

SCOPE OF WORK

GENERATION -KRIEL POWER STATION

Title: Kriel Power Station – 18 kV

Reciprocating Compressor Refurbishment and Supply of Spares on an "As and When Required" Basis for a Period

of 3 years

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1. INTRODUCTION

The Kriel Power station 18kV generator breaker uses compressed air to pneumatically operate the GCB's (generator circuit breakers). The compressed air is supplied from compressor plants that are located in unit 1 and 4 respectively. The compressor has to be serviced in accordance with OEM's specification to ensure the reliability of the 18kV compressor plant.

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2. SUPPORTING CLAUSES

2.1 SCOPE

This document covers the engineering requirements, in the form of a scope of work, for the maintenance and breakdown repairs of the following "J.A Becker & Sohne" reciprocating compressors over a 5 year period:

- 3 x SVD 600/250 reciprocating compressors
- 2 x SVC 600/250 reciprocating compressors

2.1.1 Purpose

The purpose of the document is to provide technical governance in terms of a scope of work for all *Works* that needs to be executed to maintain the reciprocating compressors at Kriel Power Station over a 5 year period. The scope is aligned with KPS's compressed air plant's maintenance philosophy.

2.1.2 Applicability

This document is applicable to Kriel Power Station.

2.2 NORMATIVE/INFORMATIVE REFERENCES

2.2.1 Normative

[1] ISO 9001 Quality Management Systems.

[2] Osh Act; Act 85 of 93 Occupational Health and Safety Act; Act 85 of 93

2.2.2 Informative

N/A.

2.3 DEFINITIONS

N/A

2.3.1 Disclosure Classification

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

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2.4 ABBREVIATIONS

Table 1: Abbreviations

Definition	Description
GCB	Generator Circuit Breaker
MMD	Mechanical Maintenance Department
OEM	Original Equipment Manufacturer
kV	Kilo Volts
KPS	Kriel Power Station
N/A	Not Applicable
QTY	Quantity

2.5 ROLES AND RESPONSIBILITIES

Roles and responsibilities are as follows:

- The compressed air system engineer is to draft the scope of work.
- The compressed air system engineer is to circulate the draft to all relevant stakeholders for comments.
- The compressed air system engineer is to consolidate all comments received and compile the scope of work.

2.6 PROCESS FOR MONITORING

Relevant procurement and tender evaluation procedures will be used to monitor the process.

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3. THE WORKS

The *Works* is inclusive of all activities necessary to service and refurbish the reciprocating compressors, in line with the OEM's requirement.

3.1 BACKGROUND

The Kriel Power Station 18kV generator breaker uses compressed air to pneumatically operate the GCB's (generator circuit breakers). The compressed air is supplied from compressor plants that are located in unit 1 and 4 respectively. Each compressed air plant consists of two reciprocating compressors that supplies compressed air at 250 bars to the plant.

3.2 DESCRIPTION OF THE WORKS

3.2.1 Refurbishment/Service/Overhaul

The *Works* entails all the *Works* necessary to maintain the following compressors, according to KPS's maintenance philosophy, over a 3-year period:

- 3 x SVD 600/250 reciprocating compressors
- 2 x SVC 600/250 reciprocating compressors

The services required will be classified as:

- Minor services (2000 hrs)
- Major service (4000 hrs)
- Overhaul (8000 hrs)
- Revision service

The *Contractor* will be allocated a workspace in the *Employer*'s workshop for servicing/overhauling the compressors. For *Works* that requires removal of the compressor from the plant to the workshop the *Contractor* will remove the compressor and when the *Works* is completed re-install the compressor on site. For minor a service that does not require removal of the compressor, the *Contractor* will perform the *Works* on the compressor in the plant. All parts that the *Contractor* replaces will be presented to the

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Employer as proof of execution of the *Works*. All work will only be executed once a QCP presented by the *Contractor* to the *Employer* has been accepted.

When a compressor breaks down the *Contractor* will assess the compressor and present a breakdown report to the system engineer. The compressor will be repaired through selection of the activities from Table 6 as part of a revision service.

When a *Contractor* overhauled a compressor, the *Contractor* will guarantee the performance of the compressor in between service intervals.

Table 2 contains the quantity of each service required over a 3-year period.

Table 2: Summary service required over a 3-year period.

Service Required	Quantity
SVD 600/250 Revision	3
SVC 600/250 Revision	2
SVD 600/250 2000 hrs service	20
SVC 600/250 2000 hrs service	20
SVD 600/250 4000 hrs service	10
SVC 600/250 4000 hrs service	10
SVD 600/250 8000 hrs service	10
SVC 600/250 8000 hrs service	10

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The Contractor will perform the activities as listed in tables below at each maintenance interval.

The Table below lists the activities for a 2000 hour service.

Table 3: 2000 hrs Maintenance Requirements

Component	COMPONENT	MAINTENANCE	QTY.	QTY.	COMMENT
No.		ACTIVITY	svc	SVD	
			600/250	600/250	
1	Filter Cartridge	Replace	1	1	-
2	Suction Valve 3 rd	Replace	1	1	-
	Stage				
3	Pressure Valve	Replace	1	1	-
	3 rd Stage				
4	Suction Valve 4 th	Replace	1	-	-
	Stage				
5	Pressure Valve	Replace	1	-	-
	4 th Stage				
6	Concentric Valve	Replace	-	1	-
	4 th Stage				
7	Gasket Ring UA	Replace	4	4	-
	16 x 10 x 1,5				
	USIT				
8	Cover Gasket 1st	Replace	2	2	-
	+ 2 nd stage				
9	Cover Gasket 3 rd	Replace	2	2	-
	+ 4 th stage				
10	Discharge Valve	Replace	2	2	-
	Piston coupling				
	3+4 stage				

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11	Discharge Valve Piston coupling 1+2 stage	Replace	2	2	-	
12	O-ring 60 x 2.5	Replace	4	4	-	
13	O-ring 51 x 2.5	Replace	2	2	-	
14	Support Ring	Replace	2	2	-	
15	Filter Element	Replace	1	1	-	
16	O-Ring 74x 4	Replace	1	1	-	
17	O-Ring 10x 3	Replace	2	2	-	
18	Gasket Ring UA 16 x 10 x 1,5 USIT	Replace	1	1	-	
19	Cover Gasket	Replace	1	1	-	
20	Discharge Valve piston coupling	Replace	1	1	-	

The table below lists the activities for a 4000 hour service.

Table 4: 4000 hrs Service requirements

Component No.	COMPONENT	MAINTENANCE ACTIVITY	QTY. SVC 600/250	QTY. SVD 600/250	COMMENT
1	Suction Valve 1st Stage	Replace	1	1	-
2	Pressure Valve 1st Stage	Replace	1	1	-
3	Cylinder 2nd stage 60 diameter	Replace	1	1	-

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Suction Valve	Replace	1	1	-	
2nd Stage					
Pressure Valve	Replace	1	1	-	
2nd Stage					
Filter Cartridge	Replace	1	1	-	
Suction Valve 3 rd	Replace	1	1	-	
Stage					
Pressure Valve	Replace	1	1	-	
3 rd Stage					
Suction Valve 4 th	Replace	1	-	-	
Stage					
Pressure Valve	Replace	1	-	-	
4 th Stage					
Concentric Valve	Replace	-	1	-	
4 th Stage					
Gasket Ring UA	Replace	4	4	-	
16 x 10 x 1,5					
USIT					
Cover Gasket 1st	Replace	2	2	-	
+ 2 nd stage					
Cover Gasket 3 rd	Replace	2	2	-	
+ 4 th stage					
Discharge Valve	Replace	2	2	-	
Piston coupling					
3+4 stage					
Discharge Valve	Replace	2	2	-	
Piston coupling					
1+2 stage					
O-ring 60 x 2.5	Replace	4	4	-	
	Pressure Valve 2nd Stage Filter Cartridge Suction Valve 3rd Stage Pressure Valve 3rd Stage Suction Valve 4th Stage Pressure Valve 4th Stage Concentric Valve 4th Stage Gasket Ring UA 16 x 10 x 1,5 USIT Cover Gasket 1st + 2nd stage Cover Gasket 3rd + 4th stage Discharge Valve Piston coupling 3+4 stage Discharge Valve Piston coupling 1+2 stage	Pressure Valve 2nd Stage Filter Cartridge Suction Valve 3 rd Replace Stage Pressure Valve 3 rd Stage Replace Suction Valve 4 th Replace Stage Pressure Valve 4 th Stage Concentric Valve 4 th Stage Gasket Ring UA 16 x 10 x 1,5 USIT Cover Gasket 1 st + 2 nd stage Cover Gasket 3 rd + 4 th stage Discharge Valve Piston coupling 3+4 stage Discharge Valve Piston coupling 1+2 stage	Pressure Valve 2nd Stage Filter Cartridge Replace 1 Suction Valve 3rd Replace 1 Suction Valve 3rd Replace 1 Stage Pressure Valve Replace 1 Stage Suction Valve 4th Replace 1 Stage Pressure Valve Replace 1 Stage Pressure Valve Replace 1 Stage Pressure Valve Replace 1 Stage Concentric Valve Replace 1 Gasket Ring UA Replace 4 16 x 10 x 1,5 USIT Cover Gasket 1st Replace 2 + 2nd stage Cover Gasket 3rd Replace 2 + 4th stage Discharge Valve Piston coupling 3+4 stage Discharge Valve Piston coupling 1+2 stage	2nd Stage Pressure Valve Replace 1	2nd Stage

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18	O-ring 51 x 2.5	Replace	2	2	-	
19	Support Ring	Replace	2	2	-	
20	Filter Element	Replace	1	1	-	
21	O-Ring 74x 4	Replace	1	1	-	
22	O-Ring 10x 3	Replace	2	2	-	
23	Gasket Ring UA 16 x 10 x 1,5 USIT	Replace	1	1	-	
24	Cover Gasket	Replace	1	1	-	
25	Discharge Valve piston coupling	Replace	1	1	-	

The Table below lists the activities for an 8000-hour service.

Table 5: 8000 hrs Maintenance Requirements

Component	COMPONENT	MAINTENANCE	QTY.	QTY.	COMMENT
No.		ACTIVITY	svc	SVD	
			600/250	600/250	
1	Oil Pressure	Replace	1	1	-
	Switch				
2	Gasket Ring U 14	Replace	1	1	-
	x 18,7 x 1,5 USIT				
3	Coupling Buffer	Replace	10	10	-
4	Connecting rod	Replace	3	3	-
	coupler 1,3 and				
	4 th stage				
5	Connecting rod	Replace	1	1	-
	coupling 2 nd				
	stage				

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6	Piston coupling	Replace	1	1	-	
	1st stage 110 diameter					
7	Piston coupling	Replace	1	1	-	
	2nd stage 60					
	diameter					
8	Piston coupling	Replace	1	1	-	
	3rd stage 27					
	diameter					
9	Piston coupling	Replace	1	1	-	
	4th stage 16					
	diameter					
10	Cylinder 1st stage	Replace	1	1	-	
	110 diameter					
11	Suction Valve 1st	Replace	1	1	-	
	Stage					
12	Pressure Valve	Replace	1	1	-	
	1st Stage					
13	Cylinder 2nd	Replace	1	1	-	
	stage 60					
	diameter					
14	Suction Valve	Replace	1	1	-	
	2nd Stage					
15	Pressure Valve	Replace	1	1	-	
	2nd Stage					
16	Filter Cartridge	Replace	1	1	-	
17	Cylinder 90	Replace	1	1	-	
	diameter					
18	Cylinder 4 th stage	Replace	1	1	-	
	16 diameter					

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19	Suction Valve 3 rd Stage	Replace	1	1	-
20	Pressure Valve 3 rd Stage	Replace	1	1	-
21	Suction Valve 4 th Stage	Replace	1	-	-
22	Pressure Valve 4 th Stage	Replace	1	-	-
23	Concentric Valve 4 th Stage	Replace	-	1	-
24	Fan wheel coupling	Replace	1	1	-
25	Gasket Ring UA 16 x 10 x 1,5 USIT	Replace	4	4	-
26	Cover Gasket 1 st + 2 nd stage	Replace	2	2	-
27	Cover Gasket 3 rd + 4 th stage	Replace	2	2	-
28	Discharge Valve Piston coupling 3+4 stage	Replace	2	2	-
29	Discharge Valve Piston coupling 1+2 stage	Replace	2	2	-
30	Solenoid 220V, 50 HZ	Replace	1	1	-
31	O-ring 60 x 2.5	Replace	4	4	-
32	O-ring 51 x 2.5	Replace	2	2	-

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33	Support Ring	Replace	2	2	-
34	Filter Element	Replace	1	1	-
35	O-Ring 74x 4	Replace	1	1	-
36	O-Ring 10x 3	Replace	2	2	-
37	Gasket Ring UA 16 x 10 x 1,5 USIT	Replace	1	1	-
38	Cover Gasket	Replace	1	1	-
39	Discharge Valve piston coupling	Replace	1	1	-
40	Gasket set coupling	Replace	1	1	-
41	Safety valve 1 st stage 6 bar	Calibrate	1	1	To be calibrated with certificate and seal
42	Safety valve 2 nd stage 25 bar	Calibrate	1	1	To be calibrated with certificate and seal
43	Safety valve 3rd stage 70 bar	Calibrate	1	1	To be calibrated with certificate and seal
44	Safety valve 4th stage 270 bar	Calibrate	1	1	To be calibrated with certificate and seal

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The Table below lists the activities for a revision service.

Table 6: Compressor Revision Requirement

Component	COMPONENT	MAINTENANCE	QTY.	QTY.	COMMENT
No.		ACTIVITY	svc	SVD	
			600/250	600/250	
1	Oil Pressure	Replace	1	1	-
	Switch				
2	Gasket Ring U 14	Replace	1	1	-
	x 18,7 x 1,5 USIT				
3	Coupling Buffer	Replace	10	10	-
4	Connecting rod	Replace	3	3	-
	coupler 1,3 and				
	4 th stage				
5	Connecting rod	Replace	1	1	-
	coupling 2 nd				
	stage				
6	Piston coupling	Replace	1	1	-
	1st stage 110				
	diameter				
7	Piston coupling	Replace	1	1	-
	2nd stage 60				
	diameter				
8	Piston coupling	Replace	1	1	-
	3rd stage 27				
	diameter				
9	Piston coupling	Replace	1	1	-
	4th stage 16				
	diameter				
10	Cylinder 1 st stage	Replace	1	1	-
	110 diameter				

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11	Suction Valve 1st Stage	Replace	1	1	-
12	Pressure Valve 1st Stage	Replace	1	1	-
13	Cylinder 2nd stage 60 diameter	Replace	1	1	-
14	Suction Valve 2nd Stage	Replace	1	1	-
15	Pressure Valve 2nd Stage	Replace	1	1	-
16	Filter Cartridge	Replace	1	1	-
17	Cylinder 90 diameter	Replace	1	1	-
18	Cylinder 4 th stage 16 diameter	Replace	1	1	-
19	Suction Valve 3 rd Stage	Replace	1	1	-
20	Pressure Valve 3 rd Stage	Replace	1	1	-
21	Suction Valve 4 th Stage	Replace	1	-	-
22	Pressure Valve 4 th Stage	Replace	1	-	-
23	Concentric Valve 4th Stage	Replace	-	1	-
24	Fan wheel coupling	Replace	1	1	-

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25	Gasket Ring UA 16 x 10 x 1,5	Replace	4	4	-
	USIT				
26	Cover Gasket 1st	Replace	2	2	-
	+ 2 nd stage				
27	Cover Gasket 3 rd	Replace	2	2	-
	+ 4 th stage				
28	Discharge Valve	Replace	2	2	-
	Piston coupling				
	3+4 stage				
29	Discharge Valve	Replace	2	2	-
	Piston coupling 1+2 stage				
00					
33	Solenoid 220V, 50 HZ	Replace	1	1	-
34	O-ring 60 x 2.5	Replace	4	4	-
35	O-ring 51 x 2.5	Replace	2	2	-
36	Support Ring	Replace	2	2	-
37	Safety valve 1st		1	1	To be calibrated with
	stage 6 bar				certificate and seal
38	Safety valve 2 nd		1	1	To be calibrated with
	stage 25 bar				certificate and seal
39	Safety valve 3rd		1	1	To be calibrated with
	stage 70 bar				certificate and seal
40	Safety valve 4th				To be calibrated with
	stage 270 bar				certificate and seal
37	Filter Element	Replace	1	1	-
38	O-Ring 74x 4	Replace	1	1	-
39	O-Ring 10x 3	Replace	2	2	-

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40	Gasket Ring UA	Replace	1	1	-
	16 x 10 x 1,5 -				
	USIT				
41	Cover Gasket	Replace	1	1	-
42	Discharge Valve piston coupling	Replace	1	1	-
43	Gasket set coupling	Replace	1	1	-

3.2.2 Supply and Delivery of Spares

1. The *Contractor* shall supply and deliver, as and when required, the following spares:

Table 7: List of Spares to be supplied.

SPARE DESCRIPTION	STOCK ITEM NO	QUANTITY	UNIT OF MEASURE
SVD 600/250 compressor complete	659790	1	Each
SVD 600/250 2000 hrs service kit	0611729	20	Each
SVC 600/250 2000 hrs service kit	0611730	20	Each
SVD 600/250 4000 hrs service kit	0611728	10	Each
SVC 600/250 4000 hrs service kit	0611725	10	Each
SVD 600/250 8000 hrs service kit	0611727	10	Each
SVC 600/250 8000 hrs service kit	0611726	10	Each

- 2. The spares shall be delivered to the *Employer's* site for storage.
- 3. The spares shall be of the compressor model and OEM.
- 4. The spares shall be packaged, handled, transported and stored as per the OEM procedures.
- 5. Quality control shall be performed prior to acceptance of the spares.

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6. The *Employer* will issue the required items to the *Contractor* to perform the required work.

3.2.3 Site Acceptance Test

The *Contractor* will return all parts removed during the service to the *Employer*. The *Contractor* will set up the serviced compressor in the MMD *Works*hop. The compressor will be tested in the presence of the *Employers*' representative and as a minimum the following parameter will be evaluated /verified:

- Verify pressure on each compressor stage (1st stage 2.5 bars, 2nd stage 16 bar,3rd stage 52 bars and 4th stage 250 bar)
- Verify that the off-loaders are draining and that the solenoid valve is functional.
- Verify that the oil pressure is between 3-4 bars.
- Verify that the low oil pressure trip function is operating

3.2.4 Service Reports

Upon completion of other service/overhauling Works the Contractor shall:

- 1. Compile and submit as signed service report in a hardcopy format:
 - The report shall state the condition of each part removed with their serial number.
 - The report shall include images of the replaced parts.
 - The report shall state all the activities performed.
 - The report shall list all the spares used with their serial number.
- 2. The report shall be accompanied by a Quality Control Procedure.

4. REVISIONS

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Date	Rev.	Compiler	Remarks
September 2021	1	DC Human	Draft Issued for Comments
June 2022	2	FS Mabuza	Second revision- comments from squad check, added list of spares supply and delivery section.

5. DEVELOPMENT TEAM

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

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