	Specification	Peaking
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Title: **The Refurbishment of the Drakensberg Intake 1 Emergency Gate Hydraulic Cylinder**

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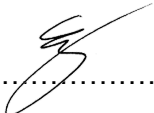
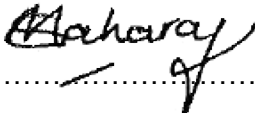
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1. INTRODUCTION

The Drakensberg Pumped Storage Scheme Intake Emergency Gates are the primary emergency isolation for the station and is activated during an emergency when the station is at risk of flooding. The emergency gate system comprises of a steel gate suspended from a hydraulic cylinder. In the event of an emergency the hydraulic pressure in the cylinder is released and the gate lowers under gravity to seal off the intake to the penstock. There are two emergency gates, one for Intake 1 and one for Intake 2

The emergency gate cylinder at Intake 1 which supplies water to penstock 1 is current leaking oil and needs refurbishment. The oil leak is emanating from the barrel which is under normal conditions situated under water. It is speculated the source of the oil leak is a defective O-ring on the interface between the barrel and the bottom end piece. Since the cylinder is in the retracted position and the source of the leak is in the non-pressure side of the piston, it may be deduced that the piston seals are passing as well.

It is proposed that the hydraulic cylinder be refurbished by replacing the piston seals and replacing the O-ring of the bottom end piece. In the event of the barrel being worn, since the piston continuously moves in only one section of the barrel, the *Contractor* submits a proposal to the *Employer* for the mitigation of the wear, such as inclusion of speciality piston seals. The endpiece is inspected for corrosion and repaired if required. All exposed non-moving parts are painted with an epoxy-based paint. A pressure test is performed to test the integrity of the seals and the functioning of the hydraulic cylinder.

2. SUPPORTING CLAUSES

2.1 SCOPE

The *works* is the following:

- Transport from Drakensberg Pumped Storage Scheme to *Contractor* premises
- The disassembly of the cylinder
- The evaluation of the damage to the cylinder and the submission of a repair report to the *Employer*
- The replacement of the Piston Seal
- The replacement of the Piston Rod Seal
- The replacement of the Endcap O-ring
- The corrosion treatment of the outside surface of the cylinder barrel
- The corrosion repair of the barrel and end piece and painting of all exposed surfaces
- If pressure testing of the cylinder to test the functionality and the integrity thereof
- Transport from *Contractor* premises to Drakensberg Pumped Storage Scheme

The removal and installation of the cylinder do not form part of the *works*

2.1.1 Purpose

The purpose of this Technical Specification is to refurbish the Emergency Gate Hydraulic Cylinder to its original condition.

2.1.2 Applicability

This document shall apply to Peaking and is to be used as an input to the associated works Information.

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2.2 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] ISO 9001 Quality Management Systems.
- [2] 240-53114002 Engineering Change Management Procedure

2.2.2 Informative

None

2.2.3 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

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3. DESCRIPTION OF THE *WORKS*

3.1 Executive overview

The *works* is the refurbishment of the Drakensberg Intake 1 Emergency Gate Hydraulic Cylinder.

The works include the following:

- The transport of the hydraulic cylinder to the *Contractor* Premises from the Drakensberg Pumped Storage Scheme Headrace Tower
- The disassembly of the hydraulic cylinder.
- The inspection and evaluation of condition of all components.
- A proposal for the repair and replacement of components is submitted to the *Employer* for acceptance.
- The replacement of all seals and wear parts see attached drawing 0.48/3253 Hydraulic Cylinder. Parts to be replaced include:
 - Bottom Endcap O-rings 1 off
 - Top Endcap O-rings 2 off
 - Piston seals 4 off
 - Piston rod seals 3 off
 - Top Clevis O-rings 3 off

Please note: Part numbers and sizes of seals and wear parts are not available; the *Contractor* supplies equivalent components with equal or better pressure and wear ratings.

- The *Contractor* supplies bill of materials, including part numbers and sizes of all wear components replaced.
- The *Contractor* assembles the hydraulic cylinder and performs a functionality and a pressure test. Functionality test includes the full extension and retraction of the cylinder (10 full cycles) and a pressure test of 248 bar for a duration of 30 minutes both in the retracted and extended position, the *Employer* representative witness these tests. No visible oil leaks are allowed.
- In the event of the failure of the functionality and pressure test, the cylinder is reworked and re-tested until the tests are passed.
- The outside surface of the cylinder is corrosion protected by means of epoxy base paint.
- Paint with one coat etch primer and two coats of BS4800 06-C-39 Saddle Brown enamel-based paint as per the paint manufacturer's instructions. Apply topcoat with airless spray to WFT of at least 560µm.
- Surfaces to be 100% Wet Sponge Holiday Detected at 1000V/mm.
- All paint manufacturer's recommendations regarding humidity, temperature, overcoating times, etc is followed by the *Contractor*
- A service report is submitted by the *Contractor* for acceptance by The *Employer*.
- Transport of the hydraulic cylinder to the Drakensberg Pumped Storage Scheme Headrace Tower.

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The hydraulic cylinder is removed from the installed position by others and installed after the refurbishment by others these activities do not form part of the scope of the *works*.

The basic dimensions of the hydraulic cylinder are as follows:

Closed length 9260 mm

Stroke length: 7250 mm

Barrel diameter 254 mm

Weight (approximate) 2000 kg

3.2 Employer's objectives and purpose of the works

The motivation is ensuring that the emergency gates of Drakensberg Pumped Storage Scheme, which serve as primary isolations are in fully operational condition.

4. MANAGEMENT AND START UP

4.1 Engineering quality assurance requirements

In the event of the failure of the functionality and pressure test, the cylinder is reworked and re-tested until the tests are passed.

4.2 Training workshops and technology transfer

Not applicable.

5. ENGINEERING AND THE *CONTRACTORS* DESIGN

Not applicable.

5.1 *EMPLOYERS* DESIGN

Not applicable.

5.2 PARTS OF THE WORKS WHICH THE *CONTRACTOR* IS TO DESIGN

All equipment and fittings necessary to perform the pressure and functional tests.

5.3 PROCEDURE FOR SUBMISSION AND ACCEPTANCE OF *CONTRACTOR'S* DESIGN

Not applicable.

5.4 OTHER REQUIREMENTS OF THE *CONTRACTOR'S* DESIGN

Not applicable.

5.5 EQUIPMENT REQUIRED TO BE INCLUDED IN THE WORKS

Not applicable.

5.6 AS-BUILT DRAWINGS, OPERATING MANUALS AND MAINTENANCE SCHEDULES

Not applicable.

6. PROCUREMENT

6.1 PLANT AND MATERIALS

6.1.1 Quality

The *Contractor* performs a pressure test at 150% (248 bar) of the operating pressure of the cylinder for a duration of 30 minutes. In the event of a drop in pressure or any visible leaks during the test, the *Contractor* repairs and retest the cylinder until the test is passed.

6.1.2 Guarantee Inspection

Not applicable.

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6.1.3 Product Support

Not applicable.

6.1.4 Defects correction

Not applicable.

6.1.5 Plant & Materials provided “free issue” by the *Employer*

Not applicable.

6.1.6 *Contractor's* procurement of Plant and Materials

Not applicable. All Plant and Materials used to perform the *works* are procured by the *Contractor*.

6.1.7 Spares and consumables

All spares and consumables and spares are provided by the *Contractor*.

6.2 TESTS AND INSPECTIONS BEFORE DELIVERY

Not applicable.

6.3 MARKING PLANT AND MATERIALS OUTSIDE THE WORKING AREAS

Not applicable.

6.4 *CONTRACTOR'S* EQUIPMENT (INCLUDING TEMPORARY WORKS).

Not applicable, no special equipment to be procured by *Contractor* which may influence the progress of the *works*.

6.5 CATALOGUING REQUIREMENTS BY THE *CONTRACTOR*

Not applicable.

7. CONSTRUCTION

Not applicable

7.1 TEMPORARY WORKS, SITE SERVICES & CONSTRUCTION CONSTRAINTS

7.1.1 *Contractor's* equipment

Contractor keeps record of all equipment used.

7.1.2 Equipment provided by the *Employer*

Employer provides no equipment related to perform the *works*.

7.1.3 Site services and facilities

Not applicable.

7.1.4 Facilities provided by the *Contractor*

Not applicable.

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7.1.5 Existing premises, inspection of adjoining properties and checking work of Others

Not applicable.

7.1.6 Survey control and setting out of the works

Not applicable.

7.1.7 Excavations and associated water control

Not applicable.

7.1.8 Underground services, other existing services, cable and pipe trenches and covers

Not applicable

7.1.9 Sequences of construction or installation

Not applicable.

7.2 COMPLETION, TESTING, COMMISSIONING AND CORRECTION OF DEFECTS

7.2.1 Work to be done by the Completion Date

	Item of work	To be completed by
	1 off hydraulic cylinder to be collected, refurbished, and delivered to site	On completion date

7.2.2 Use of the works before Completion has been certified

Not applicable.

7.2.3 Materials, facilities and samples for tests and inspections

Not applicable.

7.2.4 Commissioning

Not applicable.

7.2.5 Start-up procedures required to put the works into operation

Not applicable.

7.2.6 Take over procedures

Take over at time of Completion.

7.2.7 Access given by the *Employer* for correction of Defects

In the event of a defect the *Employer* allows the *Contractor* access to the works to repair a defect.

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7.2.8 Training and technology transfer

Not applicable.

7.2.9 Operational maintenance after Completion

Not applicable.

8. PLANT AND MATERIALS STANDARDS AND WORKMANSHIP

8.1 INVESTIGATION, SURVEY AND SITE CLEARANCE

Not applicable.

8.2 BUILDING WORKS

Not applicable.

8.3 CIVIL ENGINEERING AND STRUCTURAL WORKS

Not applicable.

8.4 ELECTRICAL & MECHANICAL ENGINEERING WORKS

Not applicable.

8.5 PROCESS CONTROL AND IT WORKS

Not applicable.

9. LIST OF DRAWINGS

9.1 DRAWINGS ISSUED BY THE *EMPLOYER*

This is the list of drawings issued by the *Employer* at or before the Contract Date and which apply to this contract.

Note: Some drawings may contain both Works Information and Site Information.


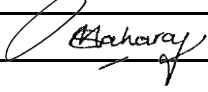
Drawing number	Revision	Title
0.48/3253	2	Hydraulic Cylinder
0.48/2914	1	Emergency Gates Linking Rods General Arrangement

10. ACCEPTANCE

This document has been seen and accepted by:

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Name & Surname	Designation	Signature
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S Maharaj	Peaking Engineering Manager	

11. REVISIONS

Date	Rev.	Compiler	Remarks

12. DEVELOPMENT TEAM

The following people were involved in the development of this document:

I.C. Meyer

13. ACKNOWLEDGEMENTS

None

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