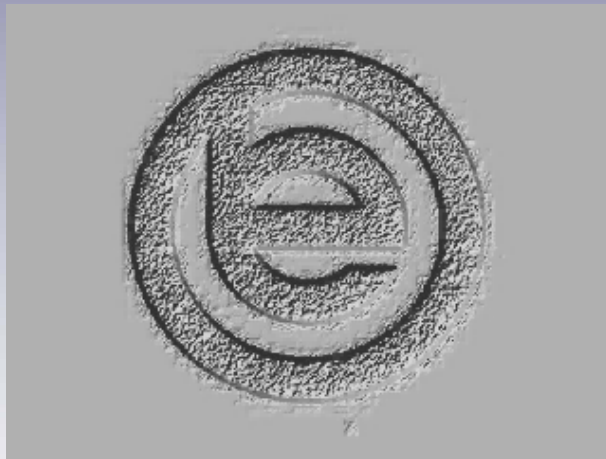


BLACKHALL

ENGINEERING LTD



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WATER PRODUCTS CATALOGUE



BLACKHALL ENGINEERING LIMITED

WATER VALVES

For

Terminal End (Free or Submerged Discharging) and In-Line Regulation.

Blackhall Engineering has been Designing and Manufacturing standard and Bespoke Valve products for the Water and Power Industry for over 40 years.



For the above-intended duties there are several Blackhall valve types that may be selected to meet the needs of Terminal End and In-Line Regulation duties.

- Fixed Cone Valves - Free Discharging
- Larner - Johnson[®] (Needle) - Free Discharging & In-Line
- Submerged Discharge Valve - Submerged Discharging
- Angle Pattern Float Controlled Valve - Free Discharging

The following pages are intended to give an insight as to the suitability of these valves in terms of size, pressure rating and application.

Fixed Cone Valve

Blackhall Series 3300

Duty – Terminal End, Free Discharging



Application –

This valve is typically used for Free Discharging Control at a Terminal Point of a pipe or culvert at the base of a Dam or Reservoir stilling basin. The valve was developed to offer the user an economic solution for this type of application.

This type of valve has other names commonly used to describe it: -

- Howell – Bunger Valve
- Hollow Cone Valve
- Sleeve Regulating Valve

Features and Benefits

- Kinetic Energy Dissipation using Air Cushioning of the Discharge Jet
- High Discharge Capacity ($K = 1.5$)
- High Velocity Discharge (up to 25 m/sec)
- Low Maintenance (all operating gear external)
- Drop Tight Closure
- Balanced During Operation (Low Operating Power Requirements)
- Pressures – Typically up to 10 Bar
- Size Range – 200mm – 1800mm (Larger Available)
- Materials – Steel and Stainless Steel (also available in Cast Forms)

Larner-Johnson® Needle Valve

Blackhall Series 3100

Duty – Terminal End (Free Discharging) and In- Line Regulation



Application –

The Larner Johnson® Valve is used for Free Discharge Control at pressures above that of the Fixed Cone Valve. The valve can also be used for In-Line Pressure or Flow Control Applications and offers fine (full range) adjustment.

Features and Benefits

- Accurate Pressure Control Capabilities
- Accurate Flow Control Capabilities
- Various Discharge Port (Characteristic) Options Available
- Pilot Balanced Operation (Low Operating Power Requirements)
- Low Maintenance and Long Life
- Wide Metal to Metal Seat Design for Reliable and Durable Shut Off
- Medium Velocity Discharge Capability (up to 8 m/sec)
- Anti-Cavitation Features Available (Air Belts)
- Jet Dispersal Option
- Heavy Duty Design and Construction
- Pressure – Up To 50 Bar – Size Dependant
- Size Range – 150mm – 2500mm + Bespoke Options
- Material – Cast Iron and Cast Steel

Submerged Discharge Valves

Blackhall Series 3200

Duty – Terminal End, Submerged Discharge



Application –

When Low discharge noise is a requirement and / or when space is at a premium the Blackhall Submerged Discharge valve is an ideal choice. The valve is design so that the discharge occurs under water into a Stilling Well reducing both noise and space required (i.e. No stilling basin). Details of the sizing for the Valve and Stilling Wells are available from the factory.

This type of valve can also be known as: – Vertical Sleeve Type Valve

Features and Benefits

- Low Discharge Noise Levels
- High Discharge Capacity ($K = 1.62$)
- Minimum Space Required for Discharging Flow (No Stilling Basin)
- Low Maintenance and Long Life
- Medium Velocity Discharge Capability (up to 6 m/sec)
- Balanced During Operation (Low Operating Power Requirements)
- Capable of High Pressure Discharge
- Various Discharge Port (Characteristic) Options Available
- Highly Stable Flow Control
- Heavy Duty Design and Construction
- Pressure – Typically Up To 20Bar
- Size range – 200mm – 1800mm (normally larger inlet than outlet)
- Material – Cast Iron and Cast Steel

Angle Pattern Float Control valve, Larner Johnson™

Blackhall Series 3078

Duty – Terminal End, Free Discharging



Application –

The valve is primarily used for the control of water into Reservoirs, Tanks or Channels and by the use of its Control Float it offers continuous level control of the inlet supply.

Features and Benefits

- Automatic Control, No External Power Supply Required
- Highly Stable Flow and Level Control
- Stilling Tank Option Available
- No Siphon Break Required
- Drop Tight Closure
- Sensitive Level Control
- Pressure – Up To 25Bar
- Size Range – 50mm – 600mm (Larger sizes on request)
- Materials – Cast Iron and Cast Steel

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***FIXED CONE VALVES
PROJECTS:***

- **NORTHUMBRIAN WATER –
COW GREEN RESERVOIR 2008**
- **GERUGU DAM – KUDAT WATER
SUPPLY MALAYSIA 2007**
- **KINTA DAM MALAYSIA 2006**



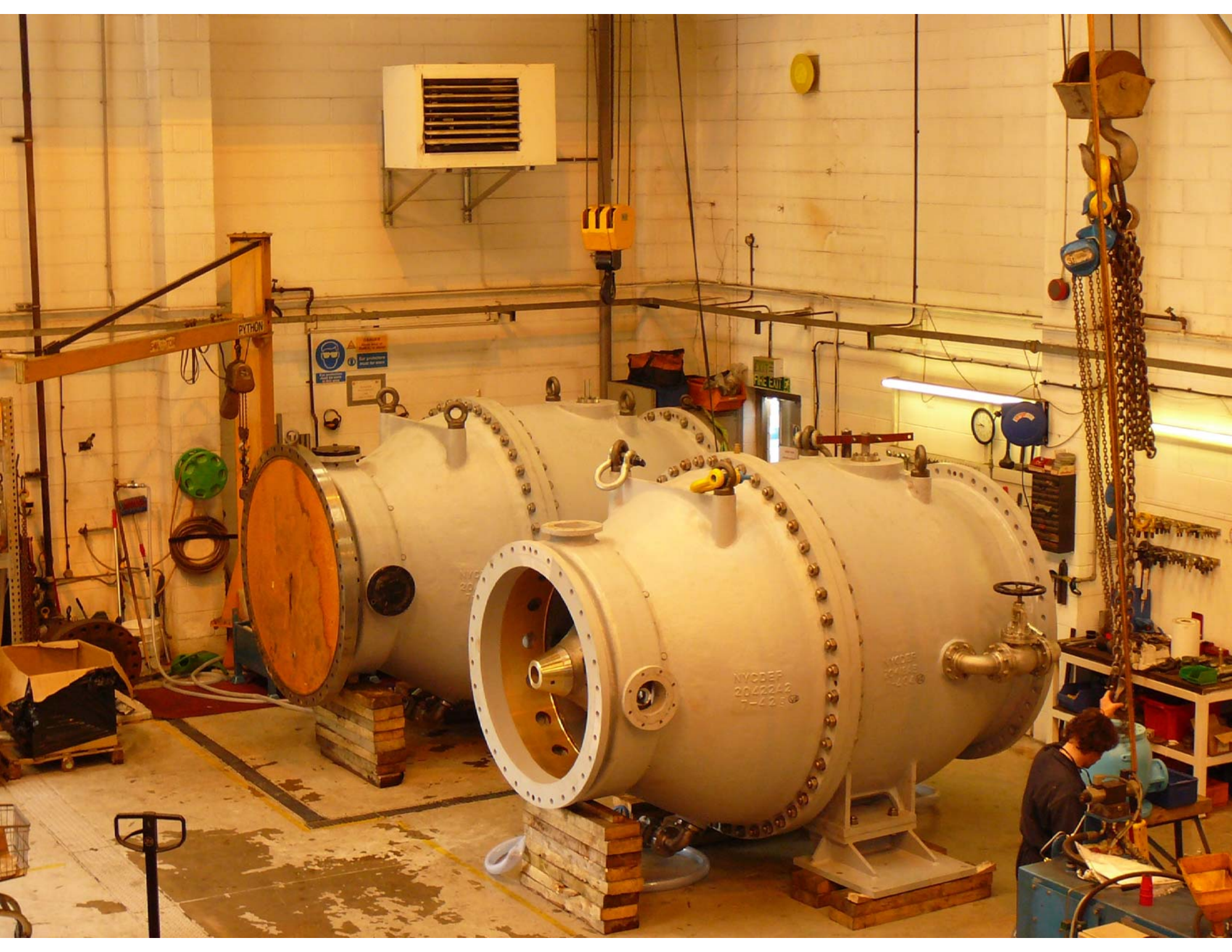




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***LARNER JOHNSON[®]
VALVES PROJECTS:***

- **CATSKILLS – NEW YORK WATER DEPARTMENT 2008 & 2009**
 - **CANBERRA FOUNTAIN – CAPTAIN COOK MEMORIAL 2008**
- **ARABIAN GULF EXPLORATION 2007**
- **SEMENYIH DAM MALAYSIA 2006**



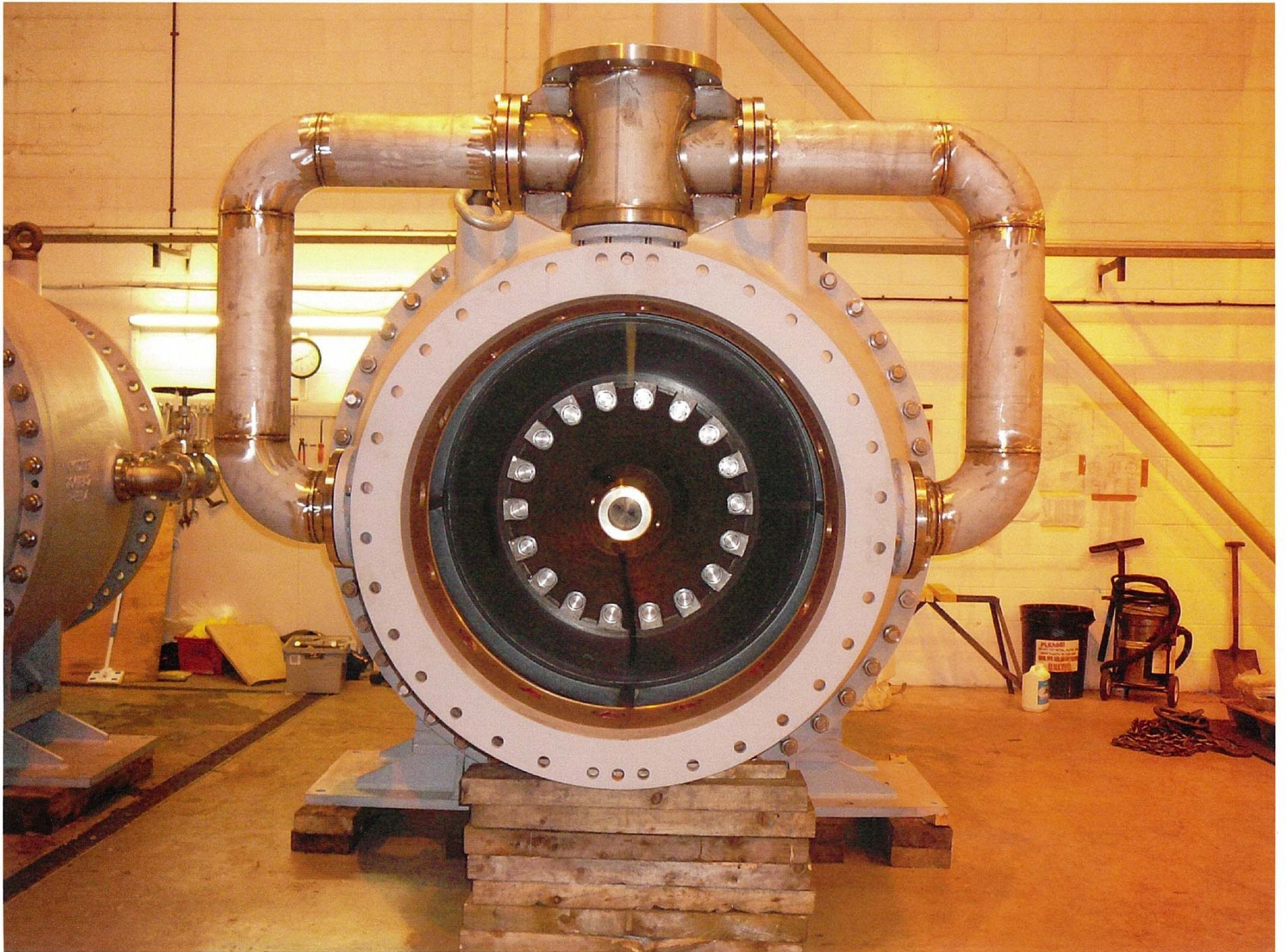
PYTHON

Wear eye protection
Wear ear protection
Wear hand protection

EXIT

NYODER
2042012
7-425

FLUORESCENT LIGHT





BLACKHALL
ARNER-JOHNSON VALVE



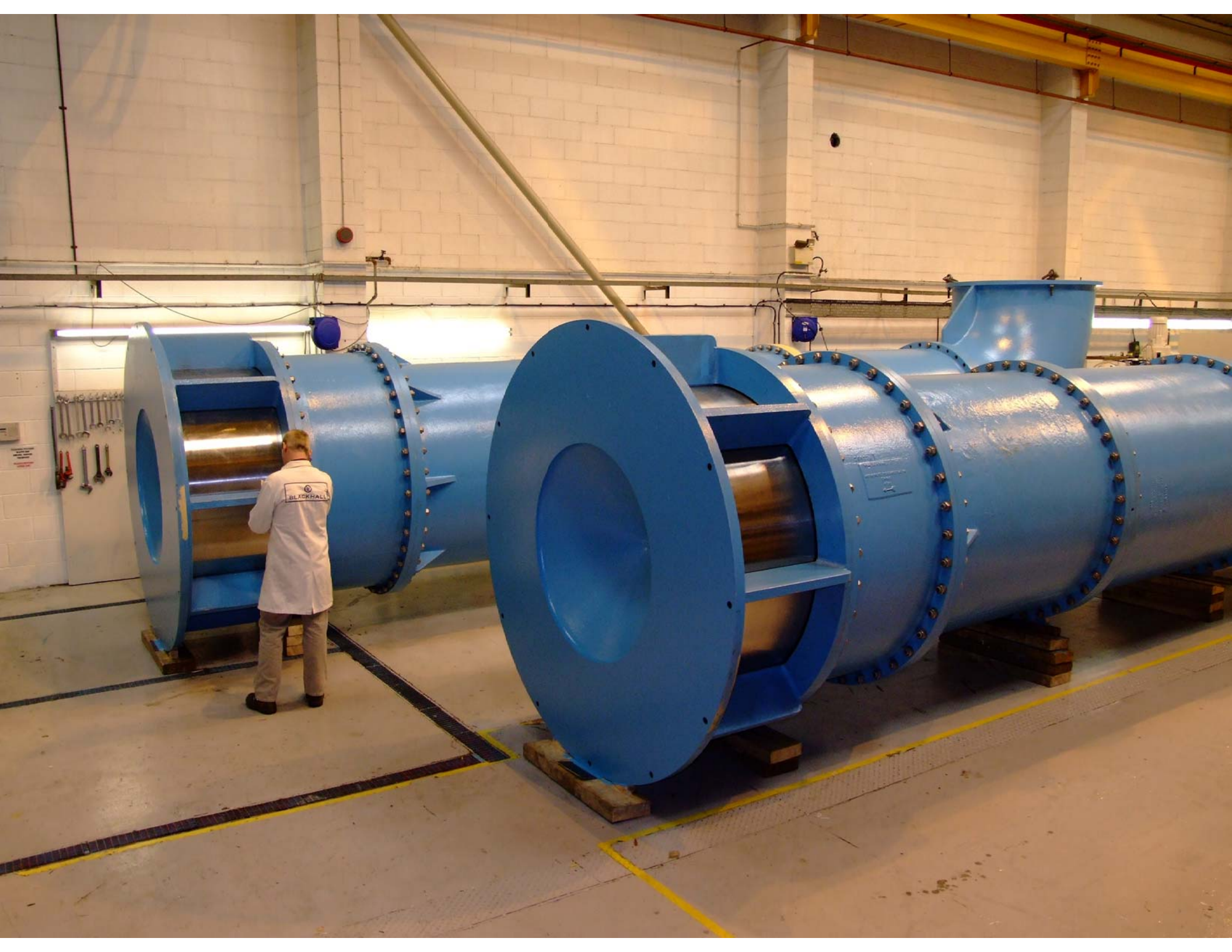
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***SUBMERGED
DISCHARGE VALVES
PROJECTS:***

- **THAMES WATER - KING
GEORGE V RESERVOIR 2008**
- **THAMES WATER - QUEEN MARY
RESERVOIR 2007**
- **SCOTTISH WATER - GLENDOE
2007**



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COLLETT







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***ANGLE PATTERN FLOAT
CONTROL VALVE
PROJECTS:***

- **RAND WATER BOARD –
SOUTH AFRICA 2009**



100 BAR
100 BAR
100 BAR
240 V

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LTD

DN
200

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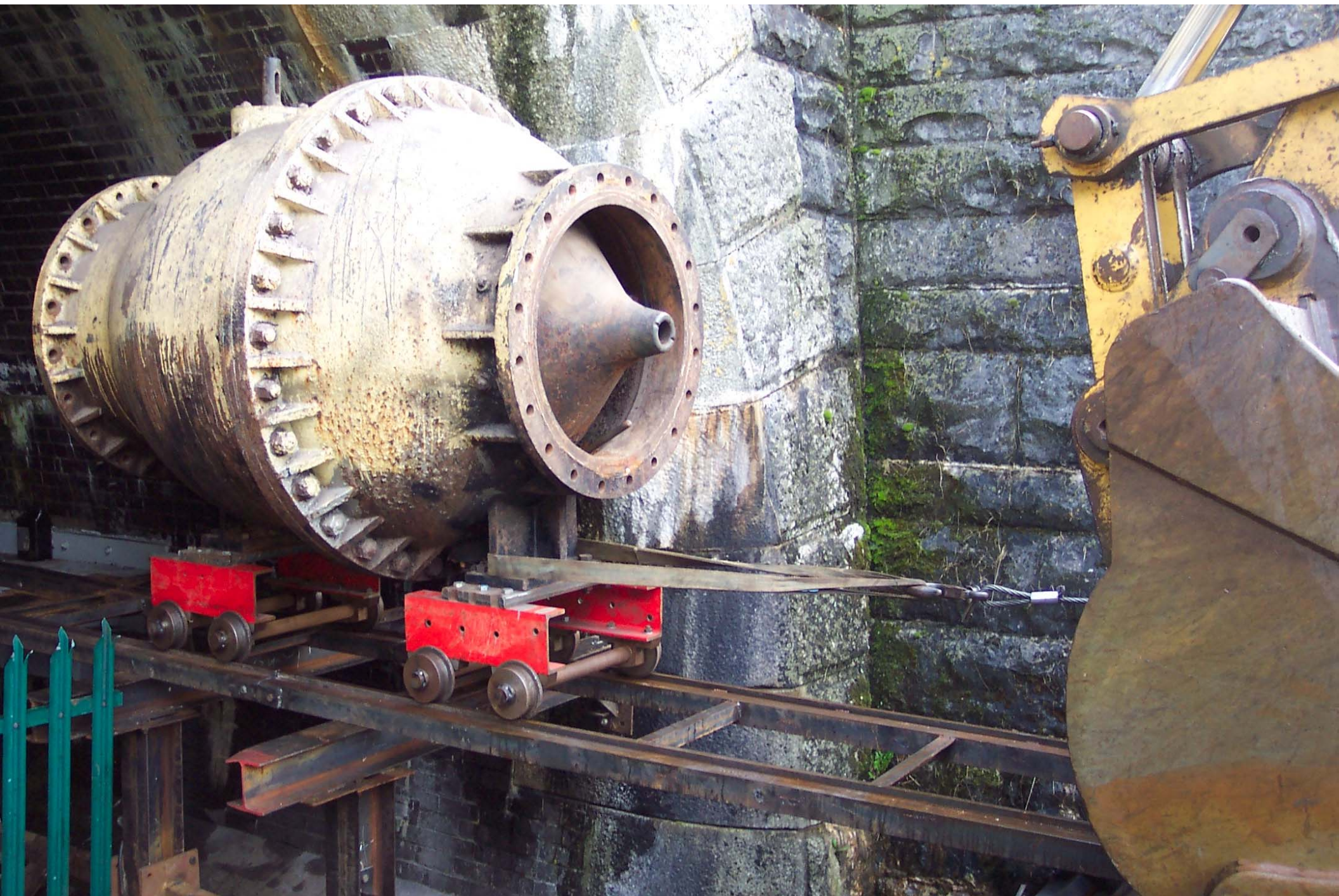
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SERVICE AND REPAIR PROJECTS:

- **UNITED UTILITIES – LLWYN-ON
RESERVOIR 2007 & 2008**
- **SEVERN TRENT WATER –
DERWENT & HOWDEN
RESERVOIR 2005 & 2006**





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DERWENT & HOWDEN RESERVOIRS

**GATE VALVE REPAIR CONTRACT
ORDER NUMBER JBVS 0526
Work carried out 2005/2006**

Prepared by: David Richmond
Tel 01484 713717
Date: 4th April 2006
Document Ref: JBVS 0526



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Contents

- ❖ **Section 1** Strip and inspection, and general condition reports

- ❖ **Section 2** Record of repairs

- ❖ **Section 3** Commissioning schedule sheets

- ❖ **Section 4** Recommended spares list

- ❖ **Section 5** Operating and Maintenance



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Jbvs 0526 Derwent West - inspection of valve S4

All descriptions are viewed looking at the inlet flange of the valve unless otherwise stated. The clock convention is used, e.g. 25 past means, 25 mins past the hour

1. Body.

Internal, minor surface corrosion. The downstream bore at 20 – past through to 20 – to, has corrosion and cavitation damage.

Recommendation

Repair cavitation damage to the outlet bore as per the contract specification

View showing the downstream seat ring and outlet bore



Ref number 20

2. Body seat rings and seat retaining pins.

The position of the wedge in relationship to the body seat rings has probably not changed since the original manufacture.

The upstream seat has signs of minor scoring / damage in various places and minor corrosion on various retaining pin heads, but is not detrimental to the long term operation of the valve.

The downstream seat is generally in good condition showing only minor scoring in places however there is a small indentation in the seat at 6 o' clock (depth unknown) and a bad mark at 12 o'clock across the full width of the seat ring probably caused by excessive wear in rollers causing the wedge barrel to rub against the face ring.

Recommendation

Clean up and scrape away any bruises around the indentation.

3. Body channel guides including the retaining pins

Both guides are in good condition, no steps or obvious visual deterioration has taken place.

All pins are intact.

Recommendation

Clean up remove any scoring and bruising.

General view of the channel guides R/H Side



Ref number 18

General view of the channel guides L/H Side



Ref number 19

4. Wedge

The condition of this Wedge has deteriorated since we carried out the inspection in 2003. The bottom of the wedge has suffered from corrosion/ cavitation damage.

Recommendation

Repair the cavitation damage to the bottom of the wedge. **(This is additional to the contract specification)** Shotblast and paint the rest of the wedge.

View of the wedge showing the cavitation damage



Ref number 100-1265

5. Wedge seat ring and retaining pins.

No detrimental wear on the upstream seat ring face, only minor wear and scoring, this is not detrimental to long term operation of the valve.

The downstream side has some wear / scoring at 20 to and 20 past. This is due to the excessive wear on the guide pins and rollers which has allowed the wedge seat ring to make heavy contact with the body seat ring.

Recommendation

Clean up the seat rings removing where possible any bruising and scoring.

6. Wedge nut box.

This was found to be in good condition.

Recommendation

Shotblast and paint

7. Wedge guide - rollers, bushes & pins.

This design comprises of three roller sets per side of the wedge, the roller sets move up or down inside the roller guides fitted to the body and bonnet.

This is to assist the opening and closing action of the wedge, each roller set comprises of 1 x roller, 1 x pin and 1 x bush.

R. H. S

The top middle and bottom set were all intact; however excessive wear on the clearances was apparent.

L.H.S

The top, middle and bottom roller sets were all intact, again excessive clearances were apparent.

Recommendation

Replace all roller sets as per the contract specification.

View showing the wedge and guide bushes



Ref number 100-1279

8. Valve stem and tee nut

This had to be cut in half to strip the valve

Recommendation

Replace the complete stem and tee nut with a 2 piece design as per the contract specification

9. Valve Bonnet.

Found to be in good condition with only minor surface corrosion visible.

Recommendation

Clean up

10. Bonnet channel guides and pins.

R. H. S.

Good condition

View showing the Bonnet Guide L/H Side



Ref number 16

L. H. S.

Good condition

Recommendation

Clean up and grind a lead onto the edge of the guides to take up any misalignment.

11. Actuator cylinder.

The cast iron cylinder has a pressed in bronze liner.

The liner showed no loss of material due to corrosion. However, a very heavy deposit of calcite build up was on the bore.

Recommendation

Machine the bore of the cylinder removing any scoring as per the contract specification.

12. Piston and Seals.

The piston was seized onto the valve stem. The stem was cut and the piston removed.

Recommendation

Machine out the old stem and modify the piston to accept the new piston seals as per the contract specification.

Typical View of the actuator cylinder bore



ref number 100-0392

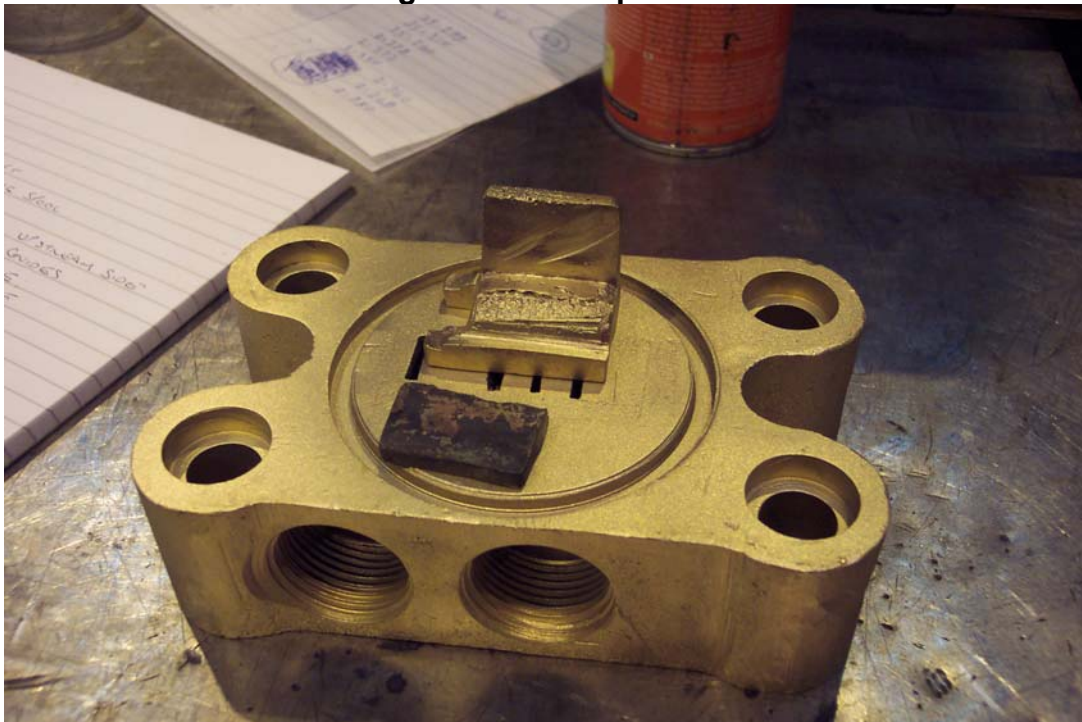
13. Actuator cylinder – open / close spool valve.

The thread on the operating spindle was found to be badly worn. This was contributing to the misalignment of the spool which controls the flow of the water to the operating cylinder. The actual spool valve shuttle was found in 2 pieces.

Recommendation

Manufacture a new operating spindle and spool valve shuttle, and adjust the alignment of the port spool valve. **(This is additional to the contract specification)**

View showing the broken spool valve shuttle



Ref number 100-1280

Report Prepared by David Richmond 6th October 2005

COMMISSIONING SCHEDULE

Reservoir location	Derwent West	
Valve Identification number	S4	
Date of Inspection	22 ND November 2005	
Blackhall Engineering Representative	David Richmond / John Lewthwaite	
Norwest Holst Representative	Andrew Bannier	
SevernTrent Water / Babtie Representative	Bob Elledge	
Operation	Record	Comments
Open the valve (guard valve closed)	Passed	Brake out pressure 35 Psig
Opening Time	3 min 10 sec	
Piston seal leakage check (opening)	Passed	Zero Leakage
Close the valve (guard valve closed)	Passed	
Closing Time	2 min 53 sec	
Check for smooth operation of the valve	Passed	
Piston seal leakage check (closing)	Passed	Zero Leakage
Operation of the spool Valve	Passed	
Body test (guard valve open)	Passed	
Open the valve (guard valve open) Brake out pressure 40 Psig	Passed	Mild Cavitation Between 20% & 30% & 50% & 55%
Noise meter Max reading opening	87 dba	
Opening Time	3 min 26 sec	
Close the valve (guard valve open)	Passed	Mild Cavitation Between 20% & 30% & 50% & 55%
Noise meter Max reading closing	86.6 dba	
Closing Time	3 min 38 sec	
Check for smooth operation of the valve	Passed	
Face Test (Guard valve open)		Leakage @ ¼ to ¼ past & 12 o'clock
Check the relief Valve operation	Passed	Relief Pressure 70 Psig

General Comments and Observations

The existing pressure gauge which registers the actuator system pressure is reading approx 15/20 Psig below the actual pressure.

Recommendations. Fit a short length of pipe to the outlet of the relief valve to divert the water down into the chamber.

Fit a pressure gauge to the air bleed valve on top of the actuator. This will help when controlling the opening and closing of the valve.

Acceptance Signatures

Norwest Holst

Date

Severn Trent Water / Babtie

Date



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Record of repairs carried out on the Automatic scour Valves at Derwent & Howden Reservoirs between September 2005 and March 2006

The work was carried out on the following valves:

Derwent West

S4

S5

S6

Howden West

S4

S5

S6

Howden East

S1

S2

S3

Derwent West (All Valves)

Replacement guide bushes, pins and rollers

Repairs to the cavitation damage at the bottom of the wedges

Repairs to the cavitation damage to the outlet bore of the bodies

New operating spindle and tee nut

New indicator rod

Bore out and hone the bores on all the actuator cylinders

Modification to the actuator piston to accept the new design piston seals

New piston seals to suit oversize actuator bore (Note all the cylinder bores are different so the seals are unique to each cylinder)

Full service of the operating spool valve including the re-alignment of the internal shuttle

New operating spindles for the spool valves

New internal shuttle for S4

Fitted a new safety valve and down pipe set at 70 Psig

Fitted a pressure gauge on top of the actuator

Installed an inline filter complete with isolating and bleed valves

Record of feeler gauge readings taken from the outlet side of the valves with the wedge in the fully closed position, after re-fitting

Readings are taken looking upstream from inside the pipeline

S4 L/H Side at ¼ to 0.020"

S4 R/H Side at ¼ past 0.020"

S5 L/H Side at ¼ to 0.012"

S5 R/H Side at ¼ past 0.015"

S6 L/H Side at ¼ to 0.020"

S6 R/H Side at ¼ past 0.037”

Points noted during re-assembly

When aligning the bonnet guides with body guides on S4 we had problems getting the alignment correct. We could only achieve the correct alignment by rotating the bonnet 180 degrees which would indicate that the bonnet has been removed before and not refitted correctly. **This was the valve which had been reported as having a fault when opening.**

When commissioning S5 it was noted that the valve operated considerably slower than the other valves. We found that the exhaust pipe on the spool valve had a small orifice plate fitted which was restricting the speed the water could exhaust from the spool valve. This was drilled out to the same size as all the other pipes which allowed the valve to operate at approx the same speed as the other valves.

Howden West (All Valves)

New wedges in S4 and S6

Repairs to the cavitation damage to the outlet bore of the bodies on S4 and S6

New operating spindle and tee nut

New indicator rod

Bore out and hone the bores on all the actuator cylinders

Modification to the actuator piston to accept the new design piston seals

New piston seals to suit oversize actuator bore (Note all the cylinder bores are different so the seals are unique to each cylinder)

Full service of the operating spool valve including the re-alignment of the internal shuttle

New operating spindles for the spool valves

Fitted a new safety valve and down pipe set at 80 Psig

Fitted a pressure gauge on top of the actuator

Installed an inline filter complete with isolating and bleed valves

Record of feeler gauge readings taken from the outlet side of the valves with the wedge in the fully closed position, after re-fitting

Readings are taken looking upstream from inside the pipeline

S4 L/H Side at ¼ to 0.008”

S4 R/H Side at ¼ past 0.010”

S5 L/H Feeler tight all round

S5 R/H Feeler tight all round”

S6 L/H Side at ¼ to 0.018”

S6 R/H Side at ¼ past 0.040”

Howden East (All Valves)

General repairs to the wedges

Repairs to the cavitation damage to the outlet bore of the bodies on S2 and S3

New operating spindle and tee nut

New indicator rod

Bore out and hone the bores on all the actuator cylinders

Modification to the actuator piston to accept the new design piston seals

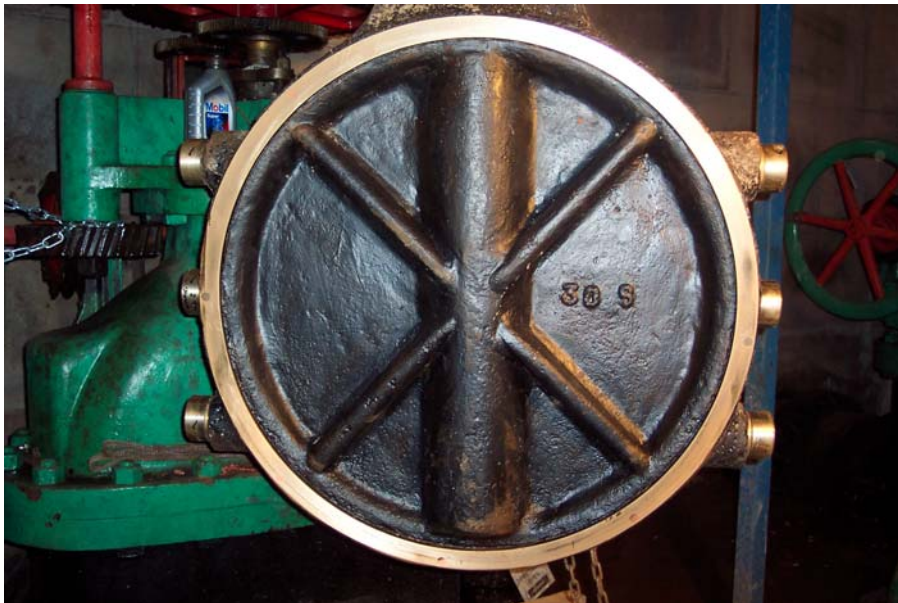
New piston seals to suit oversize actuator bore (Note all the cylinder bores are different so the seals are unique to each cylinder)

Full service of the operating spool valve including the re-alignment of the internal shuttle

New operating spindle for the spool valve on S3
Fitted a new safety valve and down pipe set at 110 Psig
Fitted a pressure gauge on top of the actuator
Installed an inline filter complete with isolating and bleed valves

Record of feeler gauge readings taken from the outlet side of the valves with the wedge in the fully closed position, after re-fitting
Readings are taken looking upstream from inside the pipeline
All feeler tight

Pictures relating to the repairs



Derwent Wedge showing the new rollers



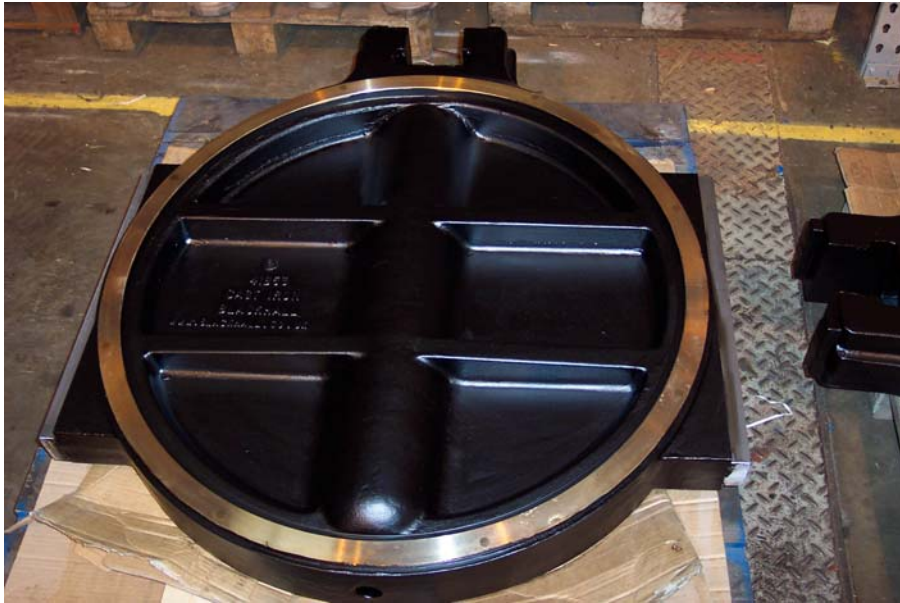
Cavitation repairs Derwent Wedge



Spool valve components



Outlet bore cavitation repairs Howden West



New wedge Howden West



Repainted actuator Howden West



Honed actuator cylinder bore



Modified piston and new seals



Piston assembled onto the new valve stem



Completed valve at Derwent West