Australian Water Engineers

Watergates NZ

ADAM ST PUMP STATION

OPERATION AND MAINTENANCE MANUAL

Model F35 Flatback Penstocks
Model P1000 Penstocks & Stopgates

Australian Water Engineers
18 Hansells Parade. Riverview, Q4303 Australia
www.aweng.com.au
info@aweng.com.au
Ph. +61 7 3832 0230

Watergates NZ
9 Anvil Rd Silverdale, New Zealand
www.wgnz.co.nz
info@wgnz.co.nz
Ph. +64 9 426 4246

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Rev1 110617

AWE Australian Water Engineers

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OPERATION AND MAINTENANCE INSTRUCTIONS FOR PENSTOCKS

Prior to Operation

1. The penstock should be brushed off to clear all dirt,grit and grout particularly around the seals and gate rear and sealing faces. A high pressure wash down with clean water is also recommended.

2. Clean the stem from grit and debris. The entire threaded portion of the stem is to be adequately lubricated with grease prior to operation. Should grit or other foreign matter contaminate the grease it should be cleaned off and re-greased as necessary prior to operating.

3. Do not lubricate the seals. The seal material is of wear resistant low friction material (UHMWPE). Applying grease will only entrap grit and debris into the seals which may cause damage.

General Operation

1. Ensure the handwheel or tee key provided with the penstock is of the correct size for the operation of that penstock. Oversizing these or the use of bars etc., to gain additional leverage may result in damage to the penstock and its components.

2. Penstocks are generally clockwise closing. Refer to handwheel markings to confirm opening and closing directions.

3. The penstock should operate freely and unlaboured throughout its full travel. A sudden increase in the input effort means that the gate has reached the end of its travel or something has caused the gate to jam mid travel. Increasing input force will overstress the penstock and may result in damage.

4. Electric actuators, bevel and spur gearboxes and pneumatic and hydraulic cylinders should be operated in accordance with the manufacturer's standard instructions.

General Maintenance

1. Penstocks in frequent use require the stem and nut to be cleaned and re-greased at least on a monthly basis. It is recommended that the old grease be cleaned off before new grease is applied. Any debris should be cleaned from the threads before re-greasing. Failure to provide consistent adequate clean lubrication will result in accelerated wear of the drive nut threads.

2. Penstocks in frequent use are inherently subject to a greater wear rate on the nut threads and this should be inspected at a minimum of 3 monthly intervals. When the wear becomes excessive the nut should be replaced. A quick check is to examine the amount of backlash in the threads by rotating the handwheel back and forth noting the angle of engagement from one direction to the other.

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3. Penstocks in occasional use should have stems cleaned and re-greased at 6 monthly intervals.

4. It is recommended that penstocks be washed down and cleaned from grit and debris build up at 12 monthly intervals. This opportunity should also be used to inspect seals and other components for wear and damage and check bolt tension.

5. Upon each inspection it is important to ensure that each penstock will open and close fully. Cycling the penstock through its full stroke should form part of the maintenance schedule.

6. Infrequent use of a penstock can result in stiff operation. In this case all old grease must be removed with a suitable solvent and re-greased accordingly.

7. Electric actuators, bevel and spur gearboxes should be maintained in accordance with the manufacturer's standard instructions.

8. The recommended grease to lubricate stem threads and thrust bearings is Castrol EPL-2 grease or equivalent.

OPERATION AND MAINTENANCE INSTRUCTIONS FOR STOPGATES

General Operation

1. Stopgates are generally made from aluminium for its lightness and easy of handling. As such, aluminium is relatively soft and care should be taken when handling so as not to knock or drop the boards resulting in damage especially to the sealing edges and surfaces.Should boards be knocked or dropped they should be inspected for burrs, scratches and dents and treated with emery cloth or hand file accordingly prior to inserting into the frame as seals can be easily damaged by sharp irregularities.

2. Under no circumstances are boards to be dragged across any surface.

3. Segmented stopgates incorporate an intermediate cross seal. These are somewhat exposed at the corners and care should be taken in the same way so as not to damage these.

4. Stopgates are bidirectional in their sealing capabilities. That is, boards may be placed in either orientation provided they fit in that orientation.

5. Stopgates should be inserted and removed under balanced head conditions.

6. Ensure the correct size stopgate is used for the frame. Forcing a stopgate inside an incompatible frame will result in damage to both the frame seals and the board. Equally, placing a board of insufficient width inside a frame may result in the board jamming or failure of the board under hydrostatic loading.

7. Under no circumstance are boards to be dropped into place. This may result in damage to the bottom seal.

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8. Inserting and removing segmented stopgates is a two man operation and the lifting ladders supplied should be used. Lifting ladders hook onto the lifting pins located at the top corners of each segment. Segments should be inserted and removed at a steady rate whilst keeping it level. Inserting or removing one side faster or slower than the other will result in the board segment jamming in the frame.

9. Larger stopgates requiring a crane lift are provided with lifting lugs for others D-shackle and slings to attach to. Boards must be lifted straight and vertically so as not to place undue stress into the frame, seals and board.

10. Do not lubricate the seals. The seal material is of wear resistant low friction material (UHMWPE). Applying grease will only entrap grit and debris into the seals which may cause damage.

Maintenance and Storage

1. After stopgates have been used they should be washed down, cleaned and stored away in an orderly fashion.The manufacturer can provide a purpose built storage frame for this upon request.

2. Check sealing edges and faces for burrs, scratches and dents. These can generally be treated with some emery cloth or hand file. It is important that these are attended to as the seals could be damaged.

3. If a purpose built storage frame is not used, stopgates should be stored with wooden chocks underneath to protect them from damage and secured appropriately to prevent wind blowing them over.

4. Segmented stopgates with intermediate cross seals should be stored out of direct sunlight to protect the seal from UV degradation.

5. It is recommended that stopgate frames be washed down and cleaned from grit and debris build up at 12 monthly intervals. This opportunity should also be used to inspect seals for wear and damage and check bolt tension.

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INSTALLATION MANUAL

Model F35 Flatback Penstocks
Model P1000 Penstocks & Stopgates

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General

1. Remove all strapping and protective packaging.
2. Check all parts are undamaged and accounted for.
3. Keep the gate or board in the closed position, as supplied, as this provides rigidity during installation.
4. Do not disassemble or alter the settings of any sealing arrangements.
5. Do not remove any frame bracing until installation is complete.

If in doubt, ask!

Rev1 110621

Wall Mounted Penstocks and Stopgates

1. Check the concrete wall face for flatness in vertical and horizontal planes. The surface should be free from debris, dust, sludge and algae growth. Ideally it should be pressure washed and scabbled.

2. Check the opening dimensions are correct to drawing.

3. Mark a vertical centre line of the opening on the wall extending beyond the top and bottom of the opening.

4. Put the penstock against the wall and support it over the opening ensuring correct positioning. For correct height positioning the bottom rubber invert seal should be flush with the invert of the opening

5. Set the penstock vertically and centred with the line on the wall. If necessary use a plumb line. Using a spirit level ensure the penstock is vertical in both directions i.e. front and side elevations.

6. At this point it is necessary to check with a feeler gauge that the bottom edge of the gate is making continuous and consistent contact with the rubber invert seal. It may be necessary to pack up the bottom cross rail member to achieve this.

7. Using the penstock frame hole pattern as a template, drill all anchor holes as per manufacturers recommendations and to depths stated on the drawing. Holes must also be thoroughly cleaned to the manufacturer's recommendations.
   ***Important!**: Anchor boltinstallation is critical to achieve full structural integrity and capacity of the equipment.*

8. Install chemical anchors as per the manufacturer's recommendations ensuring they are square and perpendicular to the frame and are centred in their holes through the frame.
   If the penstock is to have non-shrink grout behind the frame, insert the backing nuts with the anchor. *(Anchors supplied by AWE have a hex drive head to allow setting with a drill. The backing nut is held in the fingers behind the frame and the bolt is drilled through it.)*
   Allow anchor adhesive to cure as per the manufacturer's recommendations.

9. Using a spirit level ensure the penstock is vertical in both directions and ensure the penstock is free from distortion and twist which can affect operation and performance of the penstock. Use the backing nuts and front nuts to achieve this.
   ***Important!**: It is necessary to use a nickel anti-seize compound to prevent galling of threaded fasteners.*

10. If the penstock has a top seal, ensure that the cross rail member is pushed out tightly against the gate so there is continuous contact and compression of the seal.

11. Install formwork as necessary ensuring all gaps are shuttered up sufficiently to prevent grout from leaking out.

12. Grout fill the void between the penstock frame and the wall using a pourable non-shrink type grout. Ensure air pockets are removed and all cavities are filled.
    ***Tip**: If the formwork leaks, slowing down the pour and letting the grout thicken often overcomes*

this.

***Beware!**: Do not pour in stages that allow the previous pour to set. Non-shrink grout usually has an expanding component which will depend on the water/cement ratio.An expanding layer over a previously expanded layer can cause serious leaks between the frame and the grout.*

13. When the grout has cured, (refer to manufacturer's recommendations), remove the formwork. Ensure any overspill of grout is removed from the penstock especially on the seals, the stem and the rear surface of the gate. All bolts should be tightened.

Embedded Penstocks and Stopgates

1. During construction, the channel will have been provided with block-outs to suit the penstock. Check that the channel width and depth as well as block-out sizes are correct and of sufficient size to accommodate the penstock. Refer to the drawing for detail.

2. Place the penstock into the block-outs and pack under the frame so the rubber invert seal is flush with the channel floor. Check that the penstock is level across the channel and using a feeler gauge that the bottom edge of the gate makes continuous and consistent contact with the rubber invert seal.

3. Pack the penstock in the side block-outs so that it is held rigid and is vertical and square leaving space at both sides of the frame for grout. Do not over pack as this may cause distortion and twist which can affect operation and performance of the penstock.
   ***Tip**: The gate should remain in the closed position to provide rigidity to the frame when positioning, packing and setting.*

   ***Important!**: Do not remove the gate from the frame and do not remove any temporary frame supports until after the grout is set.*

4. Install formwork as necessary ensuring all gaps are shuttered up sufficiently to prevent grout leaking out.

5. It is essential to double check the frame for distortion and twist prior to grouting.

6. Grout fill the block-outs as per item 12 above.
   ***Tip**: The gate should remain in the closed position to provide rigidity to the frame whilst grouting.*

7. All embedded penstocks are provided with a flush invert, therefore the grouting at the invert of the channel should finish flush with the seal.

8. Allow grout to cure (refer to manufacturer's recommendations) and remove formwork.

9. Remove all debris and any grout that may have come into contact with other parts of the penstock. Pay particular attention to the seals and stem as grout will damage these under operation.

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Remote Operating Equipment

1. After a penstock unit has been set in position level and plumb, all remote operating equipment such as extension stems, guide brackets and pedestals should be fitted prior to grouting. This is to ensure correct alignment and levels are achieved so that moving parts run smoothly and binding does not occur under operation.

2. Check the distance from the invert of the opening to the floor level against the drawing. It is important to maintain this distance in order for the operating equipment to fit and function correctly although a tolerance of +/-20mm can be accommodated.

3. It is important that guide brackets are positioned at heights as detailed on the drawing. Guide brackets are adjustable in two planes and act as supports preventing the stem from buckling when the penstock is being closed.
   ***Tip**: Ensure to tighten all bolts after equipment has been aligned. Failure to do so may result in damage to components.*

4. Pedestals are anchored at floor level and should be set level, plumb and in true alignment with the stem. It is important that the chemical anchors are set correctly and installed to the manufacturer's recommendations to achieve full structural capacity. It may be necessary to grout under the pedestal base to achieve dead level or a correct height.

Rising Stem Penstocks

All rising stem manually operated penstocks are fitted with limit nuts to prevent over travel and exerting excessive force on the stem. It is important that limit nuts are set correctly to prevent the stem from buckling and damage to the invert seal.
For transport reasons, handwheels and stem cover tubes are supplied loose so it is necessary to fit these.

1. Fit the handwheel onto the bronze lift nut, taking care to tighten the retainer bolt and locking nut.

2. Wind the penstock to its fully closed position allowing the invert seal to compress 1 to 2mm.

3. Wind the limit nut down to seat onto the drive nut and tighten the grub screw

4. Fit the polycarbonate stem cover. For gearboxes and actuators this will be a threaded connection and PTFE thread sealing tape should be used.
   ***Important!**: Under no circumstances should the top of a gearbox or actuator be left exposed to the weather. Ingress of water may cause damage and significantly reduce the life of internal components.*

5. Lubricating the whole threaded portion of the stem is necessary as handwheel or actuator forces assume that grease will be applied as it reduces the co-efficient of friction and wear rate of the bronze drive nut.
   Prior to applying grease to the stem threads they should be cleaned to remove all grit and dust.

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If the penstocks are not going to be put into service for some time it is recommended that lubricating of the stem be performed at a later stage as grease can become contaminated over time resulting in excessive wear of the bronze drive nut.

Scope Testing Services

Acceptance and Proof Load Testing Report	
Report Number:	STS12-0078-01
Client:	Savcor ART Pty Ltd
Client Contact:	Mr Craig Wilks
Job Description:	The Proof Load Testing of Chemically Set M20 Threaded Bars, Sewage Pit, Corner of Adam and Granada Streets Wynnum, 05-07-2012.
Report Date:	08-07-2012

Paul McCarragher
Senior Engineering Technician / Director

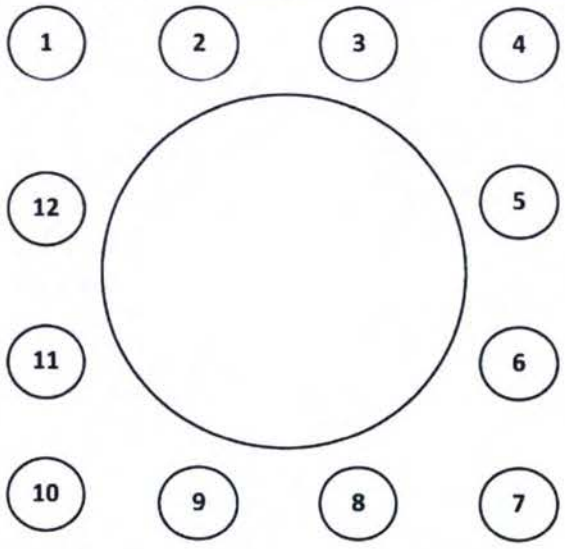
Scope Testing Services Pty Ltd
16 Willy Lane Mount Crosby
ABN No: 50 282 740 545
Mobile: 0413006692
Phone/Fax: 3201 1384
scopetesting@bigpond.com.au
Accreditation No: 17076

NATA
WORLD RECOGNISED ACCREDITATION

Accreditation compliance ISO/IEC 17025.

Note: This report is based on information supplied by the client.

Scope Testing Services



Drawing 1 Sample Locations, number represent approximate sample locations in pit.

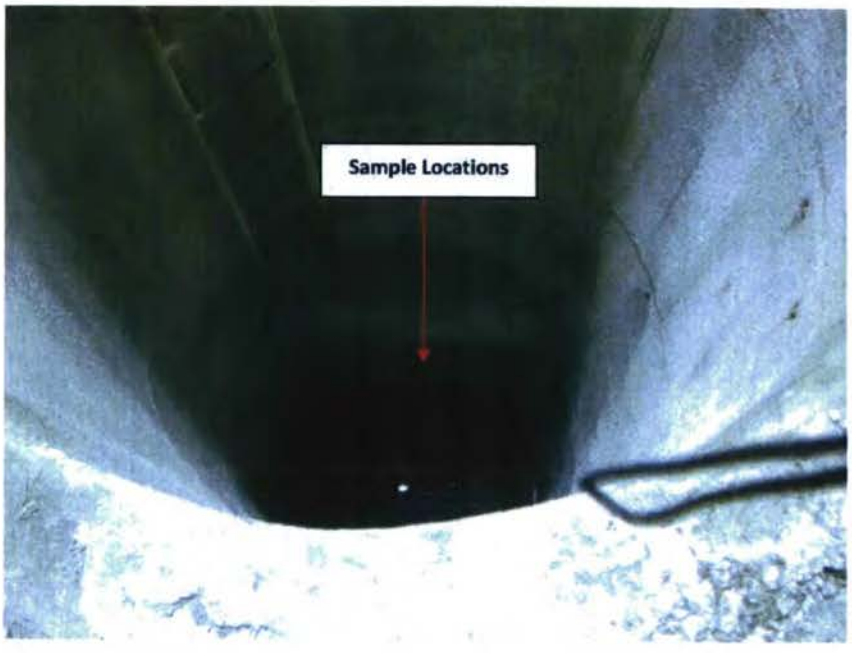


Photo 2 Test Location

Scope Testing Services

1 Test Method

1.1 Visual Inspection

The samples were inspected prior to Load Testing for correct installation and signs of failure.

1.2 Proof Load Testing

The specified Proof Loads were applied to the threaded bars. The load was applied and monitored with a HILTI DGG 100 Load Cell. The load was held for a period of 1 minute.
*Note: The tests were conducted under supervision by Mr Craig Wilks of Savcor ART.

1.3 Visual Inspection

The samples were inspected after proof load testing for signs of failure.

2 Equipment Details

Manufacturer-Model: HILTI DPG 100
Serial Number: 59930
Type: Load Cell
Range: 100 kN x 0.1 kN

3 Result

All twelve (12) samples passed the required Proof Loads without any signs of failure.
(Refer to Table 1)

Table 1 Results of Proof Load Testing

Test Location	Sewage Pit - Corner of Adam and Granada Streets Wynnum
Test Date	05-07-2012
Sample Specifications	Chemically Set M20 Threaded Bars
***Note: Minimum test load required 24.5kN**	

Sample Number Identification	Sample Location	Test Load (kN)	Embedment Depth (mm)	Adhesive	Result
1	Refer Drawing 1	33.3	Minimum 170	HILTI HY150	PASS
2		38.9			PASS
3		31.8			PASS
4		33.2			PASS
5		27.8			PASS
6		30.0			PASS
7		33.9			PASS
8		35.5			PASS
9		26.4			PASS
10		28.3			PASS
11		27.3			PASS
12		31.4			PASS

Construction of a Sewer Door, Ada...st Wynnum

Date Opened: 20-7-11 Signed: [signature] Date Closed***: 31-1-13 Signed***: [signature] SAVCOR

ITEM NUMBER	ACTIVITY	Type*	Responsibility**			Record of results	Comments/Frequency/Method	Copy to	Initials on completion	Date on Completion
			Savcor		Client					
			Supervisor	P.M/P.E						
1	Documentation Deliverables	H	R	S	R & A	This ITP	Includes CMP, QMP, SMP, EMP, WMSs, ITPs, Construction Programme, Immunisation Records,	SAV / QUU	CW	22-8-11
2	New Benching in Manhole	W	I	A	A	This ITP		SAV / QUU	RM.	23-7-12
3	Sewer Door mark out anchor holes	H	I	A	A	This ITP		SAV / QUU	RM	3-7-12
4	Sewer Door Anchor Bolts Pull-Out Tests	H	I	A	A	This ITP		SAV / QUU	RM	5-7-12
5	Installation of Sewer Door	H	I	A	A	This ITP		SAV / QUU	RM	6-7-12
6	Removal of Old Sewer Door	W	I	A	A	This ITP	Not Applicable	SAV / QUU		
7	Installation of New Ladder	W	I	A	A	This ITP		SAV / QUU	RM	22-7-12
8	Installation of New Vactor Pipe	W	I	A	A	This ITP		SAV / QUU	RM	6-7-12
9	Steel Reinforcement for New Aspro	H	I	A	A	This ITP		SAV / QUU	CW	2-8-12
10	Fabrication of New Aspro	W	I	A	A	This ITP		SAV / QUU	CW	6-9-12
11	Installation of New Sewer Door Gearbox and Commissioning of Sewer Door	W	I	A	A	This ITP		SAV / QUU	RM	17-10-12
12	Supply As Constructed Drawings, Operation and Maintenance Manuals	W		S	R & A	This ITP		SAV / QUU	CW	30-1-13

* Type of Inspection
H: Hold Point
W: Witness Point
RO: Routine

** Responsibility
A: Approve
R: Review
I: Inspect
S: Submit
M: Monitor
T: Test
N: Notice
V: Verify
P: Prepare

Approving/Confirming that all acceptance and testing criteria has been met and that the lot is closed out and conforms.

Technical Data Sheet

parchem CONSTRUCTION SUPPLIES

Vandex Plug

Fast setting, cement based permanent mortar to plug running water leaks

USES

Rapid setting, permanent plugging of water seepage through porous concrete and fast flowing water through cracks and construction joints in concrete and masonry.

Applications include plugging in-situ and precast concrete segments in tunnels, water storage tanks, sewerage mains and processing tanks, basements, below ground car parks, access chambers, building foundations and mines.

Vandex plug is effective in sealing water leaks through concrete, concrete block walls, brickwork, earthenware and all types of stone and masonry.

ADVANTAGES

- Highly abrasion resistant
- Stops water flow
- Sets in approximately 30 seconds after mixing
- Permanent durable repair
- Works on concrete, brick, stone and all types of masonry
- Can be installed underwater
- Non-toxic
- Can be mixed with water or used as a dry powder
- Easy application
- Colour compatible with the host concrete
- Packed in convenient resealable plastic containers

DESCRIPTION

Vandex Plug is a one-component, rapid setting, ready-mixed, cementitious, waterproof plugging mortar which is ready for on-site application to leaking cracks and water seepage areas in concrete, stone and all types of masonry after mixing with water.

TEST REPORTS AND APPROVALS

WRc Evaluation & Testing Centre Ltd, Oakdale, Gwent

- Potable water compatibility
  WBS Approval / Water Byelaws Scheme - approved

Drinking Water Inspectorate, Romney House, London

- Potable water compatibility - DWI-approval

National Sanitation Foundation, Michigan

- Potable water compatibility
  NSF-approval

DESIGN CRITERIA

Vandex Plug can be applied in vertical, horizontal and overhead applications. Areas of leakage must be identified and a rebate with width and depth of 30-50 mm, formed along the defect to accept the Vandex Plug.

Applications where a very high water pressure exists behind the leak can be repaired more effectively by drilling a hole through the substrate and inserting a plastic tube to allow the water to flow and release the pressure. Plugging can then be performed on the surrounding leakage points before removing the plastic tube and plugging the hole.

PROPERTIES

Form:	Cementitious powder
Colour:	Cement grey
Bulk density:	1.10 - 1.30 kg / L
Initial setting time:	30 seconds (after mixing)
Physical or chemical change:	Chemical cure
Application temperature:	5 - 30°C

Vandex Plug

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CHEMICAL RESISTANCE

Vandex Plug is suitable for use in contact with sewerage water, sea water, aggressive ground water and a range of chemical solutions.

MAINTENANCE

No special requirements, any damage identified during normal inspections should be water blasted clean, chiselled out, repaired and recoated as appropriate.

SPECIFICATION CLAUSES

Where so designated, surfaces subject to water leakage must have the leakage points identified and repaired using a one-component, rapid setting, cementitious plugging mortar.

All cracks and leakage points will be chiselled out to create a rebate having a minimum width and depth of 25 mm.

The plugging compound must have a bulk density of 1.1 to 1.3 kg / L and a setting time of 20 - 40 seconds after mixing with clean fresh water.

The cementitious mortar must be non-toxic and be suitable for hand or trowel application to vertical, horizontal and overhead repairs.

Both the manufacturer and supplier of the plugging mortar must be accredited to ISO9001.

Vandex Plug supplied by Parchem is such a product.

SURFACE PREPARATION

When applying Vandex Plug to existing concrete or masonry, all surfaces to be waterproofed should be clean, sound and free of concrete curing compounds, form release agents, paints and all other coatings, dirt and contamination.

Where surface contamination exists, concrete surfaces should be prepared by water blasting, grit blasting or wire brushing in the area of the leak in order to remove the laitance in preparation to receive the Vandex Plug.

PRIMING

Priming is not required on good quality concrete or masonry substrates before applying Vandex Plug.

APPLICATION INSTRUCTIONS

Vandex Plug is supplied in the form of a dry powder and can be dry packed as a powder or applied by hand as a putty consistency after mixing with water by spatula.

To mix, place 500 g of Vandex Plug into a small clean plastic container, add approximately 120 g of clean tap water and mix by hand with a spatula.

Mix the powder and the water quickly for about 15 seconds. Scoop the mixed mortar out of the plastic mixing container by hand and knead the mix for 5 - 15 seconds as the temperature of the mix increases. The mortar should become quite warm and stiffen indicating that it is ready for application. The rapid setting time does not allow for any delay in application, ensure that all substrate preparation has been completed ready for immediate application of the plugging mortar.

With gloved hands, roll the wet mortar between the hands like putty to shape it into an appropriate sized plug to fill the prepared rebate. Install the plugging mortar immediately ensuring that the correct temperature and consistency has been achieved and maintain firm hand pressure on the installed mortar for about 30 seconds until it has set.

In large repairs, work from the lowest end of the repair towards the highest end, applying each new plugging mix next to the previous.

Allow the mortar to set for 1 minute and using a trowel or spatula in a cutting action, cut away any excess mortar from the surface of the repair.

After completing the repair, the effectiveness of the plug can be tested by sprinkling dry Vandex Plug powder over the surface of the repair. If the powder remains dry after 30 seconds, the repair has been successful. It is recommended that areas treated with Vandex Plug be overcoated with Vandex BB75, BB75-EZ or Cemelast.

Applications where a very high water pressure exists behind the leak can be repaired more effectively by drilling a hole through the substrate and inserting a plastic tube to allow the water to flow and release the water pressure. Plugging can then be performed on the surrounding leakage points before removing the plastic tube and plugging the hole.

Note: the water temperature used for mixing the Plug has a large effect on the setting time. Use cold water in summer and avoid using water from a hose that has been lying in the sun. In very cold winter conditions warm water may be used to accelerate the cure.

Vandex Plug

ESTIMATING

PACKAGING

Vandex Plug:	15 kg resealable plastic pail

STORAGE

12 months in original containers stored in cool, dry conditions ie; not exceeding 30°C. Storage above this temperature may reduce storage life.

EQUIPMENT

Small plastic mixing container capable of holding about 1 litre of wet mortar.

A spatula for mixing.

Rubber gloves to protect the hands.

A hammer and masonry chisel for creating a rebate for the plugging mortar.

High pressure washing equipment or a wire brush for removing surface contamination where required.

Vandex Plug

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ADDITIONAL INFORMATION

Parchem provides a wide range of complementary products which include:

- concrete repair – cementitious and epoxy
- grouts and anchors – cementitious and epoxy
- waterproofing membranes – liquid applied, cementitious and bituminous sheet membranes
- waterstops – pvc and swellable
- joint sealants – building, civil and chemical resistant
- industrial flooring systems – cementitious and epoxy
- architectural coatings
- filler boards – swellable cork, bituminous and backing rod
- ancillary products

For further information on any of the above, please consult with your local distributor or Parchem sales office.

IMPORTANT NOTICE

A Material Safety Data Sheet (MSDS) and Technical Data Sheet (TDS) are available from the Parchem website or upon request from the nearest Parchem sales office. Read the MSDS and TDS carefully prior to use as application or performance data may change from time to time. In emergency, contact any Poisons Information Centre (phone 13 11 26 within Australia or 0800 764 766 within New Zealand) or a doctor for advice.

PRODUCT DISCLAIMER

This Technical Data Sheet (TDS) summarises our best knowledge of the product, including how to use and apply the product based on the information available at the time. You should read this TDS carefully and consider the information in the context of how the product will be used, including in conjunction with any other product and the type of surfaces to, and the manner in which, the product will be applied. Our responsibility for products sold is subject to our standard terms and conditions of sale. Parchem does not accept any liability either directly or indirectly for any losses suffered in connection with the use or application of the product whether or not in accordance with any advice, specification, recommendation or information given by it.

Product Datasheet
Edition 31 October 2012

Construction

SikaGrout®-HES

High early strength and rapid set cementitious grout

Description	SikaGrout-HES is a ready mixed, high quality, grout that sets rapidly with high early strengths. SikaGrout-HES is a blend of high alumina cement, selected and graded aggregates, and Sika admixtures, enabling it to achieve high strengths in short time frame.
Uses	SikaGrout-HES is used in a wide range of applications where rapid strength is required, such as: • Machine bedplates • Anchor bolts. • Bridge bearing pads. • Pre-cast concrete sections. • Cavities, gaps and recesses.
Advantages	• High early strengths (even at low temperatures). • High 28 day strengths. • Good flow characteristic. • Rapid set times and rapid strength gain. • Adjustable consistency. • Does not segregate or bleed. • Good impact and thermal resistance. • Non corrosive to steel or iron.
Shelf life	Stored in unopened original containers protected from direct sunlight and frost, shelf life is at least nine (9) months.

Instructions for Use

Surface Preparation	Correct and thorough surface preparation is essential to achieve the high performance qualities of SikaGrout-HES. All surfaces must be clean, sound and free from dust, ice, oils, grease or other surface contaminants such as curing membranes and form release agent etc. Bolt holes and fixing pockets should be free of dirt and debris by air blasting. For maximum bond, surfaces should be abraded or roughened, preferably by mechanical means such as needle gun, grit blasting, grinding etc. All prepared surfaces must be saturated with water several hours prior to grouting, ensuring it is free of any surface water or puddles.
Formwork	The formwork used must be leak proof to allow for free flowing SikaGrout-HES. The formwork should be arranged so that the grout head is maintained on the side above the level of the underside of the base plate. This will allow gravity flow to completely fill the void to be granted. Formwork should be coated with form oil to allow easy removal of forms. Ensure adequate air holes are provided.
Temperature control	Temperature affects setting time and rate of increase for strength. For optimum performance maintain grout, concrete and/or steel substrates within the range of 18-25°C prior to, during, and for 48 hours after placement of the grout.

Construction

Application

Mixing equipment	SikaGrout-HES must be mechanically mixed using a mechanical grout mixer or a suitable drum mixer. The grout mixer will reduce the chances of the mix becoming lumpy or aerated. Smaller quantities should be mixed in clean drum using an electric drill and spiral drill and spiral mixer at a speed of approximately 500 rpm. DO NOT MIX BY HAND.
Mixing Method	1) Flowable grout, add 3.2 to 3.5 litres of water per 20 kg bag. Trowellable grout, add 2.5 to 2.8 litres of water per 20kg bag. 2) Add the powder component to approximately 70% of the total amount water component while mixing. 3) Add the remaining 30% of the water component to the grout at a steady rate while continuing to mix. 4) Mix until the grout appears homogenous (3-5 minutes). Allow to stand so any entrapped air can escape. Do not add more water to increase flow of the grout if a mix has stiffened due to time delays. If the grout is unworkable discard.
Placement	SikaGrout-HES can be placed by gravity flow or by pump. It is essential that proper placing is completed without problems. Sufficient labour, grout and equipment must be present to ensure continuous placement.
Gravity Flow	Mixed grout should be poured one side of the void to avoid air entrapment. Grout is best poured over short distances to ensure this. Use a suitable header box, maintaining the grout head at all times to ensure continuous flow. To facilitate grout compaction and top plate contact, use rodding, tamping or flexible strapping in short strokes while maintaining an adequate head of grout. Do not vibrate as this will cause segregation. Any adjacent machinery or equipment causing vibration should be shut down until initial set.
Pumping	When pumping SikaGrout-HES, ensure the pump is suitable for the grout consistency and for the distance and height it is to be pumped. A positive displacement pump is recommended. Place grout by pumping into the farthest corner, filling the space gradually. Ensure that air is not entrapped under the base plate.
Placement Thickness	Recommended thickness of SikaGrout-HES in one pour is 20 mm to 50 mm. Minimum thickness is 10 mm. Maximum thickness in one pass is 100 mm. Any grout pour that exceeds this should be done in stages, or have stone aggregate added to it, to reduce the exothermic heat. Contact Sika's Technical Department for further information.
Aggregate Addition	Coarse aggregate can be added to mixed SikaGrout-HES to achieve a stronger grout, to increase the thickness of grout placed in one pass, or to increase yield. It is recommended that aggregate size be 10 mm, however as a guide the maximum aggregate size should not be more than 1/5 of the thickness of the section to be cast. The aggregate shape, and the quantity added, will effect the workability of the mix. Smooth rounded aggregate is found to produce the most workable mix. The recommended maximum aggregate addition rate is 20kg per 20kg bag of SikaGrout-HES

Construction

Curing	Suitable curing methods such as plastic sheet, wet hessian, liquid membrane (eg, Antisol curing membranes) etc. must be used to protect the freshly applied grout from the drying effects of sun and wind. Curing must commence immediately after placement, and continue for at least 7 days. Curing is vital to the ultimate performance of grout as it allows optimum strength development and ensures tight contact with the baseplate.
Cleaning	Remove uncured SikaGrout-HES from tools and equipment with water. Hardened material can only be removed mechanically.

Technical Data (Typical)

Form	Grey Powder			
Granulometry	0-2.0 mm			
Density	2200 kg/m^3 approx. (dependent on water addition rate)			
Pot life @ 20°C	20 minutes approx.			
Application temperature	Minimum 5°C Maximum 35°C			
Colour	Dark grey (when mixed)			
Yield @ 20°C			Trowellable	Flowable
	Approximate yield per 20kg bag		8.5 litres	9.5 litres
	Approximate number of 20kg bags required for 1m^3 of grout		118	105
Workability (Tested to AS1478.2-2005)	50 secs (flowable consistency)			
Setting times (hrs : mins) (tested to AS2350.4-1999)	Flowable	Temp 20°C	Initial 20-25 minutes	Final 25-35 minutes
Strength Properties (tested to AS2350.11-2000)	Compressive strength (MPa) (Tested at 20°C)	Age	Trowellable	Flowable
		2 hours	25	20
		4 hours	35	24
		1 day	40	30
		28 days	80	65
Packaging	20 kg bag			

Construction

Product Datasheet
Edition 31 October 2012

Important Notes

- Do not mix SikaGrout-HES with any Portland cement based materials.
- For detailed information on grouting application and guidelines, refer to **Sika Grouting Systems.**
- Store SikaGrout-HES in dry conditions in unopened original packaging.
- Never apply to a dry substrate.
- Trials should always be conducted when adding a recommended Sika Admixture to SikaGrout-HES to determines the optimum dosage rates under local conditions.

Handling Precautions

- Avoid contact with skin and eyes.
- Wear protective gloves and eye protection during work.
- If skin contact occurs, wash skin thoroughly.
- If in eyes, hold eyes open, flood with warm water and seek medical attention without delay.
- A full Material Safety Data Sheet is available from Sika on request.

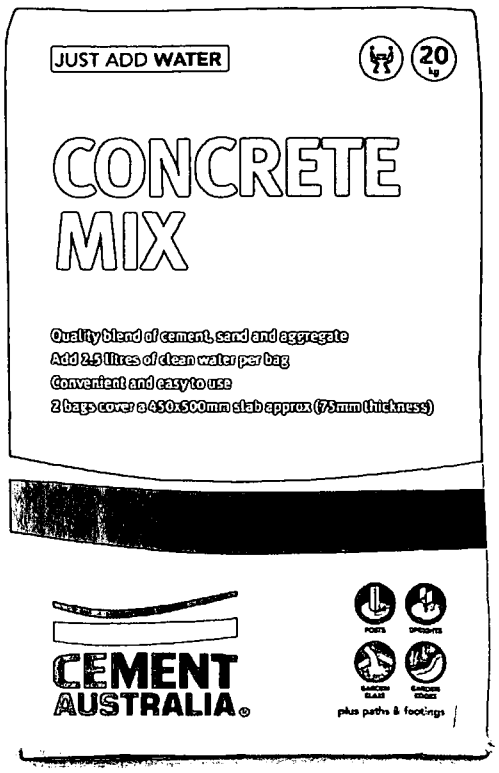
Important Notification

The information, and, in particular, the recommendations relating to the application and end-use of Sika's products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The proprietary rights of third parties must be observed. All orders are accepted subject of our terms and conditions of sale. Users should always refer to the most recent issue of the Australian version of the Technical Data Sheet for the product concerned, copies of which will be supplied on request.

PLEASE CONSULT OUR TECHNICAL DEPARTMENT FOR FURTHER INFORMATION.

Sika Australia Pty Limited
ABN 12 001 342 329

aus.sika.com
Tel: 1300 22 33 48



Cement Australia Concrete Mix is a blend of General Purpose cement, aggregate and sand, designed for use in projects where a quality concrete is required.

APPLICATIONS

Concrete Mix is a multi-purpose product that has a number of applications. Some of the more common uses are:

- Making pathways;
- Securing posts in the ground;
- Small concrete slabs for gardening sheds;
- Footings on small projects;
- Garden edging;
- Installing uprights for pergolas & decks.

AVAILABILITY

Product available in 10kg and 20kg bags.

FEATURES AND BENEFITS

- Performance is assured with consistent quality cement, sand and aggregate used in the blend.
- Good for small jobs, convenient & easy to use.
- Helps when job site accessibility is an issue.

DIRECTIONS FOR USE

1. Prepare the area to be concreted by digging out to the required depth for the slab or garden edge. The base of the area to be concreted should be levelled with gravel or bedding sand.
2. Construct formwork as required.
3. Using a wheel barrow or concrete mixer, add up to 75% of the total clean water required to the mixing vessel and slowly add the contents of the Concrete Mix bag.
4. Add additional water to achieve a workable mix, remembering too much water reduces the overall strength of the concrete.
5. Prior to placement, lightly soak the base of the area to be concreted to minimise moisture loss.
6. Place the concrete inside the formwork and ensure all corners and edges are filled.
7. Use a straight edge to screed off the concrete to the required level.
8. The top surface can be finished off with a wooden hand float.
9. To cure the concrete, keep it moist for several days by covering with damp hessian, plastic sheeting, an old tarp or similar material.

Note - Curing will control moisture loss and therefore assist in achieving the best possible strength.

Care should be taken in using hessian or old tarps so as not to mark the freshly poured concrete surface.

10. It is possible to remove the formwork 24 hours after finishing the concrete.
11. Don't walk on the path, slab or edges for at least 3 days after placing.

For more information
call **1300 CEMENT (1300 236 368)**
or visit **www.cementaustralia.com.au**

Mix it with the best.

CEMENT AUSTRALIA®

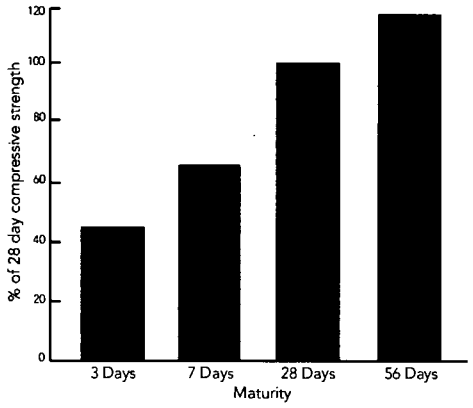
PDS CM Revision 3.0 issued 17/02/12

LIMITATIONS

- If considering using Concrete Mix with aluminium posts or poles, Cement Australia recommends you confirm the suitability of this with the aluminium manufacturer/supplier prior to use.
- Set times are affected by (extreme) temperatures. Avoid mixing and placing concrete at below 5°C or above 35°C.
- Too much water ruins good concrete.

SPECIFICATION

CONCRETE MIX COMPREHENSIVE STRENGTH RESULTS



Note: These Concrete Mix compressive strength results were achieved under controlled laboratory conditions, at 23 degrees Centigrade. They should be used only as a guide to potential strength as various factors can impact final strength results.

RECOMMENDED WATER ADDITION RATIO

One 20kg bag of Concrete Mix requires approximately 2.5 litres of clean drinking water to provide a workable mix.

Too much water ruins good concrete.

STORAGE, HANDLING & SAFETY

- Care should be taken when lifting bagged products as personal injury may occur. It is suggested that when handling bagged materials, the load is shared with another person.
- Concrete Mix contains cement powder which when damp, becomes alkaline and may be harmful to the skin. Avoid breathing the dust and avoid contact with skin and eyes. Suitable protective clothing should be worn at all times including eye protection and gloves.
- Concrete Mix should be stored and protected in a dry place off the ground.
- The recommended shelf life of cement products is approximately 6 months from date of manufacture. This is provided the product is stored as recommended above. Once opened, the bag should be used that day.

FURTHER HINTS & TIPS

- Excess water will impact the ultimate strength performance.
- Air temperature will impact concrete setting behaviour and the timing of some of the steps outlined.

THINGS YOU MIGHT NEED

- Trowel
- Steel brush
- Wet cloth
- Bucket
- Steel float
- Concrete Mix
- Shovel
- Hose
- Spirit Level
- Access to clean water
- Plastic sheeting
- Wheelbarrow

COVERAGE

110 x 20kg bags are required per cubic metre.

NOTE:
The Concrete Mix Material Safety Data Sheet (MSDS) is available at **www.cementaustralia.com.au**

Cement Australia Pty Ltd
ABN 75 104 053 474

12 Station Avenue Darra QLD 4076
1300 CEMENT (1300 236 368)
www.cementaustralia.com.au

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