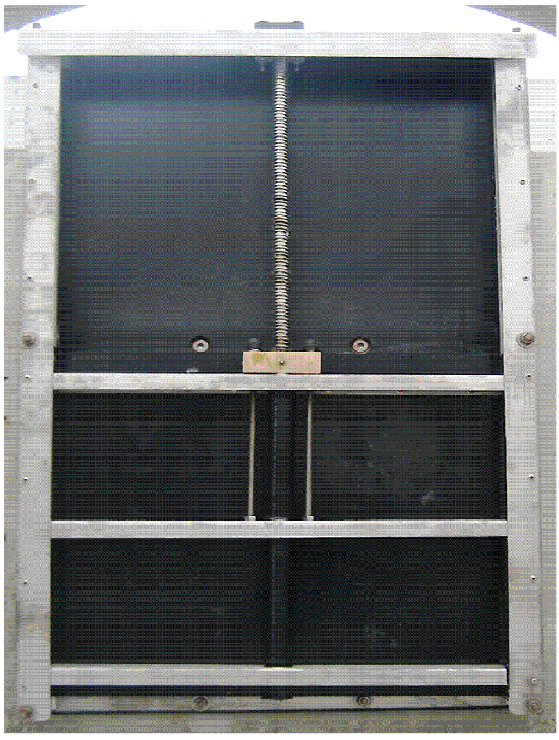
WATERFRONT

INSTALLATION, OPERATION AND MAINTENANCE MANUAL



HDPE PENSTOCK VALVE

We are a Glasgow based company providing water engineering solutions in fluid control for both the UK and International markets.



Waterfront Fluid Controls Ltd was formed in 1988 specialising in the design, manufacture and supply of fluid control products.

Waterfront is a company concentrating on the Water and Industrial Fluid Control sectors for both UK and International markets

Our range incorporates a wide range of products for controlling Water Flows. These products cover all types of valves, penstocks, stop logs , hydrostatic bellmouths , flap valves , tilting weirs and ancillary products.

Waterfront Fluid Controls LTD provides consistent high quality products and services.

Our Mission Statement : "We strive towards delivering excellence, utilising the best quality products with the greatest possible service".

WATERFRONT

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INTRODUCTION

The Waterfront HDPE penstock is constructed using HDPE and Stainless Steel 316, comprising a vertically moving door manufactured in HDPE with stainless steel stiffeners. This incorporates an EPDM rubber lip seal, to provide a seal between the back plate and is guided within a stainless steel frame with HDPE guides. An EPDM sponge seal is used between the frame and concrete wall, which is compressed to provide a good seal.

The design is such that the penstock can withstand both on and off seating heads, and although non-rising spindles are fitted as standard, we can easily fit with a rising spindle.

HANDLING AND STORAGE

HANDLING:

The HDPE Penstock has to be moved horizontally with the Weir plate facing up on a matching pallet size. It can then be lifted by means of suitable lifting slings and a lifting bar matching the width of the penstock.

Where chains or slings are used for handling purposes the frame should be protected using cloth sacking or similar material.
HOOKS ARE ONLY TO BE USED WHERE EYEBOLTS ARE FITTED.

Fully trained personnel should carry out all necessary lifting.

STORAGE:

It is recommended to store the penstock horizontally, free of dust, dirt and moisture.

INSTALLATION SEQUENCE

The installation of penstocks, avoiding distortion and consequent leakage, is not difficult providing these recommendations are followed.

Prior to commencing installation, check civil work is correct to all appropriate drawings and that there is no obvious obstruction or undulations on concrete surfaces. This will affect the seal of the penstock if the civil structure is not flat.

IT IS RECOMMENDED THAT THE MOUNTING SET IS PURCHASED WITH THE PENSTOCK FOR EASE OF INSTALLATION.

MOUNTING SET:

1) EPDM sealing (15mm thick)

2) Chemical anchor capsules and accessories

Mounting with chemical anchor bolts

1) With suitable lifting slings, lift the penstock up and adjust to ensure it is vertical and level (use lifting eye's)

2) Lower the penstock into required aperture.

3) Check and adjust the penstock into correct position, ensure invert of the pipe is flush with invert of the frame.

4) Mark all the mounting holes.

NOTE: On penstocks over 500mm diameter, there are also holes above the penstock opening. These are accessed by fully closing the penstock.

5) Remove the penstock and attach EPDM seal

Placing the EPDM seal

1) Before placing the EPDM compound, ensure that the mounting face is clean and smooth.

2) Mark the mounting holes onto the seal with a white pencil, so you will be able to drill a hole in the compound, which now correspond with the existing holes in the frame

3) The compound is self adhesive on one side. Cut the compound oversized then remove the protection slip and fit the compound to the frame

4) The compound now should be cut to length and squared so that the corners connect properly.

5) Glue the corners together by using EPDM glue. When not glued properly it can lead to leakage between the sealing face and the concrete wall

6) Now drill the previously marked holes in the compound

NOTE 1: On penstocks over 500mm diameter, there are holes above the penstock opening

NOTE 2: On penstocks with a flush invert, the sockets for the countersunk anchors need to be installed before re-positioning the penstock.

1) Replace the penstock into position, ensuring not to damage the EPDM sponge seal

2) Re-position the penstock, checking all levels and that the inverts are aligned.

3) Follow the applicable instructions for the chemical anchors to install the penstock (see below)

Follow the instructions supplied by the manufacturer of the chemical anchors.

The curing time should be considered precisely.

Procedure for installing Chemical Anchor Attachments

Standard Chemical Anchors

Comprising of:

Stainless Steel Threaded Studding

Chemical Anchor Capsules

Drill Adaptor

Stainless Steel Nuts, Washers and Spring Washers

1. Drill Mounting hole in required position to the correct depth and diameter (please refer to details supplied with chemical anchors)

2. Blow out drilled hole using compressed air. (Warning, suitable eye protection to be worn)

3. Insert a chemical anchor capsule into each hole.

4. Attach a length of studding to the drill adaptor, then attach the adaptor to a rotary drill (NOTE: Do not use a hammer-action drill, as this will cause resin to escape from the hole)

5. Place the end of the threaded stud into the hole, then in one motion operate the drill at high speed, while pushing the stud through the anchor to the back of the hole. Once the back of the hole is reached, stop the drill to prevent resin escape.

6. Carefully remove the drill adaptor from the drill chuck, taking care not to move the stud.

7. Once the resin has sufficiently cured, remove the drill adaptor from the stud, however if the stud turns, leave the resin to cure further.

8. Replace the item to be mounted, then place a washer, a spring washer and a nut onto the stud and tighten by hand.

9. Once all required anchors have been installed and are fully cured, proceed to tighten the nuts evenly to the recommended torque. Where EPDM seal is used, this must be compressed evenly to ensure a good seal, however the frame must not be allowed to deform. For torque moment data, please refer to the anchor manufacturer's guidelines supplied with the anchors.

NOTE: If any of the threaded rods turn, leave further to cure.

INSTALLATION OF SPINDLE EXTENSION

1) Place the spindle extension with the support(s) on top of the top bridge.

2) Place the upper support 150 mm below the deck or top of the spindle extension. Divide the other supports over the length of the spindle extension.

3) Mark the anchor holes of the supports in such way that the spindle extension is perpendicular to the penstock and vertical..

4) Remove the spindle extension.

5) Follow instructions for mounting of chemical anchors (see PAGE 6)

6) Replace the spindle extension and the brackets and fix these to the wall (place locking ring onto extension before placing uppermost bracket)

7) Adjust the position of the brackets to ensure a proper alignment of the spindle extension.

8) Locate the spindle extension under uppermost bracket and lock into position (non rising spindles, for rising spindles, this is done during commissioning)

INSTALLATION OF PEDESTAL

1) Remove the side plates from the pedestal and attach the pedestal to the penstock using the supplied bolts.

2) Place extension shaft into the operation point and align with the top hole of the pedestal. Tighten all grub screws.

3) Place gearbox/ Handwheel / protection hood/ actuator into place on pedestal and attach using suitable screws.

4) Replace pedestal side plates.

OPERATING EQUIPMENT

1. Whenever possible, units are dispatched completely assembled with their operating gear. However, if units have to be dispatched in separate section, each section will be labelled with the Tag Reference Number.

2. When required, coping brackets or guide brackets for extension spindles, or floor pillars for operating gear, should also be bolted to the wall, coping or floor, in the manner previously described for the type of anchor bolts specified. Refer to the appropriate Arrangement Drawing as necessary.

3. When fitting extension spindles on single spindle penstocks, it is essential that the door and the remote operating equipment, through the spindles, are in perfect vertical alignment.

INSTALLATION RECOMMENDATIONS FOR MANUAL GEARBOXES

HANDLING

If chains or slings or used for handling purposes, the unit should be protected with cloth, sacking or similar material. NEVER USE HOOKS UNLESS EYEBOLTS ARE FITTED.
Combined units i.e. penstock with a gearbox fitted direct on the frame, should NEVER be slung from the gearbox.

STORAGE

1. If gearboxes are supplied separately they should be stored in a clean, dry, warehouse. If supplied unpacked, the gearboxes should be stored on a shelf or wooden pallet. Other materials must not be stored on top of the gearboxes.

2. If gearboxes must be stored outside (because they are fitted direct on a penstock frame), they should be covered by a suitable waterproof sheet.

3. Input shafts should be rotated every three months to mix the lubricant.

4. Most standard gearboxes are weatherproof to IP67 after correct installation and are capable of operating within a temperature range of at least minus 20 degrees Centigrade to plus 70 degrees Centigrade.
If gearboxes are required for submerged use in a liquid or, for use outside the quoted temperature range, they must be specifically ordered for that purpose.
The installation of gearboxes is not difficult providing these recommendations are followed.

1. CHECK that you have the correct gearbox with the correct ratio to fit the unit, which is being installed.

2. CHECK that the gearbox is properly lubricated. Most gearboxes are factory lubricated ‘for life’ with grease. If the unit has been dismantled, the base plate must be resealed, with a silicone sealant, or other gasket compound, on reassembly and any thrust elements or bearing cavities must be greased.

3. If the gearbox drive nut is supplied separately, on the spindle, care must be

taken when fitting it into the gearbox to make sure that the thrust bearings are also fitted correctly.
4. If the gearbox has been supplied with a hand wheel it is recommended that this be fitted to the gearbox before trying to mount the unit; this will make it easier to rotate the gearing to pick up the start of the thread or key location.

5. On a KEYED NON-RISING SPINDLE, once the key and keyway are lined up, the gearbox can be rotated until a positive engagement occurs. Rotate the gearbox to the correct orientation and align fixings. Bolt gearbox to mounting flange. NOTE: - With gearboxes designed to be thrust taking with non-rising stems, the drive sleeve will be fitted to the stem. Insert the stem through the bottom bearing set and the thrust plate and lower into position. You may have to screw the stem into the door nut or fit to muff coupling. Either way screw stem down to lightly grip and locate the lower bearing set (pre-greased) and plate. Position the top bearing set on to the drive sleeve (pre-greased) and lower the gearbox over the top, the gearbox will need rotating until it engages on the drive sleeve splines. Rotate the gearbox to the correct orientation and align fixings.

6. On a SCREWED RISING SPINDLE, once the threaded nut and spindle are lined up, the gearbox can be rotated until a positive engagement occurs. Rotating the hand wheel will then screw the gearbox down the spindle and when in the correct position, the gearbox can be bolted down on to the mounting flange. With this arrangement the gearbox may well have the drive sleeve fitted, if not repeat as for non-rising for the assembly of drive sleeve, bearings (1 set either side of the drive sleeve collar/shoulder) to gearbox and screw onto stem.

7. Refer to Manufacturers Instruction Manual for Installation Procedure.

INSTALLATION RECOMMENDATIONS FOR ELECTRIC ACTUATORS

HANDLING
If chains or slings are used for handling purposes, the unit should be protected with Cloth sacking or similar material. NEVER USE HOOKS UNLESS EYEBOLTS ARE FITTED. Combined units, i.e. Penstock with an electric Actuator fitted direct on the frame should NEVER be slung from the actuator.

STORAGE
1. If electric actuators are supplied separately, they should be stored in a clean, dry warehouse. The internal heaters (if supplied) should be connected up to the power supply. If necessary, a suitable desiccant can be placed in the switch compartment.

2. Plastic plugs or caps, fitted for transportation, should be replaced with metal pipe plugs or caps and all covers fastened tight.

3. Drive shafts should be rotated at least every three months to mix the lubricant.

4. If actuators must be stored outside (because they are fitted direct on a penstock frame), the penstock unit must be stored vertically, so that the actuator

motor and switch compartment is horizontal and well off the ground. The actuator unit should be covered by a suitable waterproof sheet. Paragraphs 1, 2 and 3 above also apply.

5. Most standard actuators are weatherproof to at least IP67 BUT ONLY AFTER correct installation. They are usually capable of operating within a temperature range of at least minus 20oC to plus 70oC.

INSTALLATION SEQUENCE

The installation sequence is not difficult providing these recommendations are followed:

1. READ these instructions AND the actuator manufacturers instruction book, which has either been supplied to you separately, or may be found attached to, or inside the switch compartment.

2. CHECK that you have the correct actuator to fit the unit which is being installed.

3. It is recommended that all the actuators be inspected for proper lubrication, in accordance with the manufacturer's instructions, before being operated, especially if they have been in storage for a long time.

4. If the actuator drive nut is supplied separately, on the spindle, care must be taken when fitting it into the actuator, to make sure that the thrust bearings are also fitted correctly.

5. With the DETACHABLE actuator thrust base and a KEYED NON-RISING spindle, when the key and keyway are lined up the thrust base can be lowered onto the mounting flange and bolted down. The actuator can then be fairly easily located onto the thrust base and bolted down.

6. With a DETACHABLE actuator thrust base and a SCREWED RISING spindle the thrust base must be rotated until a positive engagement occurs. The thrust base can be rotated down the spindle onto the mounting flange and bolted down The actuator can be fairly easily located onto the thrust base and bolted down.

7. With an INTEGRAL actuator thrust base and a KEYED NON-RISING spindle; the actuator must be supported during the engagement operation. Engage "HAND OPERATION" and offer up the actuator to the spindle, and then turn the handwheel until the key and keyway are lined up. Finally, bolt down onto the mounting flange.

8. With an INTEGRAL actuator thrust base and a SCREWED RISING spindle; the actuator must be supported during the engagement operation. Engage "HAND OPERATION" and rotate until a positive engagement occurs. Rotating the handwheel will then screw the actuator down the spindle, and when in the correct position, the actuator can be bolted down onto the mounting flange.

9. After the actuator has been fixed into position engage "HAND OPERATION" and check for freedom of movement and correct operation BEFORE connecting up all electrics.

10. The ‘torque cut out switch’, designed to protect the unit, is normally set by the actuator manufacturer based on information previously supplied. If, adjustment is necessary, please refer the actuators manufacturers instruction book.

11. The ‘geared limit cut out switch’, designed to protect the unit, is normally set by the penstock manufacturer in the factory, for actuators which are fitted direct on the frame. Actuators which are supplied separately will have to set on site after installation. Please refer to the manufacturer’s instruction book.

COMMISSIONING

1. BEFORE switching on power to the actuator, engage “HAND OPERATION” and move the penstock door well away from its end of travel position.

2. AFTER switching on power, check the results using the local open and close switches, and make sure that you have the correct rotation of the spindle. Finally check the cut-out switches by fully opening and closing the unit. Be prepared to stop the unit quickly, if it does not stop automatically at the end of travel position.

3. CHECK any remote operation of the unit to make sure that it is also correct.

OPERATION RECOMMENDATIONS FOR HDPE PENSTOCKS

OPERATION
Operation of the penstock is simple and straightforward, providing the Installation recommendations have been carried out correctly.
1. The seals on a penstock are specially designed to give the best degree of water tightness, assuming that the unit is installed correctly.

2. If excessive leakage occurs, the most likely explanations are:
(a) That the frame has been distorted during installation.
(b) That the door adjusters have been moved prior to, during, or after installation.
(c) That there is debris between the door and the frame at the invert.
(d) That the seals have been scored or damaged in some way.
(e) That any limit or torque switches may need re-setting.
(f) That the operating equipment is out of alignment.

3. DO NOT use excessive force when opening or closing a penstock door, as damage could occur.

PENSTOCKS OPERATING EQUIPMENT

OPERATION OF THE GEARBOX
Operation of the gearbox is simple and straightforward providing the installation recommendations have been carried out correctly.
1. For ease of operation, the input effort is usually limited to about 250N on the

crank handle, 'T' key or handwheel.
2. If the gearbox is stiff to operate, find out the cause. DO NOT apply any additional leverage to create a higher input torque, or you may damage the unit or the equipment it is operating.

OPERATION OF THE ACTUATOR
Operation of the electric actuator is simple and straightforward providing the installation and commissioning recommendations have been carried out correctly.
1. An electric actuator can be operated locally either manually or by power. Remote operation can be either by direct power connection or by a control signal.
2. Standard electric actuators are normally supplied fitted with a 15 minute rated motor, unless otherwise specified at the time of ordering.
3. If the actuator proves difficult, or fails to operate, check that there is a power supply and that it is at the correct voltage on a continuous basis. If the power supply is alright, check the individual local and/or remote control systems and the fuses on the internal circuit board and the "cut-out" switches. Finally, check that the motor has not overheated.
4. If there is no apparent electrical or "cut-out" fault, engage "hand operation" and check for freedom of movement. If there is free movement by manual operation, then there is still a fault in the power supply or in the actuator, and you should refer to the actuator manufacturer's instruction book.
5. If the unit is difficult to operate manually, refer to the manufacturer's recommendations for checking the unit which is being operated.

MAINTENANCE RECOMMENDATIONS HDPE PENSTOCKS

The penstock should give years of trouble-free operation, providing the following simple inspection procedures are adopted.

THE FREQUENCY OF INSPECTION SHOULD BE BASED ON THE PARTICULAR REQUIREMENTS OF THE INSTALLATION.

The following parts require attention in particular and need to be cleaned if necessary

1) Spindle block (dirt and wear)

2) Spindle (dirt and wear)

3) Spindle stop (present)

4) Sealing (dirt and wear)

For heavy duty penstocks, or any other penstock fitted with Phosphor Bronze Spindle Blocks/Bushes, occasional greasing is required. We recommend the use of any suitable water-resistant grease. Penstocks fitted with POM (Polyacetol) spindle blocks should not be greased.

NOTE Do not grease any part of the penstock unless otherwise instructed.

In an aggressive environment or in locations with large amounts of silt or debris, it is strongly recommended to increase the inspection/maintenance interval.

1. Clean the unit by hosing down to remove any grit or debris.
2. Check for leakage between the frame and the concrete wall. Make good any faults.
3. Check the tightness of the bolts and nuts.
4. Check there is no damage to the frame, door or seals.
5. Check the operating equipment for damage and freedom of movement, and check to ensure that there are no damaged or worn parts.
6. Moving parts should be lightly oiled or greased as appropriate.
7. When carrying out any maintenance work with the penstock door in the open position, ALWAYS ENSURE that the door is securely and independently supported from underneath.

GREASE
Recommended Grease: BP Energrease Ref. No. L21M
Whilst every care is taken that the information given herein is reliable, Waterfront Fluid Controls Ltd cannot accept responsibility for any damage resulting from the application of these recommendations, intended for guidance only.

MAINTENANCE OF GEARBOXES

The gearbox should give years of trouble-free operation providing the following simple inspection procedures are adopted.

THE FREQUENCY OF INSPECTION SHOULD BE BASED ON THE PARTICULAR REQUIREMENTS OF THE INSTALLATION.

1. Under normal operating conditions no maintenance is required other than to keep the unit clean.
2. Check the tightness of all bolts and nuts.
3. If the equipment which is being operated is taken out of service for an overhaul, the gearbox base/thrust plate may be removed and the grease changed, using one of the recommended lubricants. The base/thrust plate must be sealed on re-assembly.
4. Refer to the gearbox manufacturers recommendations.

LUBRICANTS

MANUFACTURER	NAME OF GREASE	COMMENT
Century Oils	Lacerta CL2X	Never mix one type of oil or grease with another.
Shell	Alvania EP1	As above.
Esso	Beacon EP2	As above.

MAINTENANCE OF ACTUATORS

The electric actuator should give years of trouble free operation, providing the following simple inspection procedures are adopted. THE FREQUENCY OF INSPECTION SHOULD BE BASED ON THE PARTICULAR REQUIREMENTS OF THE INSTALLATION/OPERATION

1. Clean the actuator and CHECK for oil leaks. If oil leaks are present, take out of service, flush out, renew seals and refill with fresh oil to the actuator manufacturers recommendation. NEVER mix one type of oil or grease with another.
2. Check the tightness of all bolts and nuts.
3. If the actuator is normally only used very occasionally, a routine operation plan should be established.
4. Refer to the actuator manufacturers recommendations.
5. DO NOT CARRY OUT ANY MAINTENANCE WORK WITH THE POWER CONNECTED.

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