has been warped during install. Adjust the nuts to bring the penstock into flatness. Figure #2.
- After the penstocks properly set, grout in the space between frame and headwall using a non-shrink material. Figure #3. Check for voids carefully.
- Tighten all nuts uniformly. Do not over tighten cause the uneven surface. Penstock now is ready for install operation. Figure #4.

PROCEDURE FOR INSTALLATION ON WALL THIMBLE OR PIPE FLANGE

- Place the thimble correctly in position. Plumb is used to align the top / bottom centre line. Mark the centre line and install the thimble either flush or slightly projecting from the wall.
- Thimble need support to prevent warpage during concrete pouring. Do not mount penstock when thimble are not casted with concrete.
- All tap hole must be plug by cover or other plug before pouring concrete.
- Double check on the vertical and perpendicular alignment of the thimble before casting concrete.
- Thimble mounting face up need to clean before penstock been installed. For better sealing, a thin coat of mastic or rubber compound is apply on the front face of the thimble.
- After all the procedurals complete, mount the penstock to the thimble. Tighten the nuts on the stud or screw uniformly until metal to metal contact is made. After checking the clearance with 0.1mm feeler gauge, the penstock is ready for operation.

PROCEDURE FOR INSTALLATION STEMS AND STEM GUIDE

- After the installation of penstock is complete, install the stem to the penstock and thread the stem into the thrust nut in the nut pocket on the cover until flush with bottom of nut.
- Tighten the set screws to lock the stem for rising stem.
- Mount the stem guides from bottom up as stem is install. In this moment, do not tighten stem guide assemble bolts.
- Tighten the stem guide bracket to the wall with the spacing provide.
- Install the stem couplings as required, tighten all the set screws of the stem couplings.
- Make sure not to bend or damage the stem and threads during installation.

PROCEDURE FOR INSTALLATION HEADSTOCK MOUNTING BRACKET

- Headstock bracket mount by the anchor bolts to the wall or floor. Check the top surface and make sure is align perpendicularly with the stem is pass through the center of the stem slot.
- After the headstock bracket is install completely, put on the headstock on top of the bracket and mount with four bolts and nuts.
- Make sure the headstock is in proper alignment all the time.
- After install the headstock is in proper alignment all the time.
- After install the headstock, apply the tension to the stem by lifting the penstock. Align the stem guides and tighten the stem guide assembly bolts.

CLEANING AND ADJUSTING

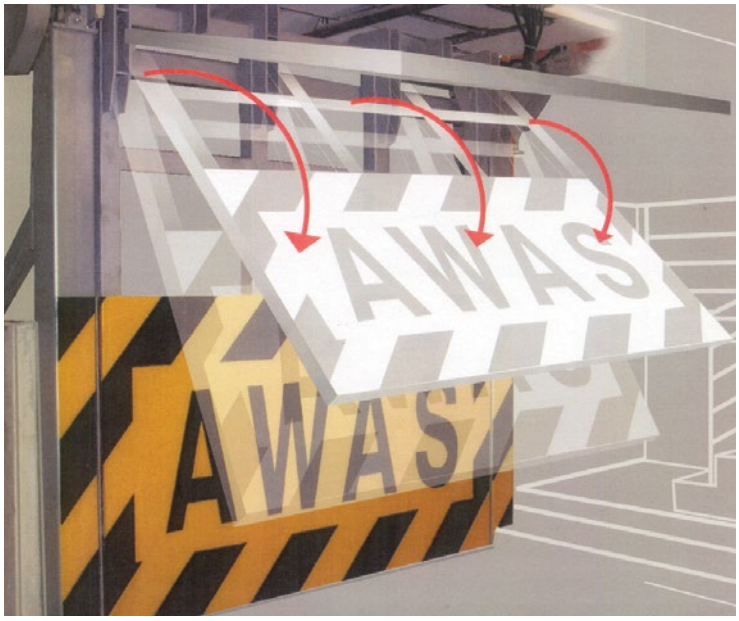
- After installation of the stem guide, and headstock, move the gate to fully open position.
- Clean all the dirt, paint, etc. off od seating and wedging surfaces, and clean loose concrete and grout form top of gate.
- Grease seating and wedging surfaces with water resistant grease. Close the gate and the penstock is ready for operation.

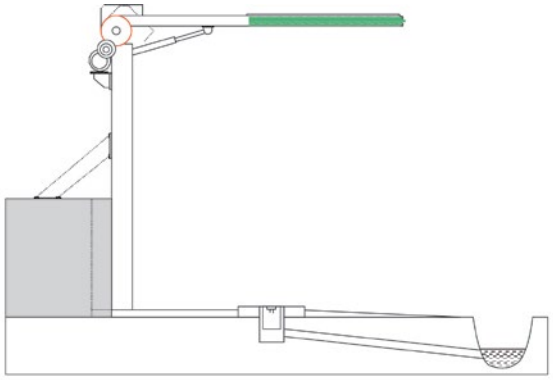
22. KT FLOODGATE DESIGN & SYSTEM

KT Floodgate is designed to block and prevent flood waters from flowing into below ground slopping arcades, public facilities, building basements and especially underground car parks. Our floodgate system can also be use to control floodwater flows at the upstream or downstream of land clearing and construction sites too.

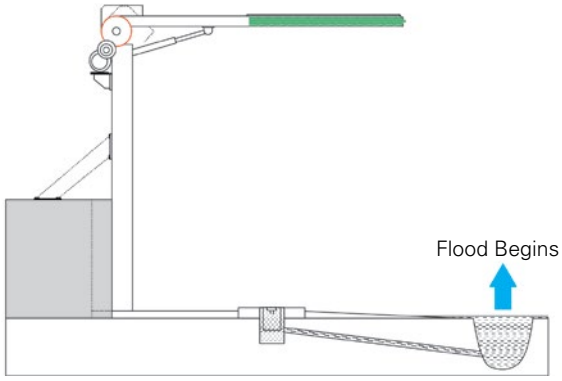
In our floodgate, the seal is designed to use only high grade EPDM seal ehich have the strength and the material properties that is highly resistant to UV radiation, high temperature and humidity, strong acids and also microbial attacks. Our floodgate seal mountings is also design for easy maintenance and replacement works.

All our floodgate structures are designed to withstand the impact force of flood water pressures, that can lead to structural and leakage failures. Our water leakage control unit is designed under the BS7775:05 standard requirements.

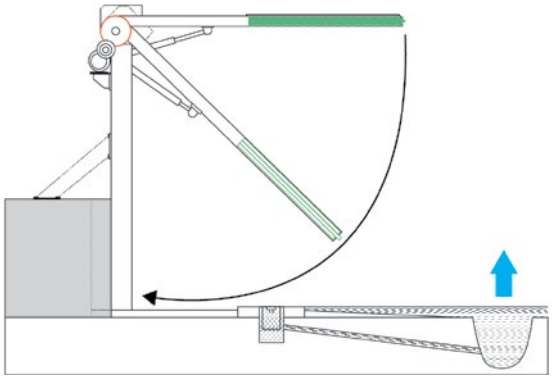




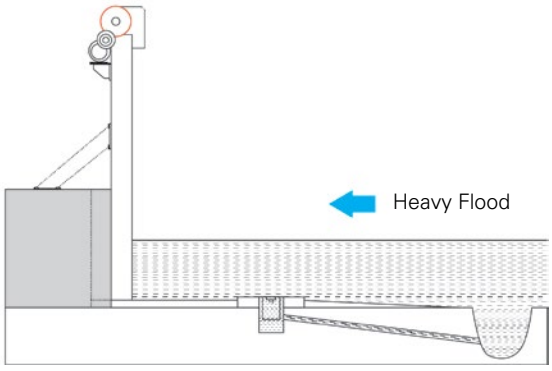
1. In a normal condition, the gate is in an opening position. The water sensor is installed at the sump with one discharge pipe which is connected to the drain.



2. When the flood happens, the flood water will rise and flow into the sump. When the water reaches the water level sensor, the alarm will be activated and warning signal is given.



3. After 30 seconds of continuing flood signal, the gate will close automatically. It takes around 30 seconds for the gate to close into a secure position.



4. After the gate is fully closed, the alarm will deactivate but the warning light is still activate. the gate can only be opened manually after the flood is all over.

DAMAGE CONTROL

KT Floodgate system can reduce the threat of floodwater damages. Can be customized and installed at any openings leading to below ground and basement facilities. All our gates are engineered to take high water pressure from one side with overflow system on the other.

The gate is a flat aluminium skin plate with all the structural members, welded into rib construction, for rigidity purposed and to prevent maximum support for the base plate to withstand against water pressure and any impact force caused by the floodwaters. All our gate supportive structures are designed with sound engineering calculations.

PLC CONTROL OPERATION

Gate operation are controlled automatically by highly effective water level sensors where located at nearest sump with pipe connected to the main draining system at that area. Programmable logic controlling system is installing for smart and effective flood controlling demand. Electrical operated AC gear motor with manual overwrite feature is used as safety feature on operation during power failure.

CUSTOMIZING DESIGN ABILITY

KT Floodgate provides you the flexibility to design to suit your building design requirement. Our professional teams are able to select the best floodgate design in various gate operating and mounting method to perfect match your building condition with no tolerate to the performance. This will minimize your building modification works to save the construction cost.

SAFETY FEATURE DESIGN

Double safety object sensor is installed at front and back of the floodgate to detect any object stoppage at the gate operating area to prevent any hitting happen.

Alarm & Revolving light alert signal given during the flooding and gate operation to alert the building operator and user to alert the flood condition.

Condition Signal indicator is given on water level condition and floodgate open/close position to tell the operator the actual condition of the gate. Error and System Trip signal also provided in any condition of system malfunction. Those signal also provided in dry contact for further connection to building BMS system.

Trapping Sensor link is located at the floodgate operation panel for building user to tell the building management who is trapping inside the building during or after the flooding incident.

Manual overwrite feature by authorize persons to operation operate the gate in anytime just a Master key is needed. The gate can be overwriting in pre-flooding condition or during maintenance. In the condition of power failure, the gate can still been operated by using manual power handwheel incase needed.

24. PROJECT REFERENCE PHOTOS

CI 1.5W x 1.5H Penstock Water Diversion Project, Panching, Pahang, Malaysia

Penstock in ABBAS Water Treatment Plant, Putrajaya, Malaysia

CI 2.5W x 1.2H Channel Penstock for Sewage Treatment Plant, Pillar Point, Hong Kong

Penstock in Pumping Station, Sg. Buloh, Malaysia

2.0mW x 2.0mH CI Penstock in Water Diversion Project (Smart Project)

1.6mW x 4.0mH SS-H Penstock

2.8mW x 3.0mH & 1.5mW x 3.0mH, MS Intake Gate for Drainage System, Jakarta

Malaysia National Sewage Treatment Plant Projects, Phase 1 – Hitachi Water System Sdn. Bhd.

2.5mW x 1.5mH CI Penstock for Hong Kong Water Supply Department (Shantin WTP), Jardin Engineering Ltd.

SS-H Penstock in Water Supply Project with 15m Water Head Design, Sandakan, Malaysia, Loh & Loh Construction Sdn. Bhd.

26. THIRD PARTY INSPECTION

BVQi International Inspector Testing for 2.5mW x 1.5mH Penstock for Hong Kong WSD, Jardine Engineering Ltd.

SYABAS Factory Inspection

IWK Site Inspection & Supervision

Penstock Factory Inspection from Jabatan Bekalan Air (JBA) Group

IKRAM Factory Audit for 2.1mW x 2.1mH CI Penstock & 1.2mW x 1.2mH SS Penstock

QC Inspection for National Sewage Projects, Hitachi Water System Sdn. Bhd.

3.6mW x 1.7mH Semi Auto Top Swing Floodgate (Menara OCBC, KL)

3.7mW x 1.7mH Semi auto Side Horizontal Sliding Tankgate (Pinewood Studios, Iskandar - Johor)

2sets of 7.4mW x 1.0mH Automatic Top Sliding Vertical Floodgate (Sungai Wang Plaza – Kuala Lumpur)

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