



NEC 3 Engineering & Construction Contract

Between **ESKOM HOLDINGS SOC Ltd**
(Reg No. 2002/015527/30)

and

(Reg No. _____)

for **Control Air Compressor System Upgrade at
Majuba Power Station**

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ENQUIRY No. MPGXC006691R1

Part C1: Agreements & Contract Data

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C1.1 Form of Offer & Acceptance

Offer

The *Employer*, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:

Control Air Compressor System Upgrade at Majuba Power Station

The tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance the tenderer offers to perform all of the obligations and liabilities of the *Contractor* under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the *conditions of contract* identified in the Contract Data.

Option A	The offered total of the Prices exclusive of VAT is	R
	Value Added Tax @ 15% is	R
	The offered total of the amount due inclusive of VAT is ¹	R
	(in words)	

This Offer may be accepted by the *Employer* by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, whereupon the tenderer becomes the party named as the *Contractor* in the *conditions of contract* identified in the Contract Data.

Signature(s)

Name(s)

Capacity

**For the
tenderer:**

(Insert name and address of organisation)

Name &
signature of
witness

Date

Tenderer's CIDB registration number (applicable)

¹ This total is required by the *Employer* for budgeting purposes only. Actual amounts due will be assessed in terms of the *conditions of contract*.

Acceptance

By signing this part of this Form of Offer and Acceptance, the *Employer* identified below accepts the tenderer's Offer. In consideration thereof, the *Employer* shall pay the *Contractor* the amount due in accordance with the *conditions of contract* identified in the Contract Data. Acceptance of the tenderer's Offer shall form an agreement between the *Employer* and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part C1	Agreements and Contract Data, (which includes this Form of Offer and Acceptance)
Part C2	Pricing Data
Part C3	Scope of Work: Works Information
Part C4	Site Information

and drawings and documents (or parts thereof), which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the *Employer* during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The tenderer shall within two weeks of receiving a completed copy of this agreement, including the Schedule of Deviations (if any), contact the *Employer's* agent (whose details are given in the Contract Data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the *conditions of contract* identified in the Contract Data at, or just after, the date this agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy signed between them of this document, including the Schedule of Deviations (if any).

Unless the tenderer (now *Contractor*) within five working days of the date of such receipt notifies the *Employer* in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the Parties.

Signature(s)

Name(s)

Capacity

**for the
Employer**

(Insert name and address of organisation)

Name &
signature of
witness

Date

Note: If a tenderer wishes to submit alternative tenders, use another copy of this Form of Offer and Acceptance.

Schedule of Deviations to be completed by the *Employer* prior to contract award

No.	Subject	Details
1		
2		
3		
4		
5		
6		
7		

By the duly authorised representatives signing this Schedule of Deviations below, the *Employer* and the tenderer agree to and accept this Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules, as well as any confirmation, clarification or changes to the terms of the Offer agreed by the tenderer and the *Employer* during this process of Offer and Acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Form shall have any meaning or effect in the contract between the parties arising from this Agreement.

	For the tenderer:	For the <i>Employer</i>
Signature
Name
Capacity
On behalf of	(Insert name and address of organisation)	(Insert name and address of organisation)
Name & signature of witness
Date

C1.2 ECC3 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data
1	General	
	The <i>conditions of contract</i> are the core clauses and the clauses for main Option	
	dispute resolution Option	A: Priced contract with activity schedule
	and secondary Options	W1: Dispute resolution procedure
		X1 Price adjustment for inflation
		X2 Changes in the law
		X3 Multiple Currencies
		X5 Sectional Completion
		X7: Delay damages
		X16: Retention
		X17: Low performance damages
		X18: Limitation of liability
		Z: <i>Additional conditions of contract</i>
	of the NEC3 Engineering and Construction Contract, April 2013 (ECC3)	
10.1	The <i>Employer</i> is (Name):	Eskom Holdings SOC Ltd (reg no: 2002/015527/30), a state owned company incorporated in terms of the company laws of the Republic of South Africa
	Address	Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg
10.1	The <i>Project Manager</i> is: (Name)	Karin Smit
	Address	Majuba Power Station Private Bag 9001 Volkstrust 2470
	Tel	+2717 799 3595
	Fax	+2786 665 9052
	e-mail	Bronkhce@eskom.co.za

10.1	The <i>Supervisor</i> is: (Name)	TBC	
	Address		
	Tel No.		
	Fax No.		
	e-mail		
11.2(13)	The <i>works</i> are	Control Air Compressor System Upgrade at Majuba Power Station	
11.2(14)	The following matters will be included in the Risk Register	<div>1. Delays in commissioning, due to software changes and optimisation.</div> <div>2. Outage movements.</div> <div>3. Other relevant issues identified by the Employer or Contractor.</div> <div>A Risk Register is to be maintained by the Supplier throughout the contract period.</div>	
11.2(15)	The <i>boundaries of the site</i> are	Control Air plant at Majuba Power Station	
11.2(16)	The Site Information is in	Part 4: Site Information	
11.2(19)	The Works Information is in	Part 3: Scope of Work and all documents and drawings to which it makes reference.	
12.2	The <i>law of the contract</i> is the law of	the Republic of South Africa	
13.1	The <i>language of this contract</i> is	English	
13.3	The <i>period for reply</i> is	3 days	
2	The Contractor's main responsibilities	Data required by this section of the core clauses is provided by the Contractor in Part 2 and terms in italics used in this section are identified elsewhere in this Contract Data.	
3	Time		
11.2(3)	The <i>completion date</i> for the whole of the <i>works</i> is	31 March 2025	
30.1	The provisional <i>access dates</i> are:	<div>Part of the Site</div> <div><div>1</div><div>Unit 4</div></div> <div><div>2</div><div>Unit 5</div></div> <div><div>3</div><div>Unit 1</div></div> <div><div>4</div><div>Unit 6</div></div> <div><div>5</div><div>Unit 2</div></div> <div><div>6</div><div>Unit 3</div></div> <div><div>7</div><div>Remainder of the Works</div></div>	<div>Date</div> <div><div>2022/12/08</div></div> <div><div>2022/12/09</div></div> <div><div>2023/03/01</div></div> <div><div>2023/04/07</div></div> <div><div>2024/04/01</div></div> <div><div>2024/05/09</div></div> <div><div>2023/06/01</div></div>

31.1	The <i>Contractor</i> is to submit a first programme for acceptance within	2 weeks from the <i>starting date</i>.
31.2	The <i>starting date</i> is	01 September 2022 or as soon as possible
32.2	The <i>Contractor</i> submits revised programmes at intervals no longer than	1 week However, the <i>Employer</i> may request more frequent programme update submissions at any time during the works, as and when necessary, at no additional cost.
35.1	The <i>Employer</i> is not willing to take over the <i>works</i> before the Completion Date.	Take over for the sections of the <i>works</i> identified is in accordance with the sectional completion dates. Take-over of the whole of the <i>works</i> is in accordance with the <i>completion date</i>.
4	Testing and Defects	
42.2	The <i>defects date</i> is	52 weeks after Completion of each Section of the <i>works</i>.
43.2	The <i>defect correction period</i> is	2 weeks
5	Payment	
50.1	The <i>assessment interval</i> is	between the 25th day of each successive month.
51.1	The <i>currency of this contract</i> is the	South African Rand.
51.2	The period within which payments are made is	either 30 days or 14 days, as applicable.
51.4	The <i>interest rate</i> is	<p>the publicly quoted prime rate of interest (calculated on a 365 day year) charged from time to time by the Standard Bank of South Africa Limited (as certified, in the event of any dispute, by any manager of such bank, whose appointment it shall not be necessary to prove) for amounts due in Rands and</p> <p>(ii) the LIBOR rate applicable at the time for amounts due in other currencies. LIBOR is the 6 months London Interbank Offered Rate quoted under the caption "Money Rates" in The Wall Street Journal for the applicable currency or if no rate is quoted for the currency in question then the rate for United States Dollars, and if no such rate appears in The Wall Street Journal then the rate as quoted by the Reuters Monitor Money Rates Service (or such service as may replace the Reuters Monitor Money Rates Service) on the due date for the payment in question, adjusted <i>mutatis mutandis</i> every 6 months thereafter and as certified, in the event of any dispute, by any manager employed in the foreign exchange department of The Standard Bank of South Africa Limited, whose appointment it shall not be necessary to prove.</p>

6	Compensation events	
60.1(13)	<p>The place where weather is to be recorded is:</p> <p>The <i>weather measurements</i> to be recorded for each calendar month are,</p> <p>The <i>weather measurements</i> are supplied by</p> <p>The <i>weather data</i> are the records of past <i>weather measurements</i> for each calendar month which were recorded at:</p> <p>and which are available from:</p>	<p>Majuba Power Station</p> <p>the cumulative rainfall (mm).</p> <p>the number of days with rainfall more than 10 mm.</p> <p>the number of days with minimum air temperature less than 0 degrees Celsius.</p> <p>the number of days with snow lying at 09:00 hours South African Time.</p> <p>and these measurements:</p> <p>South African Weather Bureau</p> <p>Volkstrust</p> <p>the South African Weather Bureau and included in Annexure A to this Contract Data provided by the <i>Employer</i></p>
60.1(13)	Assumed values for the ten year return <i>weather data</i> for each <i>weather measurement</i> for each calendar month are:	As stated in Part 4, Site Information, section 8.10 - Precipitation
7	Title	There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.
8	Risks and insurance	
80.1	These are additional <i>Employer's</i> risks	None
84.1	The <i>Contractor</i> provides these additional insurances:	whatever the <i>Contractor</i> deems necessary.
84.2	The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the <i>works</i> , Plant, Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the <i>Contractor</i>) caused by activity in connection with this contract for any one event is	whatever the <i>Contractor</i> deems necessary in addition to that provided by the <i>Employer</i>, plus the amount of the deductibles in the amount of R 500 000.00 (Five hundred thousand Rand) payable in terms of the <i>Employer's</i> Contract ALL Risk Insurance Policy.
9	Termination	There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.

10	Data for main Option clause			
A	Priced contract with activity schedule	There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.		
11	Data for Option W1			
W1.1	The <i>Adjudicator</i> is	the person selected from the ICE-SA Division (or its successor body) of the South African Institution of Civil Engineering Panel of Adjudicators by the Party intending to refer a dispute to him. (see www.ice-sa.org.za). If the Parties do not agree on an Adjudicator, the Adjudicator will be appointed by the Arbitration Foundation of Southern Africa (AFSA).		
W1.2(3)	The <i>Adjudicator nominating body</i> is:	the Chairman of ICE-SA a joint Division of the South African Institution of Civil Engineering and the London Institution of Civil Engineers. (See www.ice-sa.org.za) or its successor body.		
W1.4(2)	The <i>tribunal</i> is:	arbitration.		
W1.4(5)	The <i>arbitration procedure</i> is	the latest edition of Rules for the Conduct of Arbitrations published by The Association of Arbitrators (Southern Africa) or its successor body.		
	The place where arbitration is to be held is	Johannesburg, South Africa		
	The person or organisation who will choose an arbitrator	the Chairman for the time being or his nominee of the Association of Arbitrators (Southern Africa) or its successor body.		
	- if the Parties cannot agree a choice or			
	- if the arbitration procedure does not state who selects an arbitrator, is			
12	Data for secondary Option clauses			
X1	Price adjustment for inflation			
X1.1(a)	The <i>base date</i> for indices is	September 2021		
X1.1(c)	The proportions used to calculate the Price Adjustment Factor are:	Proportion	Linked to index for	Index prepared by
		0.24	Labour	Labour - Seifsa Table C3(a) : Actual Labour cost (field force) where subsistence allowance is paid
		0.07	Electrical	Material - Seifsa Table G-1: Electrical Engineering
		0.10	Mechanical	Material - Seifsa Table G-1: Mechanical Engineering

		0.44	Civil Eng	Material - Seifsa Table G3: Civil Engineering
		0.05	Transport	Transport - Seifsa Table L2A : Road Freight costs
		0.10	Non-adjustable	
		Total		
X2	Changes in the law	There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.		
X5	Sectional Completion			
X5.1	The <i>completion date</i> for each <i>section</i> of the <i>works</i> is:	Section	Description	Completion date
		1	Unit 1	As per the Accepted Programme
		2	Unit 2.	As per the Accepted Programme
		3	Unit 3	As per the Accepted Programme
		4	Unit 4	As per the Accepted Programme
		5	Unit 5	As per the Accepted Programme
		6	Unit 6	As per the Accepted Programme
		3	Common Plant.	As per the Accepted Programme
X5 & X7	Sectional Completion and delay damages used together			
X7.1 X5.1	Delay damages for late Completion of the <i>sections</i> of the <i>works</i> are:	section	Description	Amount per day
		1	Unit 1 Compressor Train	R25 000
		2	Unit 2 Compressor Train	R25 000
		3	Unit 3 Compressor Train	R25 000
		4	Unit 4 Compressor Train	R25 000
		5	Unit 5 Compressor Train	R25 000
		6	Unit 6 Compressor Train	R25 000

	Remainder of the <i>works</i>		R25 000
	The total delay damages payable by the <i>Contractor</i> does not exceed:	R 3 000 000.00	
X15	Limitation of the <i>Contractor's</i> liability for his design to reasonable skill & care	There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.	
X16	Retention		
X16.1	The <i>retention percentage</i> is	2.5% which is applicable to the fulfilment of the SDL obligations	
	The <i>retention free amount</i> is	R0.00	
X17	Low performance damages		
X17.1	The amounts for low performance damages are:	Amount R 15 000.00 per incident R 15 000.00 per incident R 15 000.00 per incident	Performance level Any of the new compressors does not achieve Pressure of 700 kPa(g) when in service Any of the new compressors does not achieve a dew point: of minus (-) 40 °C PDP, max oil content of < 0.1mg/m ³ and max particle size of < 1micron when in service The throttle and natural surge test does not meet the design criteria of the compressor design performance curve.
X18	Limitation of liability		
X18.1	The <i>Contractor's</i> liability to the <i>Employer</i> for indirect or consequential loss is limited to:	R0.0 (zero Rand)	
X18.2	For any one event, the <i>Contractor's</i> liability to the <i>Employer</i> for loss of or damage to the <i>Employer's</i> property is limited to:	the amount of the deductibles relevant to the event described in the insurance policy format selected in the data for clause 84.1 above, which policy is available on request from Eskom Group Insurance	
X18.3	The <i>Contractor's</i> liability for Defects due to his design which are not listed on the Defects Certificate is limited to	The greater of <ul style="list-style-type: none"> the total of the Prices at the Contract Date and the amounts excluded and unrecoverable from the <i>Employer's</i> assets policy for correcting the Defect (other than the resulting physical damage which is not excluded) plus R25M (Twenty five Million Rand) first amount payable in terms of the <i>Employer's</i> assets policy. 	
X18.4	The <i>Contractor's</i> total liability to the <i>Employer</i> for all matters arising under or in connection with this contract, other than excluded matters, is limited to:	the total of the Prices other than for the additional excluded matters.	

		<p>The Contractor's total liability for the additional excluded matters is not limited.</p> <p>The additional excluded matters are amounts for which the Contractor is liable under this contract for</p> <ul style="list-style-type: none"> • Defects due to his design which arise before the Defects Certificate is issued, • Defects due to manufacture and fabrication outside the Site, • loss of or damage to property (other than the works, Plant and Materials), • death of or injury to a person and • infringement of an intellectual property right.
X18.5	The <i>end of liability date</i> is	<p>(i) Seven (7) years after the <i>defects date</i> for latent Defects and</p> <p>(ii) the date on which the liability in question prescribes in accordance with the Prescription Act No. 68 of 1969 (as amended or in terms of any replacement legislation) for any other matter.</p> <p>A latent Defect is a Defect, which would not have been discovered on reasonable inspection by the Employer or the Supervisor before the <i>defects date</i>, without requiring any inspection not ordinarily carried out by the Employer or the Supervisor during that period. If the Employer or the Supervisor do undertake any inspection over and above the reasonable inspection, this does not place a greater responsibility on the Employer or the Supervisor to have discovered the Defect.</p>
Z	The Additional conditions of contract are	
Z1	Cession delegation and assignment	
	Z1.1	The Contractor does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the Employer .
	Z1.2	Notwithstanding the above, the Employer may on written notice to the Contractor cede and delegate its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the Electricity Supply Industry.
Z2	Joint ventures	
	Z2.1	If the Contractor constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations then these persons or organisations are deemed to be jointly and severally liable to the Employer for the performance of this contract.

- Z2.2 Unless already notified to the *Employer*, the persons or organisations notify the *Project Manager* within two weeks of the Contract Date of the key person who has the authority to bind the *Contractor* on their behalf.
- Z2.3 The *Contractor* does not alter the composition of the joint venture, consortium or other unincorporated grouping of two or more persons without the consent of the *Employer* having been given to the *Contractor* in writing.

Z3 Change of Broad Based Black Economic Empowerment (B-BBEE) status

- Z3.1 Where a change in the *Contractor's* legal status, ownership or any other change to his business composition or business dealings results in a change to the *Contractor's* B-BBEE status, the *Contractor* notifies the *Employer* within seven days of the change.
- Z3.2 The *Contractor* is required to submit an updated verification certificate and necessary supporting documentation confirming the change in his B-BBEE status to the *Project Manager* within thirty days of the notification or as otherwise instructed by the *Project Manager*.
- Z3.3 Where, as a result, the *Contractor's* B-BBEE status has decreased since the Contract Date the *Employer* may either re-negotiate this contract or alternatively, terminate the *Contractor's* obligation to Provide the Works.
- Z3.4 Failure by the *Contractor* to notify the *Employer* of a change in its B-BBEE status may constitute a reason for termination. If the *Employer* terminates in terms of this clause, the procedures on termination are P1, P2 and P3 as stated in clause 92, and the amount due is A1 and A3 as stated in clause 93.

Z4 Confidentiality

- Z4.1 The *Contractor* does not disclose or make any information arising from or in connection with this contract available to Others. This undertaking does not, however, apply to information which at the time of disclosure or thereafter, without default on the part of the *Contractor*, enters the public domain or to information which was already in the possession of the *Contractor* at the time of disclosure (evidenced by written records in existence at that time). Should the *Contractor* disclose information to Others in terms of clause 25.1, the *Contractor* ensures that the provisions of this clause are complied with by the recipient.
- Z4.2 If the *Contractor* is uncertain about whether any such information is confidential, it is to be regarded as such until notified otherwise by the *Project Manager*.
- Z4.3 In the event that the *Contractor* is, at any time, required by law to disclose any such information which is required to be kept confidential, the *Contractor*, to the extent permitted by law prior to disclosure, notifies the *Employer* so that an appropriate protection order and/or any other action can be taken if possible, prior to any disclosure. In the event that such protective order is not, or cannot, be obtained, then the *Contractor* may disclose that portion of the information which it is required to be disclosed by law and uses reasonable efforts to obtain assurances that confidential treatment will be afforded to the information so disclosed.
- Z4.4 The taking of images (whether photographs, video footage or otherwise) of the *works* or any portion thereof, in the course of Providing the Works and after Completion, requires the prior written consent of the *Project Manager*. All rights in and to all such images vests exclusively in the *Employer*.
- Z4.5 The *Contractor* ensures that all his subcontractors abide by the undertakings in this clause.

Z5 Waiver and estoppel: Add to core clause 12.3:

- Z5.1 Any extension, concession, waiver or relaxation of any action stated in this contract by the Parties, the *Project Manager*, the *Supervisor*, or the *Adjudicator* does not constitute a waiver of rights, and does not give rise to an estoppel unless the Parties agree otherwise and confirm such agreement in writing.

Z6 Health, safety and the environment: Add to core clause 27.4

- Z6.1 The *Contractor* undertakes to take all reasonable precautions to maintain the health and safety of persons in and about the execution of the *works*. Without limitation the *Contractor*:
- accepts that the *Employer* may appoint him as the "Principal Contractor" (as defined and provided for under the Construction Regulations 2014 (promulgated under the Occupational Health & Safety Act 85 of 1993) ("the Construction Regulations") for the Site;
 - warrants that the total of the Prices as at the Contract Date includes a sufficient amount for proper compliance with the Construction Regulations, all applicable health & safety laws and regulations and the health and safety rules, guidelines and procedures provided for in this contract and generally for the proper maintenance of health & safety in and about the execution of *works*; and
 - undertakes, in and about the execution of the *works*, to comply with the Construction Regulations and with all applicable health & safety laws and regulations and rules, guidelines and procedures otherwise provided for under this contract and ensures that his Subcontractors, employees and others under the *Contractor's* direction and control, likewise observe and comply with the foregoing.
- Z6.2 The *Contractor*, in and about the execution of the *works*, complies with all applicable environmental laws and regulations and rules, guidelines and procedures otherwise provided for under this contract and ensures that his Subcontractors, employees and others under the *Contractor's* direction and control, likewise observe and comply with the foregoing.

Z7 Provision of a Tax Invoice and interest. Add to core clause 51

- Z7.1 Within one week of receiving a payment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice in accordance with the *Employer's* procedures stated in the Works Information, showing the amount due for payment equal to that stated in the payment certificate.
- Z7.2 If the *Contractor* does not provide a tax invoice in the form and by the time required by this contract, the time by when the *Employer* is to make a payment is extended by a period equal in time to the delayed submission of the correct tax invoice. Interest due by the *Employer* in terms of core clause 51.2 is then calculated from the delayed date by when payment is to be made.
- Z7.3 The *Contractor* (if registered in South Africa in terms of the companies Act) is required to comply with the requirements of the Value Added Tax Act, no 89 of 1991 (as amended) and to include the *Employer's* VAT number 4740101508 on each invoice he submits for payment.

Z8 Notifying compensation events

- Z8.1 Delete from the last sentence in core clause 61.3, "unless the *Project Manager* should have notified the event to the *Contractor* but did not".

Z9 Employer's limitation of liability

- Z9.1 The *Employer's* liability to the *Contractor* for the *Contractor's* indirect or consequential loss is limited to R0.00 (zero Rand)
- Z9.2 The *Contractor's* entitlement under the indemnity in 83.1 is provided for in 60.1(14) and the *Employer's* liability under the indemnity is limited.

Z10 Termination: Add to core clause 91.1, at the second main bullet point, fourth sub-bullet point, after the words "against it":

Z10.1 or had a business rescue order granted against it.

Z11 Addition to secondary Option X7 Delay damages (if applicable in this contract)

Z11.1 If the amount due for the *Contractor's* payment of delay damages reaches the limits stated in this Contract Data for Option X7 or Options X5 and X7 used together, the *Employer* may terminate the *Contractor's* obligation to Provide the Works using the same procedures and payment on termination as those applied for reasons R1 to R15 or R18 stated in the Termination Table.

Z12 Ethics

For the purposes of this Z-clause, the following definitions apply:

Affected Party	means, as the context requires, any party, irrespective of whether it is the <i>Contractor</i> or a third party, such party's employees, agents, or Subcontractors or Subcontractor's employees, or any one or more of all of these parties' relatives or friends,
Coercive Action	means to harm or threaten to harm, directly or indirectly, an Affected Party or the property of an Affected Party, or to otherwise influence or attempt to influence an Affected Party to act unlawfully or illegally,
Collusive Action	means where two or more parties co-operate to achieve an unlawful or illegal purpose, including to influence an Affected Party to act unlawfully or illegally,
Committing Party	means, as the context requires, the <i>Contractor</i> , or any member thereof in the case of a joint venture, or its employees, agents, or Subcontractor or the Subcontractor's employees,
Corrupt Action	means the offering, giving, taking, or soliciting, directly or indirectly, of a good or service to unlawfully or illegally influence the actions of an Affected Party,
Fraudulent Action	means any unlawfully or illegally intentional act or omission that misleads, or attempts to mislead, an Affected Party, in order to obtain a financial or other benefit or to avoid an obligation or incurring an obligation,
Obstructive Action	means a Committing Party unlawfully or illegally destroying, falsifying, altering or concealing information or making false statements to materially impede an investigation into allegations of Prohibited Action, and
Prohibited Action	means any one or more of a Coercive Action, Collusive Action Corrupt Action, Fraudulent Action or Obstructive Action.

Z12.1 A Committing Party may not take any Prohibited Action during the course of the procurement of this contract or in execution thereof.

Z12.2 The *Employer* may terminate the *Contractor's* obligation to Provide the Services if a Committing Party has taken such Prohibited Action and the *Contractor* did not take timely and appropriate action to prevent or remedy the situation, without limiting any other rights or remedies the *Employer* has. It is not required that the Committing Party had to have been found guilty, in court or in any other similar process, of such Prohibited Action before the *Employer* can terminate the *Contractor's* obligation to Provide the Services for this reason.

Z12.3 If the *Employer* terminates the *Contractor's* obligation to Provide the Services for this reason, the amounts due on termination are those intended in core clauses 92.1 and 92.2.

Z12.4 A Committing Party co-operates fully with any investigation pursuant to alleged Prohibited Action. Where the *Employer* does not have a contractual bond with the Committing Party, the *Contractor* ensures that the Committing Party co-operates fully with an investigation.

Z13 Insurance

Z 13.1 Replace core clause 84 with the following:

Insurance cover 84

- 84.1** When requested by a Party, the other Party provides certificates from his insurer or broker stating that the insurances required by this contract are in force.
- 84.2** The *Contractor* provides the insurances stated in the Insurance Table A.
- 84.3** The insurances provide cover for events which are at the *Contractor's* risk from the *starting date* until the earlier of Completion and the date of the termination certificate.

INSURANCE TABLE A

Insurance against	Minimum amount of cover or minimum limit of indemnity
Loss of or damage to the <i>works</i> , Plant and Materials	The replacement cost where not covered by the <i>Employer's</i> insurance The <i>Employer's</i> policy deductible, as at Contract Date, where covered by the <i>Employer's</i> insurance
Loss of or damage to Equipment	The replacement cost
Liability for loss of or damage to property (except the <i>works</i> , Plant and Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the <i>Contractor</i>) caused by activity in connection with this contract	<u>Loss of or damage to property</u> <u>Employer's property</u> The replacement cost where not covered by the <i>Employer's</i> insurance The <i>Employer's</i> policy deductible, as at Contract Date, where covered by the <i>Employer's</i> insurance <u>Other property</u> The replacement cost <u>Bodily injury to or death of a person</u> The amount required by applicable law
Liability for death of or bodily injury to employees of the <i>Contractor</i> arising out of and in the course of their employment in connection with this contract	The amount required by the applicable law

Z 13.2

Replace core clause 87 with the following:

The *Employer* provides the insurances stated in the Insurance Table B.

INSURANCE TABLE B

Insurance against or name of policy	Minimum amount of cover or minimum limit of indemnity
Assets All Risk	Per the insurance policy document
Contract Works insurance	Per the insurance policy document
Environmental Liability	Per the insurance policy document
General and Public Liability	Per the insurance policy document
Transportation (Marine)	Per the insurance policy document
Motor Fleet and Mobile Plant	Per the insurance policy document
Terrorism	Per the insurance policy document
Cyber Liability	Per the insurance policy document
Nuclear Material Damage and Business Interruption	Per the insurance policy document
Nuclear Material Damage Terrorism	Per the insurance policy document

Z14 Nuclear Liability

- Z14.1 The *Employer* is the operator of the Koeberg Nuclear Power Station (KNPS), a nuclear installation, as designated by the National Nuclear Regulator of the Republic of South Africa, and is the holder of a nuclear licence in respect of the KNPS.
- Z14.2 The *Employer* is solely responsible for and indemnifies the *Contractor* or any other person against any and all liabilities which the *Contractor* or any person may incur arising out of or resulting from nuclear damage, as defined in Act 47 of 1999, save to the extent that any liabilities are incurred due to the unlawful intent of the *Contractor* or any other person or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.
- Z14.3 Subject to clause Z14.4 below, the *Employer* waives all rights of recourse, arising from the aforesaid, save to the extent that any claims arise or liability is incurred due or attributable to the unlawful intent of the *Contractor* or any other person, or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.
- Z14.4 The *Employer* does not waive its rights provided for in section 30 (7) of Act 47 of 1999, or any replacement section dealing with the same subject matter.
- Z14.5 The protection afforded by the provisions hereof shall be in effect until the KNPS is decommissioned.

Z15 Asbestos

For the purposes of this Z-clause, the following definitions apply:

- AAIA** means approved asbestos inspection authority.
- ACM** means asbestos containing materials.

AL	means action level, i.e. a level of 50% of the OEL, i.e. 0.1 regulated asbestos fibres per ml of air measured over a 4 hour period. The value at which proactive actions is required in order to control asbestos exposure to prevent exceeding the OEL.
Ambient Air	means breathable air in area of work with specific reference to breathing zone, which is defined to be a virtual area within a radius of approximately 30cm from the nose inlet.
Compliance Monitoring	means compliance sampling used to assess whether or not the personal exposure of workers to regulated asbestos fibres is in compliance with the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.
OEL	means occupational exposure limit.
Parallel Measurements	means measurements performed in parallel, yet separately, to existing measurements to verify validity of results.
Safe Levels	means airborne asbestos exposure levels conforming to the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.
Standard	means the <i>Employer's</i> Asbestos Standard 32-303: Requirements for Safe Processing, Handling, Storing, Disposal and Phase-out of Asbestos and Asbestos Containing Material, Equipment and Articles.
SANAS	means the South African National Accreditation System.
TWA	means the average exposure, within a given workplace, to airborne asbestos fibres, normalised to the baseline of a 4 hour continuous period, also applicable to short term exposures, i.e. 10-minute TWA.

Z15.1 The *Employer* ensures that the Ambient Air in the area where the *Contractor* will Provide the Services conforms to the acceptable prescribed South African standard for asbestos, as per the regulations published in GNR 155 of 10 February 2002, under the Occupational Health and Safety Act, 1993 (Act 85 of 1993) ("Asbestos Regulations"). The OEL for asbestos is 0.2 regulated asbestos fibres per millilitre of air as a 4-hour TWA, averaged over any continuous period of four hours, and the short term exposure limit of 0.6 regulated asbestos fibres per millilitre of air as a 10-minute TWA, averaged over any 10 minutes, measured in accordance with HSG248 and monitored according to HSG173 and OESSM.

Z15.2 Upon written request by the *Contractor*, the *Employer* certifies that these conditions prevail. All measurements and reporting are effected by an independent, competent, and certified occupational hygiene inspection body, i.e. a SANAS accredited and Department of Employment and Labour approved AAIA. The *Contractor* may perform Parallel Measurements and related control measures at the *Contractor's* expense. For the purposes of compliance the results generated from Parallel Measurements are evaluated only against South African statutory limits as detailed in clause Z15.1. Control measures conform to the requirements stipulated in the AAIA-approved asbestos work plan.

Z15.3 The *Employer* manages asbestos and ACM according to the Standard.

Z15.4 In the event that any asbestos is identified while Providing the Services, a risk assessment is conducted and if so required, with reference to possible exposure to an airborne concentration of above the AL for asbestos, immediate control measures are implemented and relevant air monitoring conducted in order to declare the area safe.

Z15.5 The *Contractor's* personnel are entitled to stop working and leave the contaminated area forthwith until such time that the area of concern is declared safe by either Compliance Monitoring or an AAIA approved control measure intervention, for example, per the emergency asbestos work plan, if applicable.

-
- Z15.6 The *Contractor* continues to Provide the Services, without additional control measures presented, on presentation of Safe Levels. The contractually agreed dates to Provide the Services, including the Completion Date, are adjusted accordingly. The contractually agreed dates are extended by the notification periods required by regulations 3 and 21 of the Asbestos Regulations, 2001.
- Z15.7 Any removal and disposal of asbestos, asbestos containing materials and waste, is done by a registered asbestos contractor, instructed by the *Employer* at the *Employer's* expense, and conducted in line with South African legislation.

Annexure B: Insurance provided by the *Employer*

1. For the purpose of works contracts, insurance provided by Eskom (the *Employer*) has been arranged on the basis of “project” or “contract” value, where the value is the total of the Prices at Completion of the whole of the works including VAT.

A “project” is a collection of contracts or work packages to be undertaken as part of a single identified capital expansion or refurbishment of a particular asset or facility.

A “contract” is a single contract not linked to or being part of a “project”.

2. For ECC3 there are three main “formats” of cover and deductible structure; Format A, Format B and Format Dx.

Format A is for a project or contract value less than or equal to R350M (three hundred and fifty million Rand) inclusive of VAT.

Format B is for a project or contract value greater than R350M (three hundred and fifty million Rand) inclusive of VAT.

In the case of contracts / packages within a project:

- For a contract / package of R50M which is part of a R400M project, Format B will apply
- For a contract / package of R250M which is part of a R6 billion project, Format B will apply;
- For a contract / package of R120M which is part of a R350M project Format A will apply;

For a contract which is not part of a project the same limits apply:

- For a contract of R50M, Format A will apply
- For a contract of R355M, Format B will apply.

Format Dx applies only to Distribution Division projects and contracts. If a Distribution Division project or contract exceeds the Format A limit, the Eskom Insurance Management Services [EIMS] need to be contacted for advice on how to formulate the insurance cover. Cover and deductibles for Distribution Division are per the relevant policy available on the internet web link given below.

Format A generally applies to Transmission Division projects and contracts. If a Transmission Division project or contract exceeds the Format A limit, the Eskom Insurance Management Services [EIMS] need to be contacted for advice on how to formulate the insurance cover.

3. Tendering *Contractor*s should note that cover provided by the *Employer* is only per the policies available on the internet web link listed below and may not be the cover required by the tendering *Contractor* or as intended by each of the listed insurances in the left hand column of the Insurance Table in clause 84.2. In terms of clause 84.1 “the *Contractor* provides the insurances stated in the Insurance Table except any insurance which the *Employer* is to provide”. Hence the *Contractor* provides insurance which the *Employer* does not provide and in cases where the *Employer* does provide insurance the *Contractor* insures for the difference between what the Insurance Table requires and what the *Employer* provides.
4. When the Marine Insurance is required the *Contractor* needs to obtain a copy of the latest edition of Eskom’s Marine Policies Procedures found at internet website given below.
5. **Further information and full details of all Eskom provided policies and procedures may be obtained from:**

http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies.aspx

C1.2 Contract Data

Part two - Data provided by the *Contractor*

Completion of the data in full, according to Options chosen, is essential to create a complete contract.

Clause	Statement	Data
10.1	The <i>Contractor</i> is (Name): Address Tel No. Fax No.	
11.2(8)	The <i>direct fee percentage</i> is The <i>subcontracted fee percentage</i> is	_____% _____%
11.2(18)	The <i>working areas</i> are the Site and	
24.1	The <i>Contractor's</i> key persons are: 1 Name: Job: Responsibilities: Qualifications: Experience: 2 Name: Job: Responsibilities: Qualifications: Experience:	CV's (and further key persons data including CVs) are appended to Tender Schedule entitled NB. <i>Contractor's</i> data and CV's supplied complies with the Works Information for key people listed under 4.1.1, Minimum Requirements of People Employed on the Site
11.2(3)	The <i>completion date</i> for the whole of the works is	
11.2(14)	The following matters will be included in the Risk Register	
11.2(19)	The Works Information for the <i>Contractor's</i> design is in:	

31.1	The programme identified in the Contract Data is	
A	Priced contract with activity schedule	
11.2(20)	The <i>activity schedule</i> is in	
11.2(30)	The tendered total of the Prices is	
		(in figures)
		(in words), excluding VAT

PART 2: PRICING DATA
ECC3 Option A

Document reference	Title	No of pages
	This cover page	1
C2.1	Pricing assumptions: Option A	2
C2.2	The <i>activity schedule</i>	4
	Total number of pages	7

C2.1 Pricing assumptions: Option A

How work is priced and assessed for payment

Clause 11 in NEC3 Engineering and Construction Contract, (ECC3) Option A states:

Identified and defined terms 11
11.2

(20) The Activity Schedule is the *activity schedule* unless later changed in accordance with this contract.

(27) The Price for Work Done to Date is the total of the Prices for

- each group of completed activities and
- each completed activity which is not in a group.

A completed activity is one which is without Defects which would either delay or be covered by immediately following work.

(30) The Prices are the lump sum prices for each of the activities on the Activity Schedule unless later changed in accordance with this contract.

This confirms that Option A is a lump sum form of contract where the work is broken down into activities, each of which is priced by the tendering *Contractor* as a lump sum. Only completed activities are assessed for payment at each assessment date; no part payment is made if the activity is not completed by the assessment date.

Function of the Activity Schedule

Clause 54.1 in Option A states: "Information in the Activity Schedule is not Works Information or Site Information". This confirms that specifications and descriptions of the work or any constraints on how it is to be done are not included in the Activity Schedule but in the Works Information.

This is further confirmed by Clause 20.1 which states, "The *Contractor* Provides the Works in accordance with the Works Information". Hence the *Contractor* does **not** Provide the Works in accordance with the Activity Schedule. The Activity Schedule is only a pricing document.

Link to the programme

Clause 31.4 states that "The *Contractor* provides information which shows how each activity on the Activity Schedule relates to the operations on each programme which he submits for acceptance". Ideally the tendering *Contractor* will develop a high level programme first then resource each activity and thus arrive at the lump sum price for that activity both of which can be entered into the *activity schedule*.

Preparing the activity schedule

Generally it is the tendering *Contractor* who prepares the *activity schedule* by breaking down the work described within the Works Information into suitable activities, which can be well defined, shown on a programme and priced as a lump sum.

The *Employer*, in his Instructions to Tenderers or in a Tender Schedule, may have listed some items that he requires the *Contractor* to include in his *activity schedule* and be priced accordingly.

It is assumed that in preparing his *activity schedule* the *Contractor*:

- Has taken account of the guidance given in the ECC3 Guidance Notes pages 19 and 20;
- Understands the function of the Activity Schedule and how work is priced and paid for;

-
- Is aware of the need to link the Activity Schedule to activities shown on his programme;
 - Has listed and priced activities in the *activity schedule* which are inclusive of everything necessary and incidental to Providing the Works in accordance with the Works Information, as it was at the time of tender, as well as correct any Defects not caused by an *Employer's* risk;
 - Has priced work he decides not to show as a separate activity within the Prices of other listed activities in order to fulfil the obligation to complete the *works* for the tendered total of the Prices.
 - Understands there is no adjustment to the lump sum Activity Schedule price if the amount, or quantity, of work within that activity later turns out to be different to that which the *Contractor* estimated at time of tender. The only basis for a change to the Prices is as a result of a compensation event.

C2.2 the *activity schedule*

Notes on the Price List:

- The Price List provided by the *Employer* below includes as many of the activities determined as relevant for the execution of the *works* as possible through planning stages. The *Contractor* (tenderer) however, remains responsible to price correctly for the *works* ensuring that the *Employer's* Price List is completed in full and any relevant items which are omitted, are added to the Price List, thereby ensuring that the final Price List covers the provision of the entire *works*.
- All other items of expense not listed in the *Employer's* Price List is specified in detail and added in by the *Contractor* below or on a separate sheet. Any item not stated by the *Contractor* but necessary to Provide the Works is accepted as being included in the pricing and is not claimable during the course of the *works*.
- The quantities provided by the *Employer* are only estimated and the *Contractor* confirms and corrects them upon tendering.
- The *Contractor* enters units, quantities, rates and prices where none are shown (no rates without quantities should be entered) or corrects them if necessary where they are already entered.
- All prices are VAT exclusive however, VAT is claimable upon invoicing.

Pricing Data

No.	Description	Unit	Quantity	Rate	Price
1.	Design Work for Control Air Compressor upgrade				
1.1.	Detailed Design Package (Mechanical, electrical, C&I and Civil) (3.1 and 2.3.5)	Le	1		
1.2.	Plant Codification (3.4.1)	Le	1		
1.3.	Technical Risk Assessment (3.4.2)	Le	1		
1.4.	Failure Mode and Effect Analysis (3.4.3)	Le	1		
1.5.	System Interfaces (3.4.4)	Le	1		
1.6.	As-built Drawings, Manuals and Maintenance Schedules (3.6)	Le	1		
1.7.	Other (Specify here or on a separate sheet)	Le	1		
2.	Fabrication/ Manufacturing, Supply and Delivery of Unit Compressors including auxiliaries (3.2 and 1.2)				
2.1.	Compressor, motor, piping and auxiliaries	Each	6		
2.2.	Soft Starter	Each	6		
2.3.	Dryer Units	Each	6		
2.4.	Factory acceptance testing	Each	6		
2.5.	Delivery and freight	Each	6		

No.	Description	Unit	Quantity	Rate	Price
2.6.	Other (Specify here or on a separate sheet)				
3.	Fabrication/ Manufacturing, Supply and Delivery of Common Plant Compressors including auxiliaries (3.2 and 1.2)				
3.1.	Compressor, motor, piping and auxiliaries	Each	3		
3.2.	Soft Starter	Each	3		
3.3.	Dryer Units	Each	3		
3.4.	Factory acceptance testing	Each	3		
3.5.	Delivery and freight	Each	3		
3.6.	Other (Specify here or on a separate sheet)	Le	1		
4.	Installation and Commissioning of New Compressors and Auxiliaries (3.2, 1.2, 5.2)				
4.1.	Removal of old Compressor and related equipment including decommissioning of plant	Each	9		
4.2.	Installation, Commissioning and on-site Testing of new Compressors and Auxiliaries				
4.2.1.	Mechanical installation – Compressors pipework and auxiliaries	Each	9		
4.2.2.	Dryer Installation	Each	9		
4.2.3.	Electrical Installation and SOW				
4.2.3.1.	Unit 1 and 2 Compressors	Each	2		
4.2.3.2.	Unit 3 to 6 Compressors	Each	4		
4.2.3.3.	Common Plant Compressors	Each	3		
4.2.4.	C&I SOW				
4.2.4.1.	Unit Compressors	Each	6		
4.2.4.2.	Common Plant Compressors	Each	3		
4.2.5.	Plant Labelling (3.4.1)	Each	9		
4.2.6.	Commissioning and Testing (5.2.3)	Each	9		
4.2.7.	Other (Specify here or on a separate sheet)	Each	9		

No.	Description	Unit	Quantity	Rate	Price
5.	Preliminaries and General (provide detailed breakdown separately for all lump sum items)				
5.1.	Site Establishment (5.1.11.1)	Le	1		
5.2.	Supply and permanent installation of 6 m x 2.4 m storage container (5.1.11.1)	Ea	1		
5.3.	Other site establishment requirements (specify) (5.1.11.1)	Ea	1		
5.4.	Site De-establishment (5.1.11.1)	Le	1		
5.5.	Other (Specify here or on a separate sheet)				
5.6.	Travelling and Accommodation and meals (4.1.2.3 and 5.1.1.2)				
5.6.1.	Travelling	Each	9		
5.6.2.	Accommodation and meals	Each	9		
5.6.3.	Other Transportation, Accommodation and meals (Specify here or on a separate sheet)				
5.7.	Lifting and Rigging Requirements (Contractor to state no. of days) (2.4.10)				
5.7.1.	Lifting and Rigging Equipment	Each	9		
5.7.2.	Crane operator and Rigger team	Each	9		
5.7.3.	Other Lifting Requirements (Specify here or on a separate sheet)				
5.8.	SHEQ Management (2.3.5.3)				
5.8.1.	Safety Officer (4.1.1)	Each	9		
5.8.2.	Personal Protective Equipment (2.4.1)	Sum	1		

No.	Description	Unit	Quantity	Rate	Price
5.8.3.	Safety plan/file and all related documentation (including exit medicals) (5.1.1 and 2.3.5.2)	Sum	1		
5.8.4.	Responsible Persons and Authorised Person(s) training and authorisation (5.1.1).	Sum	1		
5.9.	Quality Management (2.6)				
5.9.1.	Quality Co-ordinator (2.6)	Each	9		
5.9.2.	Quality file and all documentation including data packs and QCP's (2.6 and 2.3.5)	Each	9		
5.10.	Environmental Management and documentation (2.5 and 5.1.12)	Each	9		
5.11.	Other SHEQ (Specify here or on a separate sheet)				
5.12.	Project and Site Management				
5.12.1.	Contract Manager or <i>Project Manager</i> (4.1.1)	Each	9		
5.12.2.	Site Manager (4.1.1)	Each	9		
5.12.3.	Other (Specify here or on a separate sheet)				
5.13.	Training and Training Manuals (5.2.9)				
5.13.1.	Training Manuals	Sum			
5.13.2.	Training to <i>Employer's</i> staff	Sum			
5.13.3.	Other (specify here or on a separate sheet)				
Total of the Prices (excluding VAT):					

PART 3: SCOPE OF WORK

Document reference	Title	No of pages
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1. Description of the Works

1.1. Executive Overview

The Control Air Plant provides compressed air for control and critical applications on the power plant. The control air is essential to many control applications and protections that are critical to the operation of the plant. The current system is unreliable and needs an upgrade.

The *Contractor* upgrade nine (9) control air compressors, their dryer assemblies, all related equipment, and auxiliaries. Three (3) control air compressors with their related equipment are part of the Common Plant and are operated and controlled from the ABB supplied, Common Plant Distributed Control System (DCS). Six (6) control air compressors with their related equipment are operated and controlled from the Siemens supplied Unit DCS. The upgrade includes the following:

- 1.1.1.** Design: The detailed mechanical, electrical, Control and Instrumentation (C&I), and civil design and engineering of the new control air compressors, all other related equipment, and auxiliaries, called a compressor train. The design consists of a detailed design report and all related drawings and specifications. The detailed design report is done using 240-49910707 - Detail Design Report Template.
- 1.1.2.** Manufacturing: ONLY after detailed design acceptance by the *Project Manager*, the procurement, manufacturing, fabrication, quality control and assurance, supply of the compressors, dryer assemblies, and all related equipment, material and equipment supply, testing and delivery to and offloading at Majuba Power Station.
- 1.1.3.** Workshop: The *Contractor* have their own local workshop with sufficient covered space where the compressor and dryer assemblies, including all electrical and C&I spares will be manufactured/stored and tested. A letter providing proof of workshop and available space to be provided at contract award. The *Employer* has the right to visit and accept the workshop before contract award.
- 1.1.4.** Decommissioning and removal: The decommissioning and removal of the existing compressors dryer assemblies, instrumentation, electrical boards, -breakers and all cables from the plant, packaging of the instruments to prevent them from being damaged, loading and moving them to a designated temporary storage area, offloading and stacking them properly, ready for the *Employer's* asset scrapping process. Decommissioning of the Common Plant Compressor auxiliary cooling system and the 6.6 kV electrical apparatus utilised on Units 1 and 2. The decommissioning of all the related equipment, which will be replaced as part of the contract.
- 1.1.5.** Installation: The installation of the 9 new control air compressors, dryer assemblies and other related equipment, including auxiliaries, in their respective positions on the Plant.
- 1.1.6.** Main drive motors and soft starters: The detailed design, manufacturing, testing, supplying, delivering, offloading, installation and commissioning of each control air compressor's main drive motor, which is supplied in tandem with the compressor as a complete assembly and includes an electrical pushbutton, a soft starter and all related cabling.
- 1.1.7.** Common Plant C&I software: For the Common Plant Compressors, installation of new input/output (IO) modules on the existing DCS, the connection to the DCS, software configuration changes and the commissioning of the compressors. The *Contractor* notes that only a well-experienced C&I artisan/technical/engineer will be allowed access to the ABB DCS-AC450 and Software Engineering system. Refer to section 4.1.1 - Minimum Requirements of People Employed on the Site for the minimum qualification requirements. The *Contractor* may subcontract this service.

- 1.1.8.** Unit C&I software: For the Unit Compressors, the C&I connections; configuration and commissioning will be done by the *Employer*. The Scope of Work is displayed in the LOSS. The *Contractor* provides the new Functional system and Philosophy documentation as stated in section 2.3.2 Vendor Document Submission Schedule for the integrated unit i.e. Compressor and dryer unit, to the *Employer*. The *Employer* will make use of the Control Philosophy to implement software changes to the unitised DCS. The *Contractor* will assist in the design process and advise on best process practices to be adhered to and implemented during the design and implementation process on the DCS.
- 1.1.9.** Integration: All work related to integrate and interface with existing systems.
- 1.1.10.** Testing and commissioning: All required testing and cold and hot commissioning of the compressor trains.
- 1.1.11.** Hand-over: Handing over, and correcting defects during the guarantee period.

The removal and installation of each control air compressor are conducted in a phased approach i.e. one compressor train at a time, to ensure continuous production of control air by the remaining compressors. Alignment of the *Contractor's* programme with the Unit outages is required for the termination of C&I cables and transfer of software code to the DCS as well as the Unit 1 and 2 6.6kV boards isolation for decommissioning of cables. Refer to section 2.7, Programming Constraints,

The works listed below are not necessarily in a sequence or preference, which the *Contractor* must adhere to hence, the *Contractor* considers all requirements in preparing and submitting his own plan/method statement for review and acceptance by the *Project Manager*. It is also possible, that planning may change during the works should the *Employer* deem it necessary and the *Contractor* re-aligns the programme accordingly.

1.2. Employer's Objectives and Purpose of the Works

- 1.2.1.** Upon the start date, the *Contractor* studies the *Employer's* Works Information, prepares and submits a detailed work methodology and draft Quality Control Plan (QCP) to the *Project Manager*, for each section of works, to obtain acceptance before each activity is started.
- 1.2.2.** The *Contractor* liaises with all the *Employer's* project team such as engineers, quality controller/s, plant specialist/s etc. and requests clarification from the *Project Manager* immediately if any discrepancy or vagueness is discovered in the Works Information, which was not clarified during the tender period. The *Contractor* identifies all such discrepancies and vague areas of scope within the first twelve (12) weeks of the contract and submits them for further clarification to the *Employer* who reviews and provides decisions on those issues.
- 1.2.3.** The Supporting Factors For The System Upgrade
- 1.2.3.1.** The currently installed control air compressors are of an obsolete model. This has increased refurbishment costs and lead time for refurbishment (and critical spares). This has led to the deterioration of the reliability (and subsequently redundancy) of this plant. This has also led to multiple-unit trips (MUT) due to low control air pressure.
- 1.2.3.2.** The refrigerant dryer (auxiliary component to compressors) needs to change its refrigerant gas from hydro-chlorofluorocarbons (R22 gas) to an environmentally friendly alternative in line with government regulations.
- 1.2.3.3.** The desiccant dryer assemblies are problematic. These model dryers are rare and subsequently, there are few competent servicing options available.

- 1.2.3.4. The Soft Starters used on the control air compressors are obsolete as well resulting in the unavailability of spares.
- 1.2.3.5. The motors on Units 1 and 2 are obsolete and refurbishment is costly with poor performance.

1.2.4. The Purpose of the Works

- 1.2.4.1. Address the issue of obsolescence of the control air compressors and dryer assemblies at Majuba Power Station.
- 1.2.4.2. Ensure that Majuba Power Station has reliable compressors with OEM support for the equipment for the next 25 - 30years.

1.2.5. Design of the New Control Air Compressor System

- 1.2.5.1. The *Contractor* designs the new control air system as documented in Section 3, Engineering and the *Contractor's* Design. The *Contractor* only starts with the procurement, manufacturing and fabrication process after the *Contractor's* design was formally accepted by the *Project Manager*.

1.2.6. Manufacturing and Fabrication of the New Control Air Compressor System

- 1.2.6.1. The *Contractor* submits the manufacturing and fabrication Quality Control Plans (QCP's) detailing activities listed as per the activities in the *works* for approval by the *Project Manager* before any manufacturing and fabrication work starts. Refer to Section 2.6.2, Quality Control Plans.

1.2.7. Transportation, storage and Preservation of Compressors and Related Equipment

- 1.2.7.1. The *Contractor* submits a storage and preservation procedure for review and acceptance by the *Project Manager*. This procedure ensures that the dryer pressure vessels are kept in good condition from the time of manufacture until they are put into service. The *Contractor* makes use of inert gas to create positive pressure inside the dryer vessels. Gauges must be fitted onto the dryer pressure vessel to display the vessel pressure.
- 1.2.7.2. The *Contractor* performs regular monitoring of temperature, humidity, vibration and dust entry and provides feedback as part of the preservation plan.
- 1.2.7.3. On delivery, the equipment is dry externally and internally and is preserved in this way until installation. It is advised that the *Contractor* seals/wraps the equipment in plastic to prevent dust ingress and controls the moisture and temperature at a constant.
- 1.2.7.4. The equipment is stored inside a building or container or in ventilated covers. The storage area is clean, dry and dust-free.
- 1.2.7.5. The *Contractor* transports all electrical motors complying with the standard 240-56361435 - Transport of Power Station Electric Motors and stores and preserves all electrical motors complying with section 10.1 of MAINT/EMD 101 44 – Storage of Power Station Electrical Motors.

1.2.8. Decommissioning and Removal of Existing Plant

- 1.2.8.1. The *Contractor* studies, understands and documents all the hazards of working on the compressor plant and compiles a risk assessment and puts all necessary precautions and mitigations in place.

-
- 1.2.8.2. Before the removal of any Plant and Materials, the *Contractor* compiles a comprehensive list containing all Plant and Materials to be removed. As a minimum, this list includes the serial numbers, model numbers and the location at which the Plant and Materials were installed. This list is submitted to the *Project Manager* for acceptance.
- 1.2.8.3. The *Contractor* submits a proposal outlining the planned method for use to remove the existing and installation of the new compressors trains for the *Project Manager's* review and acceptance. Only after acceptance is given in writing, may the removal and installation begin.
- 1.2.8.4. Apply for a permit to enable the approval and the commencement of work on the related plant.
- 1.2.8.5. The removal and re-installation of the plant affected is the responsibility of the *Contractor*. The *Contractor* securely and safely protects the pipework remaining in service to ensure that they are not damaged during installation. Any damages to the plant may result in serious safety and production-related incidents and must be avoided.
- 1.2.8.6. The *Contractor* removes all existing control air compressors, motors, dryer assemblies, all related equipment and cabling no longer required.
- 1.2.8.7. All plant removed for access is included in the respective activities in the QCP/ITP to ensure that all plant/apparatus is properly re-installed.
- 1.2.8.8. The *Contractor* permanently decommissions the Common Plant compressor auxiliary cooling water supply system, by blanking off the supply and return line PGB10/20 BR010.
- 1.2.8.9. The *Contractor* permanently decommissions the 6.6 kV electrical apparatus utilised on Units 1 and 2. The *Contractor* notes that the generating unit will have to be shut down to perform the decommissioning. The estimated duration for the activities is approximately three (3) days and the *Contractor* confirms the duration before making provision in the project programme. The *Contractor* refers to section 2.7, Programming Constraints, for the *Employer's* preliminary outage schedule. The *Contractor* isolates the 6.6 kV electrical boards for Units 1 and 2 and performs the following activities:
- a. Isolates the circuit concerned
 - b. Disconnects the 6.6kV power cable utilised to feed the affected Unit's (either Unit 1 or 2) MV compressor motor
 - c. Racks out the 6.6kV MV circuit breaker
 - d. Locks out and decommissions the circuit
 - e. Close the cable entry point into the panel with a fire retardant sealant
- 1.2.8.10. The *Contractor* packages all the removed instruments to prevent them from being damaged.
- 1.2.8.11. The *Contractor* loads the compressors, dryer assemblies, instruments, electrical boards and breakers, and move them to a designated temporary storage area, where they are offloaded and stacked properly, in the correct marked area, for the *Employer* to either re-use or dispose of. The temporary storage area is approximately 1 km from the plant. Items containing copper are handled as in section 5.1.12.8.
- 1.2.8.12. The *Contractor* removes the rest of the equipment on the accepted list from their positions and treats them as general waste. The *Contractor* disposes of them according to the *Employer's* waste management standards, 32-245 - Eskom Waste Management Standard and ENV/GEN/WI/12 - Majuba Waste Management.

1.2.9. Installation of New Compressor Trains

- 1.2.9.1. The *Contractor* supplies and fits new fixtures, fittings and hold-down bolts and secures the new compressor and dryer assemblies into position. Rigging of compressors and dryer assemblies or any other equipment is done by the *Contractor*
- 1.2.9.2. The adjacent plant and equipment may not be modified without written permission from the *Project Manager*.
- 1.2.9.3. The compressors and dryer assemblies are tested under normal operating conditions, which include vibrations.
- 1.2.9.4. The *Contractor* provides all tools, software and licenses required for installation, maintenance, configuration and calibration of the compressors and associated.
- 1.2.9.5. The *Contractor* provides calibration certificates for all instrumentation provided as part of the works. The calibration is performed by either a SANAS or any other internationally accredited certification/calibration laboratory, capable of certifying temperature measurement instruments. The calibration certificates are accompanied by a SANAS accretion certificate.
- 1.2.9.6. The *Contractor* provides Certificates of Compliance for electrical supplies.

1.3. Interpretation and Terminology

1.3.1. Definitions

Definition	Explanation
Air Quality	The quality of compressed air is guided by the degree of dryness and filtration needed and the acceptable contaminant level for end users.
Adsorption	The general working principle of adsorption is simple as moist air flows over hygroscopic material (typical materials used are silica gel, molecular sieves, activated alumina) and is thereby dried.
Agent	(OHS Act) means any person who acts as a representative for a client
Competent person	(OHS Act) means any person having the knowledge, training, experience, and qualifications, specific to the work or task being performed, provided that, where appropriate, qualifications and training are registered in terms of the South African Qualifications Authority Act, 1995 (Act No. 58 of 1995)
Compressor capacity	Capacity in m ³ /min at a particular inlet reference conditions, including temperature, pressure and relative humidity, at a specified pressure.
Consumers	In this document, the word “consumer” refers to the instruments and equipment on the plant which are supplied with control air for operational purposes. These are therefore the end-users of the control air supply.
Construction work	(OHS Act) means any work in connection with: the erection, maintenance, alteration, renovation, repair, demolition or dismantling of, or addition to, a building or any similar structure; the installation, erection, dismantling, or maintenance of a fixed plant where such work includes the risk of a falling person; the construction, maintenance, demolition, or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system, or any similar civil engineering structure; or the moving of earth, the clearing of land, the making of an excavation, pilling, or any similar type of work
<i>Contractor</i>	Concerning this document, where the word “ <i>Contractor</i> ” is used, it will mean all or some of the following: principal <i>Contractors</i> , appointed <i>Contractors</i> , suppliers, vendors, service providers and consultants

Definition	Explanation
Design	(OHS Act) concerning any structure, includes drawings, calculations, design details, and specifications
Design Authority / Designer	Means any person who: <ul style="list-style-type: none"> • Prepares a design ; • Checks and approves a design; • Arranges for any person at work under his control (including an employee of his, where he is the <i>Employer</i>) to prepare a design, as well as; • Architects and engineers contributing to, or having overall responsibility for the design; • <i>Contractors</i> carrying out design work as part of a design and build project.
Employer	(OHS Act) means, subject to the provisions of subsection (2), any person who employs or provides work for any person and remunerates that person or expressly or tacitly undertakes to remunerate him/her, but excludes a TES (ex-labour broker) as defined in section 1(1) of the Labour Relations Act 1956 (Act No. 28 of 1956)
Environment	(32-94) means: the land, water, and atmosphere of the earth; micro-organisms and plant and animal life; and any part or combination of (a) and (b) and the interrelationships among and between them, and the physical, chemical, aesthetic, and cultural properties and conditions of the foregoing that influence human health and well-being
Environmental Management plan	A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. This Environmental Management Plan should preferably form part of Eskom's Environmental Management System
Eskom requirements	Eskom requirements flowing from directives, policies, standards, procedures, specifications, work instructions, guidelines, or manuals
Fall protection plan	(OHS Act) means a documented plan of all risks relating to working from an elevated position, considering the nature of work undertaken, and setting out the procedures and methods to be applied to eliminate the risk
Free air delivery	It is the volume of uncompressed air at inlet conditions that is delivered by the compressor.
Hazard	(OHS Act) means a source of, or exposure to, danger
Health and safety plan	(OHS Act) means a documented plan that addresses hazards identified and includes safe work procedures to mitigate, reduce, or control hazards identified
Health and safety requirements	Means comprehensive health and safety requirements for a contract, project, Site, and scope of work. This specification is intended to ensure the health and safety of persons, both workers and the public, and the duty of care to the environment. The health and safety requirements must be specific to each contract, project, Site, and scope of work
Hot work	means any activity involving, a source of ignition, such as welding, cutting, grinding, sparks, and any electrical equipment that could give off sparks and any other work that could serve as a source of ignition that can pose a danger, specifically when carried out in a confined space or in the vicinity of any combustible material.
Hot work approval	Means a document that approves hot work and states the precautions to be taken before, during and after hot work. This document is prepared and signed by the hot work monitor. (Refer General Safety Regulation 9 of the Act)
Lifesaving Rules	(240-62196227) a rule that, if not adhered to, has the potential to cause serious harm to people

Definition	Explanation
Method statement	(OHS Act) means a written document detailing the key activities to be performed to reduce, as reasonably as practicable, the hazards identified in any risk assessment
Normal Cubic meter	It is the volume of air at 0°C, 1.01325 bar (101.325kPa) (atmospheric pressure at sea level) and 0% relative humidity (completely dry air).
Obsolescence	In this document, the obsolescence (or about something being obsolete) of a compressor refers to the fact that the particular model is not manufactured on a commercial basis anymore from the supplier company. Spares are being manufactured on receipt of order only, thereby resulting in extended downtimes. Compressor casings however are no longer manufactured at all. Therefore where these items are required, use must be made of second-hand casings.
Pressure Dew point	The temperature of a given pressure at which relative humidity of 100% will be reached. At this point the water vapour and partial pressures are equal and condensation will take place if the temperature is further reduced or if the pressure increases.
<i>Project Manager/ Leader</i>	(32-136) means the person who has the responsibility for the successful planning and execution of a project. The <i>Project Manager</i> must satisfy the certification requirements set by the South African Council for the Project and Construction Management Professions. Note: the <i>Project Manager</i> is the duly authorised Eskom representative who acts on Eskom's behalf as the administrating officer for the contract
Redundancy	Use of more than one independent means to accomplish a given function.
Relative Humidity	The ratio of the partial pressure of a vapour to the vapour saturation at the dry bulb temperature of a mixture.
Remanufactured	This refers to machinery that was been rebuilt using available spares and associated parts. The machinery does not consist of entirely new parts but rather a mix of what is available in stores and unavailable items, which are then manufactured.
Risk assessment	(OHS Act) means a programme to determine any risk associated with any hazard at a Construction Site to identify the steps needed to remove, reduce, or control such hazard.
Site	(34-228) means an Eskom department, unit, complex, building, specific project, work site, or the site where agents, clients, principal <i>Contractors</i> , <i>Contractors</i> , suppliers, vendors, and service providers provide a service to Eskom, directly or indirectly
Stakeholder	Is considered to be anyone that has an interest in the outcome of the project.
Supplier	(32-1034) means a natural or legal person who renders a service and may include the following current or potential supplier vendor, <i>Contractor</i> , consultant
<i>Supervisor</i>	<i>The supervisor</i> is the <i>Employer's</i> appointed person responsible for supervising the <i>works</i> as per the NEC contract.
Surge	The reversal of flow within a dynamic compressor that takes place when the capacity being handled is reduced to a point where insufficient pressure is being generated to maintain flow.
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services, and other support facets.
System pressure	The air pressure of a particular class of compressed air as measured at the air receiver directly after the dryers.

Definition	Explanation
Task	(34-227) a segment of work that requires a set of specific and distinct actions for its completion
Vapour	A gas that is at a temperature below its critical temperature and that, therefore can be liquefied by isothermal compression.
VDSS	The applicable system document exchange list between the <i>Employer</i> and the <i>Contractor</i> .
Waste	Any matter, whether liquid or solid or any combination thereof, which is a by-product, emission, residue or remainder of any process or activity carried out in connection with the <i>works</i> and which is not reused on the Site in the ordinary course of carrying out the <i>works</i> within seven days of production.

1.3.2. Abbreviations

The following abbreviations are used in this Works Information:

Abbreviation	The meaning given to the abbreviation
°C	Degrees Celsius
ABB	ABB DCS-AC450
AC	Alternating Current
AS	Authorised Supervisor
ASME	American Society of Mechanical Engineers
AUTOCAD	Auto-Computer Assisted Diagnosis
B-BBEE	Broad-Based Black Economic Empowerment
BCEA	Basic Conditions of Employment Act
BS EN	British Standard European Norm
C&I	Control and Instrumentation
CAC	Control Air Compressor
CAT	Central African Time
CB	Circuit Breaker
CCT	Circuit
CFC	Chlorofluorocarbons
COC	(Electrical) Certificate of Compliance
COID	Compensation for Occupational Injuries and Diseases
COVID	Coronavirus disease
CPA	Cost/Contract Price Adjustment
CSIR	Council for Scientific and Industrial Research
CV	Curriculum Vitae
DB	(Electrical) Distribution Board
DCS	Distributed Control System
dP	Differential Pressure
ECC	Engineering Construction Contract
ECSA	Engineering Council of South Africa
EPS	Expanded Polystyrene
FAT	Factory Acceptance Test
FET	Further Education and Training
FRI	Forecast Rate of Invoicing
FSS	Finance Shared Services

GA	General Arrangement
GPO	General Post Office
GR	Goods Receipt
HIRA	Hazard Identification and Risk Assessment
HMI	Human Machine Interface
hr	Hour
ID	Identity Number
IEC	International Electro-technical Commission
IIW	International Institute of Welding
IO	Input/Output
IP	Ingress Protection
ISO	International Organisation for Standardisation
ITP	Inspection and Test Plan
IWP	International Welding Practitioner
IWS	International Welding Specialist
JB	Junction Box
KKS	Kraftwerk Kennzeichen System (unique identification system for plant components)
kPa	Kilo Pascal (Pressure measurement unit)
LCP	Local Control Panel
LDV	Light Delivery Vehicle
LED	Light-emitting Diode
LOSS	Limits of Supply and Services
LRA	Labour Relations Act
LTI	Lost Time Injury
LV	Low Voltage
M / m	Meter
MAJ	Majuba
MCB	Miniature Circuit Breaker
MM/mm	Millimetre
mm ²	Square Millimeter
MPS	Majuba Power Station
MS	Microsoft
MSL	Mean Sea Level
MUT	Multiple Unit Trip
NB	Nominal Bore
NCR	Non Conformance Report (Eskom document)
NDT	Non-Destructive Testing
NEC	New Engineering Contract
m ³ /min	Normal cubic meter per minute
NQF	National Qualification Framework
NRV	Non-Return Valve
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
OHSAS	Occupational Health and Safety Assessment Series
OP	Outside Plant
ORHVS	Operating Regulations High Voltage Systems

PDF	Portable Document Format
PDP	Pressure Dew Point
PER	Pressure Equipment Regulations
PPE	Personal Protective Equipment
PPM	Parts Per Million
PTW	Permit To Work
PVC	Polyvinyl Chloride
QC	Quality Control
QCP	Quality Control Plan
QS	Quantity Surveyor
RP	Responsible Person (for PTW)
RSA	Republic of South Africa
SABS	South African Bureau of Standards
SAIW	South African Institute of Welding
SAMTRAC	Safety Management Training Course
SANS	South African National Standard
SAQA	South African Qualifications Authority
SARS	South African Revenue Services
SDL&I	Supplier Development, Localisation and Initiatives
SE	Service Entry
SETA	Skills Education Training Authorities
SFT	Sanction for Test
SHEQ	Safety, Health, Environmental and Quality
SMME	Small, Medium and Micro Enterprises
SS	Soft Starter
UIF	Unemployment Insurance Fund
UVG	Universal Voice Grade
VA	Visual Automation (Signal trending software used by Majuba Power Station)
VAT	Value Added Tax
VDSS	Vendor Document Submission Schedule
W	Width
WPQR	Welding Procedure Qualification Record
WPS	Welding Procedure Specification
WQR	Welder Qualification Record
WRB	Welding Rule Book

2. Management and Start-Up

2.1. Management, Feedback and Reporting

- 2.1.1.** The *Contractor* manages all contracted personnel including Subcontractors and is responsible for ensuring compliance to the Works Information and all contracted terms and conditions.
- 2.1.2.** The *Project Manager* is the delegated *Employer's* representative and the *Contractor* reports directly to the *Project Manager* and obeys all lawful instructions given. The *Project Manager* manages the overall performance of the *Contractor* and all Subcontractors used in Providing the Works. Therefore,

the *Contractor* ensures that the *Project Manager* is given their full cooperation including the timeous reporting and feedback of all matters of importance and compliance to all instructions.

2.1.3. The *Contractor* complies with the Works Information and reports all matters timeously and with sufficient detail to the *Project Manager*.

2.1.4. The *Contractor*, being the competent party for execution of the works, raises concerns, risks or other matters which affect or could affect the performance of the *Contractor* or the performance of the works to the *Project Manager*.

2.2. Management Meetings

2.2.1. Regular meetings may be convened and chaired by the *Project Manager* as follows:

Title or purpose	Approximate time or interval	Location	Attendance by:
Kick-off meeting	Within two weeks of contract start	Majuba Power Station, Projects Boardroom	<i>Employer's and Contractor's Project/Contract and Site Managers and SHEQ representatives.</i>
Overall contract progress and feedback	Weekly	Majuba Power Station, Projects Boardroom	<i>Employer's and Contractor's Project/Contract and Site Managers</i>
Risk register and compensation events	Monthly	Majuba Power Station, Projects Boardroom	<i>Employer's and Contractor's Project/Contract and Site Managers</i>
Majuba <i>Contractor's</i> Safety meeting	Monthly (while on site)	Majuba Power Station, Ben Steyn Auditorium	<i>Employer's Project Manager and Contractor's Site Managers and Contractor's Safety Officer</i>
Quality and NCR/ Defect meeting	Monthly	Majuba Power Station, Projects Boardroom	<i>Employer's and Contractor's Project/Contract and Site Managers and/ or Contractor's and SHEQ representatives.</i>
Assessment meetings	On or before the 25th of the month.	Majuba Power Station, Projects Boardroom and on site	<i>Employer's and Contractor's Project/Contract and Site Managers</i>

2.2.2. The *Project Manager* may change the frequency of meetings, convene special meetings as specified elsewhere in this Works Information or if not specified then as and when required by the *Project Manager* and attended by all relevant *Contractor's* personnel at the times and locations communicated by the *Project Manager*.

2.2.3. All meetings are recorded using minutes and an attendance register prepared and circulated by the person who convened the meeting. Such minutes or register is not used for confirming actions or instructions under the contract as these are done separately by the person identified in the conditions of the contract to carry out such actions or instructions.

- 2.2.4.** The *Contractor* arranges and holds all necessary and mandatory meetings with his employees including daily toolbox talks, pre-job and post-job briefings, health and safety and risk assessment meetings etc. The *Contractor* informs the *Project Manager* of the dates and times of such meetings and ensures that there is minimal impact on performing the work.
- 2.2.5.** The use of online meetings will be preferred wherever possible and the *Contractor* utilises the application preferred by the *Employer* i.e. Microsoft Teams and ensures the availability of suitable tools e.g. laptops and internet connectivity.

2.3. Documentation Control

2.3.1. General

- 2.3.1.1.** The NEC ECC contract terms and conditions, the signed contract document (agreement) and all referenced documents are the only documents, which detail the obligations of the *Employer* and *Contractor*.
- 2.3.1.2.** The *Contractor* submits all documentation to the *Project Manager* and the *Project Manager* to the *Contractor's* Project/Contract Manager.
- 2.3.1.3.** Electronic contract communication is restricted to electronic mail (email) only using the official/business email address/es and stating the contract number, shortened contract title (or Acronym) and relevant subject of the email in the subject line.
- 2.3.1.4.** All communications are filed in hard copy and kept on Site. These communication documents are to adhere to the ECC 3 communication requirements.
- 2.3.1.5.** For contractual issues, standard NEC templates and forms are used by both parties or if unavailable, the *Employer's* templates and forms are used e.g. Non-Conformance Reports, Pre-commissioning checks or Assessment Certificates. Alternatively, the *Project Manager* instructs the *Contractor* to prepare appropriate documentation to meet contract requirements.
- 2.3.1.6.** All documentation is controlled and managed following the Document and Records Management Procedure (32-6).
- 2.3.1.7.** A master register of documents are to be maintained by the *Contractor*, this document register will be used to keep track of document submission dates, review comments, statuses and document/drawing numbers. The latest master register of documents is submitted to the *Project Manager* on request.
- 2.3.1.8.** Documents and drawing numbers are assigned by the *Employer* as documents/drawings are developed. The *Contractor* submits a request for document numbers to the *Project Manager*. The *Contractor* allows for five (5) days for the issuing of the document and drawing numbers in the project programme.

2.3.2. Vendor Document Submission Schedule

- 2.3.2.1.** The *Employer* provides the *Contractor* with a preliminary Vendor Document Submission Schedule (VDSS). The *Contractor* updates the VDSS to be in line with the programme and submits the VDSS back to the *Project Manager* for acceptance. The changes to the VDSS may be additional documentation recorded and submitted, changes in submission dates or corrections in documentation descriptions, document numbers, etc.
- 2.3.2.2.** The VDSS is a live document and changes during the contract execution are discussed and agreed upon by all parties.
- 2.3.2.3.** The *Project Manager* tracks the submission progress of documentation by the *Contractor* as per the committed dates on the VDSS.

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- 2.3.2.4. A master register of documents are to be maintained by the *Contractor*, this document register will be used to keep track of document submissions, review comments, statuses and document/drawing numbers. The master register template is available on request from the *Project Manager*.
- 2.3.2.5. The *Contractor's* documents and submissions comply with the following standards:
- a. 240-124341168, Project Plant Specific Technical Documents - Handover Works Instruction
 - b. 240-65459834, Project Documentation Deliverable Requirement Specification.
 - c. 240-54179170, Technical Documentation Classification and Designation Standard
 - d. 240-76992014, Project/ Plant Specific Technical Documents and Records Management Work Instruction.
- 2.3.2.6. The *Contractor* may use the Eskom large file submission facility on <https://zendto.eskom.co.za/> for bulk document submission.
- 2.3.2.7. During the design phase, the *Contractor* submits electronic copies of the latest revision of all drawings to the *Employer* for acceptance. The *Contractor* provides full sets of drawings per compressor type to the *Employer* for acceptance before design freeze. After the designs are frozen, any design change or other required optimisation changes after completion complies with section 3.3.7.

2.3.3. Documentation Submission with the Tender

- 2.3.3.1. The *Contractor* submits all commercial documentation as specified in the Invitation to Tender document, as well as all documentation as specified by the SHEQ requirements.

2.3.4. Documentation Submissions after Contract Award

- 2.3.4.1. The *Contractor* submits the following prerequisite documentation, with the appropriate motivation, before any work commences on or off Site, for acceptance by the *Project Manager*. Requirements listed at the tender stage still apply after the contract award.
- a. A detailed project programme is submitted within two weeks of the *start date*.
 - b. The project/site organogram indicating names and positions and CV's with certified qualifications and work experience for all key personnel and skilled workers are submitted within three weeks of the start date.
 - c. A project responsibility matrix outlining the responsibility of all key personnel and skilled workers inclusive of external or interfacing stakeholders, within 14 days of the Contract date.
 - d. Any change of the personnel nominated at the tender stage is submitted for acceptance by the *Project Manager* and the *Contractor* ensures that all the listed competencies are complied with. The *Project Manager* requests the removal of any *Contractor* personnel from the project who do not meet minimum requirements and their subsequent replacement at the *Contractor's* cost.
 - e. Quality Control Plans (QCP's) detailing activities listed as per the accepted programme and relating to all activities in the works are submitted within three weeks of the start date. No work may begin without an approved QCP.
 - f. Safety Plan is submitted for acceptance within three weeks of the start date. Based on the acceptance of the safety plan, the *Contractor* ensures that certified identity documents, police clearance certificates and valid medical fitness certificates are provided for safety induction to be performed. Only original medical fitness certificates issued by a medical doctor or an occupational hygienist will be accepted. Access is not granted unless the safety plan is approved.
 - g. Police clearance certificates for all the *Contractor's* workers, supervisors and management, including all Subcontractors are included in the safety file.
 - h. Letters of Good Standing for COID and SARS, refer to section 2.4.1.6 for additional information.
 - i. List of proposed Subcontractors to be used during fabrication and installation.
 - j. A welding package for review and acceptance by the *Employer's* welding inspector. The *Contractor* to make provision in the programme for at least 10 working days to obtain the approval. Refer to section 4.1, People, for the minimum requirements for all welding related staff. The Welding package contains the following:
 - ISO 3834-4 certificate
 - Welding quality control inspector's qualification records
 - Welding Procedure Qualification Records (WPQR) and Welding Procedure Specification (WPS) to BS EN ISO 15614 - Part 1 for thickness range 2.5 to 30 mm for processes SMAW welding of group 1 materials. All WPS's are supported by a valid WPQR to BS EN ISO 15614 - Part 1 as stipulated in 240-106628253 (Eskom Welding Standard). The *Contractor* submits alternative WPQR and WPS if the material specification of the design differs from the specified specifications.
 - Proof of consumables to be used
 - Material certificates

- Non-destructive testing procedures to be used during construction and installation
- Non-destructive testing operator's qualifications
- Non-destructive testing equipment calibration certificates

2.3.4.2. Other quality documents to be submitted include:

- a. Proposed Quality data pack index.
- b. Manufacturer's quality certification records.
- c. Non-destructive testing procedures to be used during construction and installation.
- d. Non-destructive testing operator's qualifications.
- e. Non-destructive testing equipment calibration certificates.
- f. Corrosion protection and painting application procedures.
- g. Welding quality control inspector's qualification records.
- h. Welders' qualification records.

2.3.4.3. Material specifications and product data sheets are submitted before procurement is performed. The *Project Manager* requests the removal of any *Contractor's* materials and products from the project which do not meet minimum requirements and their subsequent replacement at the *Contractor's* cost.

2.3.4.4. A template of the *Contractor's* daily Site diary is submitted before access to Site.

- a. Commencing as from site establishment and all through execution and commissioning of the works, the *Contractor* completes and submits a daily Site diary to the *Project Manager* or *Supervisor* daily for checking, commenting and signing-off. A hard copy is supplied which includes the following information as a minimum:
 - Actual start time and end times of work for the day (not generic times).
 - The number of people in attendance per trade.
 - Equipment used.
 - Description of the programme activity and progress achieved for the day, which includes:
 - i. Times and activities e.g.
 - 07:45 – 08:00 Toolbox talk and topic
 - 08:00 – 15:00 decommissioning of the electrical system – U1
 - 15:30 Stop work due to permit issues, etc.
 - ii. Estimated percentage completion achieved for that activity. Site manager and supervisor/s must plan work according to the Accepted Programme.
 - Weather data especially rainfall readings - take and record the measurements with times (as and when it occurs). Other issues such as wind or temperature should be noted if/when it affects the work.
 - Include other site activities e.g. scaffold building for access, work or inspections by others etc.

- The toolbox talk safety topic for the day, pre-job brief, post-job brief, requests, risks, issues etc.
- Spaces available for names, signatures, date and comments of the *Contractor's Site/Project Manager* and *Project Manager*.
- Sign-off by all the *Contractor's* employees. ***

***If the daily Site diary is not signed off by all the *Contractor's* employees in attendance then a separate daily attendance register is used and supplied. Attendance registers include full names, ID numbers, starting time, finishing time and signatures. Attendance registers are signed off by the *Contractor's* project/site manager and submitted to the *Project Manager* daily. Diaries and attendance registers are also required for the assessment day and again at month-end with the monthly man-hours report.

2.3.5. Documentation Submissions at Contract Completion

2.3.5.1. Data pack

- a. All documentation requirements such as forms, datasheets, certificates, drawings, maintenance and operating manuals, etc. for newly installed equipment remain the responsibility of the *Contractor*. All documentation conforms to the *Project Manager's* requirements, for review and acceptance by the *Project Manager* or other *Employer's* delegates e.g. Engineer reviews and accepts the QCP's.
- b. The *Contractor* refers to section 3.6, for requirements of operating and maintenance manuals, which forms part of the data pack.
- c. The *Contractor* files all documents listed above in a data pack as the work progresses and QC files are reviewed regularly to check and confirm that the *Project Manager's* requirements are met. By completion, the data pack is almost fully compiled and ready for the *Contractor* to make and submit copies and perform hand-over. The documents required in the data pack include the following:
 - For all pipework, the relevant material certificates, corrosion protection control sheets and corrosion protection inspection and test certificates, ISO-datasheets, final installation inspection reports, and safety clearance certificates must be included in the data pack.
 - For all C&I instrumentation and equipment, the relevant datasheets, loop diagrams, IO diagrams, software manuals, hardware manuals and datasheets, maintenance manuals, conformance certificates, calibration certificates, final inspection reports and equipment guarantee certificates must be included in the data pack.
 - For all valves, the relevant datasheets, maintenance manuals, material certificates, hydrostatic pressure test certificates, final inspection reports, safety clearance certificates, and equipment guarantee certificates must be included in the data pack.
 - For all actuators, the relevant datasheets, maintenance manuals, conformance certificates, stroke certificates, final inspection reports, and equipment guarantee certificates for the actuators must be included in the data pack.
 - For all other miscellaneous equipment not mentioned here, the relevant datasheets, maintenance manuals, conformance certificate, final inspection reports and safety clearance certificates must be included in the data pack.

- For the soft starters, the relevant datasheets, maintenance manuals, material certificates, final inspection reports, safety clearance certificates, and equipment guarantee certificates must be included in the data pack.
 - For the compressor motors, the relevant datasheets, factory acceptance certificate, maintenance manuals, type test certificates, material certificates, final inspection reports, and safety clearance certificates must be included in the data pack. The data pack includes the dimensioned outline of motors and auxiliaries and torque vs. speed curves and current vs. speed curves for the requested terminal voltages. Where the load torque is provided, it is superimposed on the motor torque-speed curve.
 - For electrical cables, the calibration certificate of the megohmmeter used to test the cables. Test certificates with the results per cable indicated on the test certificate.
 - For any other electrical components, “As-Built” drawings, power reticulation diagrams, cable schedules, cable rack designs.
 - For the control air compressors and dryer assemblies, the following documents must be included in the data pack as a minimum:
 - i. ITP's/QCP's
 - ii. Design and Construction documentation
 - iii. Welding Procedures and Welder Qualifications
 - iv. NDT Procedures and Operator Qualifications
 - v. Manufacturer's Inspection and Test Certificates
 - vi. Material Certificates
 - vii. NDT Reports
 - viii. Corrosion Protection Control Sheet
 - ix. Corrosion Protection Inspection and Test Certificates
 - x. Installation Inspection and Test Certificates
 - xi. Safety Clearance Certificate
 - xii. Pressure Test Certificate for pressure vessels
 - xiii. “As-Built” drawings
 - xiv. Photocopy of Nameplate
 - xv. Datasheet/ISO Datasheet/Performance Curve
 - xvi. Equipment guarantee certificates
 - For all civil work, verification of load capacity report.
- d. The data pack contains the relevant spares list for all newly installed plant and components, which includes all mechanical, electrical and C&I spares.
- e. The additional requirements for the data pack include:
- Project title, Power Station name and contract number;
 - Index page/s;
 - List of reference drawings;

- Details of all components;
 - Properly divided into sections with numerical or labelled dividers;
 - Submitted in hardcover, loose-leaf binders in A4 size. Fixings are preferable 'D' ring and are of the snap-close type or lever arch type. The document identity appears on printed labels on both the front cover and on the spine.
- f. The data pack includes an overall Contract Quality Plan, Completion Certificate, Handover Certificate and Safety Clearance Certificate for the entirety of the *works*.
- g. The *Contractor* submits one set of the data pack in draft for final review and acceptance by the *Project Manager*. The draft data pack is accommodated with a document index/checklist from the *Contractor*. Handover cannot be done unless the data pack is accepted.
- h. After acceptance by the *Project Manager*, the *Contractor* submits three (3) sets of the final version of the data pack in hardcopy and three electronic copies (on discs). The final signed-off master register of documents is submitted with the hand-over of the data pack.

2.3.5.2. Safety plan and entry permits

- a. The *Contractor* submits the up-to-date site safety plan, which includes:
- Exit medical certificates for all staff that were issued with an entry permit
 - Access permits for all staff that were entered site with a permit

2.3.5.3. Relevant payments may be withheld by the *Project Manager* until the data pack is submitted by the *Contractor*.

2.4. Health and Safety Risk Management

2.4.1. General

- 2.4.1.1. The *Contractor* complies with all relevant Eskom health and safety policies and procedures, with emphasis on the health and safety requirements contained in the Majuba Safety, Health & Environmental Specification (RA/RM/STD/01).
- 2.4.1.2. The *Contractor* performs all work according to OHSAS 18001.
- 2.4.1.3. The *Contractor* complies with the following:
- a. Eskom SHEQ Policy, 32-727.
 - b. SHE Requirements for Eskom Commercial Process, 32-726.
 - c. SHE Organisation, 240-28463367
 - d. Safety, Health and Environmental Specifications for *Contractors*, 240-30008949
 - e. OHS Act 85 of 1993.
 - f. Disaster Management Act 57 of 2002.
 - g. Eskom *Contractor* Health and Safety requirements standards, 32-136
 - h. Employees' Right of Refusal to Work in an Unsafe Situation Procedure, 240-43848327
 - i. Outbreak, Pandemic or Epidemic Disaster Response Plan, 240-100092892.

- j. Guidelines on the management of vulnerable employees during COVID-19 Pandemic, 240-155326818.
- k. Majuba Power Station COVID -19 Workplace Plan, MNGT/CMPLC/PLN/01.

- 2.4.1.4. The *Contractor's* Safety Plan must be prepared and submitted to the *Employer's* Safety Risk Officer for auditing and acceptance, as per the accepted programme and before any work can commence. The *Contractor's* Safety Officer liaises directly with the *Employer's* Safety Risk Officers regarding the Safety Plan and it is the *Contractor's* responsibility to arrange the appointments with the Majuba Safety Risk Officers. The Safety Plan (one or more files) is the *Employer's* requirement and remains the *Project Manager's* property and is always available on site for inspection and handed over to the *Project Manager* upon completion. The *Contractor's* Safety Plan file/s are kept neat, clean and up to date and audited monthly for the duration of the contract.
- 2.4.1.5. All of the *Contractor's* staff attend Safety Induction, presented by the MPS Risk Management Department.
- 2.4.1.6. Compensation for Occupational Injuries and Diseases (COID) Certificate and Letter of Good Standing must be valid at all times and included in the Safety Plan and re-submitted to the *Project Manager* upon the start of the contract and when renewed. These documents are also to be submitted to the Eskom vendor database by the *Contractor* before they expire.
- 2.4.1.7. The *Contractor* provides a monthly safety statistic report (man-hours worked) to the *Project Manager* on the first working day of each month for the duration of the contract. This report must indicate the *Contractor's* actual man-hours worked on Site as summed from the daily diaries and attendance registers and is not a generic extrapolation of the daily working hours multiplied by the number of people.
- 2.4.1.8. The *Contractor* is responsible for the provision of adequate and correct personal protective equipment (PPE) for the *Contractor's* staff during the entire works, which includes standard PPE such as safety boots, hard-hat, overalls, hearing protectors, safety glasses etc.
- 2.4.1.9. The *Contractor* ensures that all personnel are fully conversant with the emergency procedures to be followed in case of an incident.
- 2.4.1.10. The *Contractor* ensures cleaning of work areas and disposal of any scrap and waste materials generated is done continuously during the entire works.
- 2.4.1.11. MPS is a national key point and therefore industrial action/strikes are not permitted. Strikes are to be managed by the *Contractor* at his/her own cost. The *Contractor* takes all necessary measures to prevent such action during the period of the contract.
- 2.4.1.12. The *Contractor* has a dedicated Safety Officer on Site on a full-time basis and present at all times when work is performed to monitor activities and ensure compliance to SHE procedures.

2.4.2. Eskom Life Saving Rules

- 2.4.2.1. The *Contractor* Complies with the Eskom Life Saving rules as per the Eskom Life Saving Rules Directive, 240- 62196227.
- 2.4.2.2. The *Employer* takes a "ZERO TOLERANCE" approach towards Safety. The violation of any safety rule while performing work for or on behalf of the *Employer* may result in the *Project Manager* terminating the *Contractor's* obligation to perform work in terms of the contract with the *Employer*.

2.4.3. Reporting of Incidents

- 2.4.3.1. The *Employer* follows an incident prevention policy; refer to 32-95, Environmental, Occupational Health and Safety Incident Management Procedure, which includes the investigation of all incidents involving personnel and property. This is done to introduce control measures to prevent a recurrence of the same incident. The *Contractor* is expected to co-operate fully to achieve this objective. The *Project Manager or Supervisor* must be informed immediately of any incident before the end of the shift.
- 2.4.3.2. NOTE: The reporting of the incident to the *Project Manager* does not relieve the *Contractor* of his legal obligation to report incidents to the Department of Labour, or to keep records in terms of the Occupational Health and Safety Act, and Compensation for Occupational Injuries and Diseases Act.

2.4.4. Work Stoppages

- 2.4.4.1. The *Employer* takes safety seriously and therefore, lessons learnt from other safety lost time incidents (LTI), if and when they take place, are shared with all *Contractors* and employees on Site. These stoppages are compulsory and the *Contractor* cannot be allowed to claim additional compensation for these stoppages.
- 2.4.4.2. If the *Contractor* experiences an LTI, the *Contractor* is expected to prepare a presentation and present it at a work stoppage that is arranged by the *Employer* within three working days. The presentation template is provided by the *Project Manager*.

2.4.5. Vehicle and Driver Safety

- 2.4.5.1. All drivers, passengers and pedestrians must obey the vehicle safety requirements in terms of the National Road Traffic Act, Act No 93 of 1996, as amended, including other relevant provincial or local requirements.
- 2.4.5.2. With effect from 31 May 2006, no Eskom employee or *Contractor* is allowed to transport passengers on the back of light delivery vehicles (LDV's). It is a legal requirement to provide safe transportation for *Contractor* employees.

2.4.6. Vehicle Standard Minimum Specifications

- 2.4.6.1. *Contractor* vehicles are to comply with the requirements specified in the Eskom Vehicle Safety Specification 32-345.

2.4.7. Hot Work

- 2.4.7.1. When performing any hot work, the *Contractor* complies with the Generation Plant Safety Regulations, 36-681 and all local procedures.
- 2.4.7.2. Any Hot Work conducted on any part of the plant will be done per the following:
- Compliance with procedure 240-106628253 Standard for Welding Requirements on Eskom Plant
 - Quality requirements for welding according to ISO 3834
 - Refer to section 2.3.5 - Documentation Submissions at Contract Completion, for requirements for a welding package.

2.4.8. Confined Spaces

- 2.4.8.1. Confined Spaces are spaces such as Vessels, Mills, Culverts, Flues, Furnaces, Ducts, Pits, Sewers, Tunnels and Underground Chambers, refer to General Safety Regulation 5 of the OHS Act.
- 2.4.8.2. All work in confined spaces complies with the requirements of the OHS Act and the *Employer's Plant Safety Regulations*, 36-681.
- 2.4.8.3. The *Contractor* assesses, and allows in the rates, for any access challenges due to confined and restricted areas, existing structures and equipment etc., which may be encountered.
- 2.4.8.4. Any outage of sections of the plants required by the *Contractor* during this period is, as far as practicable, arranged to suit the convenience and requirements of the *Employer*.

2.4.9. Working at Heights

- 2.4.9.1. The *Contractor* complies with Eskom Working at Heights procedure, 32-418 and all other relevant procedures and regulations.

2.4.10. Lifting and Rigging

- 2.4.10.1. The *Contractor* complies with MPS Lifting and Rigging procedure, MAINT/MMD 103 75 and all other relevant procedures and regulations.
- 2.4.10.2. The *Contractor* is responsible to plan and organise all crane and lifting operations for the works.
- 2.4.10.3. The *Contractor* submits the following documentation before a crane (if required) is brought onto Site, for review and acceptance to the *Project Manager* and allows at least three working days for authorisation thereof:
 - a. Rigger and crane driver's proof of safety induction completed with certified ID copy and valid medical fitness certificate.
 - b. Rigger and crane driver's Site access permits.
 - c. Rigger and crane driver's competency certificates (proof of training).
 - d. Safe work procedure(s) for the crane, which includes rigging plans.
 - e. Detailed risk assessment specific to the Site work.
 - f. Valid load test certificates and monthly inspection sheets for all lifting gear.
- 2.4.10.4. All complex rigging is only done by a certified rigger and while a safety officer is in attendance.

2.5. Environmental Constraints and Management

- 2.5.1. Majuba Power Station is ISO 14001 2004 certified. The *Contractor* is required to ensure that all works are carried out as per the ISO 14001 standard and must comply with all policies and procedures including the following procedures:
 - 2.5.1.1. Eskom Waste Management Procedure, 32-245
 - 2.5.1.2. Majuba Waste Management Procedure, RA/ENV/06 and ENV/GEN/WI/12.
 - 2.5.1.3. Safety, Health & Environmental Specification for *Contractors*, RA/RM/STD/01.
 - 2.5.1.4. Emergency Preparedness and Response, 39-29.
 - 2.5.1.5. Eskom Smoking Policy, 32-1126.

2.6. Quality Assurance Requirements

2.6.1. Quality Control

- 2.6.1.1. The *Contractor* performs all work according to ISO 9001. The *Contractor* complies with Eskom's quality requirements as specified in Standard 240-10565800 (previously QM85), Supplier Contract Quality Requirement's Specification and all relevant quality requirements including those listed in section 6 - Plant and Materials Standards and Workmanship.
- 2.6.1.2. The *Contractor* ensures that a coordinated and formally documented management system is in place for the assurance of quality as specified in ISO 9001, Quality Management Systems Requirements.
- 2.6.1.3. The *Contractor* has dedicated, full-time Quality Controllers on Site at all times when work is performed. The work may not take place unless the relevant QC is present on site. The *Contractor* uses a Quality Controller for each engineering discipline as work is being performed, as part of the *works*.

2.6.2. Quality Control Plans

- 2.6.2.1. The *Contractor* develops QCP's for all activities to be performed during the *works*. The QCP's are grouped by the *Contractor* according to activities performed on and off site e.g. manufacturing, fabrication, welding activities and factory acceptance tests etc., as one QCP. Welding activities, electrical, C&I, civil engineering and mechanical works are in separate QCP's however, they are all in line with the breakdown of Section 1.2, *Employer's* Objectives and Purpose of the Works and section 3 - Engineering and the *Contractor's* Design.
- 2.6.2.2. These QCP's are reviewed and accepted by the *Project Manager* before any activity to which they apply commences. The *Project Manager* requires approximately one week for reviewing and approving QCP's.
- 2.6.2.3. The *Contractor* is responsible to verify that all information contained in Section 1.2, *Employer's* Objectives and Purpose of the Works and section 3 - Engineering and the *Contractor's* Design. Any discrepancies should be reported to the *Project Manager* and the specification amended or corrected.
- 2.6.2.4. The QCP's and therefore, the installation of all equipment is in alignment with the relevant manufacturer's maintenance/installation manual.
- 2.6.2.5. The *Project Manager* and the *Contractor* perform the QC according to the QCP documents supplied by the *Contractor* and accepted by the *Project Manager* for installation, calibration, loop checks to the operator stations and engineering station, cold commissioning and hot commissioning.
- 2.6.2.6. The *Contractor* issues preliminary notification of hold, witness and verification points by giving 5 working days in advance notice to the *Project Manager*.
- 2.6.2.7. Where holding points exist on the manufacturing QCP's, no manufacturing activity proceeds if the preceding activity on the manufacturing QCP was not approved by both the *Contractor* and *Employer's* representatives.
- 2.6.2.8. The *Project Manager* carries out quality inspections at his discretion and as per the pre-approved Quality Control Plan (QCP).
- 2.6.2.9. The *Contractor* allows for the following witness and hold points as a **minimum** in the respective QCP's:
 - a. Witness Points

- Cable testing before and after installation
 - On completion of power supply module installation,
 - On completion of cable installation and termination,
 - Loop checks,
 - Verification of alarm signals and response procedure.
- b. Hold Points
- Balancing of rotor assemblies
 - Verification testing,
 - Type testing of electrical motors
 - Routine testing of electrical motors
 - On completion of installation,
 - On completion of the Operational Acceptance Testing to ensure performance requirements are met.
 - Performance testing of compressors
 - Integration into DCS

2.6.3. Reliability and Availability

- 2.6.3.1. The reliability and availability of the control air compressor should be 95%.
- 2.6.3.2. The C&I spares to be available for a minimum of 10 years after installation.

2.6.4. Supply of Genuine OEM Manufactured and Supported Parts

- 2.6.4.1. The *Contractor* ensures that the quality of parts or items purchased and supplied to the *Employer* meets or surpasses all standards stipulated herein and is relevant to the Power Station environment. Suitable motivation and evidence are supplied to the *Employer* in all proposals.
- 2.6.4.2. The *Contractor* supplies items supplied strictly by the OEM or authorised dealers/agents/distributors of the OEM only, ensuring that continued after-sales services are offered. Documentary proof in the form of a letter and relevant contact details are submitted and the *Employer* verifies and accepts such information before the procurement or manufacturing process starts.
- 2.6.4.3. All items procured by the *Contractor* are not obsolete or flagged for obsolescence or discontinuation of support by the OEM or agent within five (5) years of purchase.
- 2.6.4.4. All items procured by the *Contractor* bear a minimum warranty/guarantee period of fifty-two (52) weeks against any defect arising, workmanship included. Any extended warranty/guarantee period offered which is greater than fifty-two (52) weeks for any procured item is stated in writing along with the details of the claims process to be followed by the *Employer* after the issue of a Defects Certificate.
- 2.6.4.5. Day-to-day maintenance will be done by either the *Employer's* employees or an appointed contractor. The *Contractor* therefore ensures that the relevant maintenance and operating procedures are provided in the manuals, refer to section 3.6.4 - Maintenance Instruction Manuals and Schedules, to ensure that the correct preventative and corrective maintenance can be performed by the appointed staff. The relevant training on the maintenance of the

compressors are provided as per section 5.2.9 - Training and Technology Transfer, to ensure that the warranty of the compressors are still valid for the minimum of fifty-two (52) weeks of the warranty period.

2.6.5. Covering of System Openings

- 2.6.5.1. All plant system openings (pipes, valves, vessels etc.) are kept covered by the *Contractor* except while work is being carried out at the point of opening. This is to prevent the introduction of foreign objects/material into the component or system during the work. The *Contractor* secures all covers and fasteners to ensure that they do not enter the systems. All foreign objects or materials entering by accident must be reported to the *Employer* and removed by the *Contractor* before closing the opening.

2.7. Programming Constraints

- 2.7.1. The *Contractor* provides an initial programme with the tender submission, which is aligned to section C2.2 - The Activity Schedule.
- 2.7.2. Within two weeks of the starting date, the *Contractor* provides a detailed, integrated programme to the *Project Manager* that incorporates all of the planned work activities to the lowest level, including activities of Subcontractor/s. It also includes System engineering design freeze, Factory Acceptance Test (FAT), Site Integration Testing (SIT), Operational Acceptance Testing (OAT), Plant system completion (Handover).
- 2.7.3. The *Contractor* performs the installation and commissioning in a phased approach in line with the preliminary outage plan as indicated in **Table 1: Preliminary Outage Plan for Majuba Power Station**. The *Contractor* notes that the outage plan changes frequently as electricity demand changes and requests an updated outage plan from the *Project Manager* at the contract start date and frequently during the contract execution.

Table 1: Preliminary Outage Plan for Majuba Power Station (16 July 2021 version)

Unit	Planned Start Time	Planned End Time	Outage Description	Planned Duration
5	2022/08/01 00:00:00	2022/11/13 23:59:00	Mini GO	105
3	2022/08/18 00:00:00	2022/09/11 23:59:00	IR	25
5	2022/12/08 00:00:00	2023/01/14 23:59:00	HSSD	38
4	2022/12/09 00:00:00	2023/01/15 23:59:00	HSSD	38
6	2022/12/10 00:00:00	2023/01/13 23:59:00	HSSD	35
1	2023/03/01 00:00:00	2023/03/28 23:59:00	IR	28
6	2023/04/07 00:00:00	2023/07/15 23:59:00	Mini GO	100
5	2023/10/13 00:00:00	2023/10/26 23:59:00	BTI	14
2	2024/04/01 00:00:00	2024/04/28 23:59:00	Interim repairs	28
3	2024/05/09 00:00:00	2024/07/18 23:59:00	GO	71
6	2024/05/20 00:00:00	2024/06/02 23:59:00	BTI	14
4	2024/05/23 00:00:00	2024/06/20 23:59:00	Interim Repairs	29
1	2024/08/21 00:00:00	2024/09/03 23:59:00	Boiler inspection	14
5	2025/04/27 00:00:00	2025/05/24 23:59:00	IR	28
6	2025/07/31 00:00:00	2025/08/27 23:59:00	IR	28
2	2025/08/01 00:00:00	2025/08/14 23:59:00	BTI	14
1	2025/09/05 00:00:00	2025/11/06 23:59:00	GO	63
3	2026/01/16 00:00:00	2026/02/19 23:59:00	IR	35
4	2026/02/10 00:00:00	2026/02/23 23:59:00	Boiler inspection	14
2	2026/04/13 00:00:00	2026/05/17 23:59:00	IR & Hydro	35

Unit	Planned Start Time	Planned End Time	Outage Description	Planned Duration
1	2026/05/25 00:00:00	2026/06/07 23:59:00	BTI	14
2	2026/09/15 00:00:00	2026/11/16 23:59:00	GO	63
5	2026/11/23 00:00:00	2026/12/06 23:59:00	BTI	14
3	2027/01/11 00:00:00	2027/01/24 23:59:00	BTI	14
4	2027/02/15 00:00:00	2027/02/28 23:59:00	BTI	14
6	2027/02/26 00:00:00	2027/03/11 23:59:00	BTI	14
4	2027/08/26 00:00:00	2027/10/27 23:59:00	GO	63
1	2027/11/15 00:00:00	2027/12/12 23:59:00	IR	28
2	2028/02/14 00:00:00	2028/02/27 23:59:00	BTI	14
5	2028/03/20 00:00:00	2028/04/02 23:59:00	BTI	14
4	2028/05/01 00:00:00	2028/06/04 23:59:00	IR & Hydro	35
5	2028/06/07 00:00:00	2028/08/08 23:59:00	GO	63
6	2028/09/10 00:00:00	2028/11/11 23:59:00	GO	63
3	2028/10/23 00:00:00	2028/12/10 23:59:00	MO & Hydro	49
6	2029/03/12 00:00:00	2029/03/25 23:59:00	BTI	14

- 2.7.4.** All documentation submissions for review and acceptance stated in the Works Information are also included in the programme with a time allowance of no less than one week made for review and acceptance unless stated otherwise. All lead times for the supply of items are also included.
- 2.7.5.** The programme is submitted electronically in MS Project (2010 version or any other version, which allows compatibility for viewing and editing) as well as PDF format and provides all activities and tasks with expected durations, resource allocations and start and completion dates.
- 2.7.6.** If the programme is suitable and agreed between the parties, the *Project Manager* accepts the programme otherwise changes are requested before re-submission. The first Accepted Programme becomes the baseline programme and subsequent, accepted changes are labelled as revisions in numerically ascending order.
- 2.7.7.** The Accepted Programme becomes a live document by which the *Contractor* controls all work packages and activities.
- 2.7.8.** The *Contractor* completes the works by the completion date specified in the *Contractor's* Accepted Programme.
- 2.7.9.** Thereafter, the *Contractor* updates the programme at least weekly, including updating the actual dates and durations, while optimising remaining activities to ensure that the original planned completion date is met. The programme updates are submitted each Monday morning by noon. The *Project Manager* may request more frequent programme updates, including daily if required, at any time during the works and it is the *Contractor's* responsibility to comply.
- 2.7.10.** Non-submission of the initial programme results in a twenty-five percent (25%) deduction from the first assessment amount due. This amount is only paid in the next assessment, dependent upon submission, review and acceptance of the programme.
- 2.7.11.** Non-compliance to the completion date on the programme results in claims for delay damages by the *Project Manager*.
- 2.7.12.** Completion of any activity on the programme is achieved only upon sign-off of the relevant hold/witness/verification point by the *Project Manager*.

2.8. Contractor's Management, Supervision and Key People

- 2.8.1.** The *Contractor* appoints a competent contract representative or contract manager to manage contractual issues, as and when required. Regular Site visits and attendance of all meetings called by the *Employer* is essential.
- 2.8.2.** A competent Site manager, with at least two years of experience with similar projects, oversees the works on a full-time basis.
- 2.8.3.** Supervision is provided by a competent supervisor or foreman, with at least two years of experience with similar projects and remains in attendance during all work and on a full-time basis.
- 2.8.4.** A competent safety officer oversees safety management on a full-time basis. The safety officer is present for Site inspections and attends contract meetings, safety meetings, work stoppages, incident investigations etcetera.
- 2.8.5.** All other appointed staff are competent to provide the service required.

2.9. Pricing

- 2.9.1.** The Price List provided by the *Employer* is not a bill of quantities. The *Contractor* is responsible to read and understand the scope of work for each item in the Price List and to price each activity so that all items/services/competencies of expense are supplied and used to complete the activity to meet the *Employer's* standards of quality, specifications and performance specified within the stated duration (Accepted Programme) and at no additional cost to that priced by the *Contractor*.
- 2.9.2.** The Price List provided by the *Employer* for tendering includes as many of the activities determined as relevant for the execution of the works as possible through the planning stages. The *Contractor* (tenderer) however, remains responsible to price fully and correctly for the works ensuring that the *Employer's* Price List is completed in full and any relevant items which are omitted, are added to the Price List, thereby ensuring that the final Price List covers the provision of the entire works.
- 2.9.3.** All other items of expense not listed in the *Employer's* Price List is specified in detail and added by the *Contractor* below or on a separate sheet. Any item(s) not stated by the *Contractor* but necessary to Provide the Works are accepted as being included in the pricing and are not claimable during the works.
- 2.9.4.** The quantities provided by the *Employer* are only estimated and the *Contractor* confirms and corrects them upon tendering.
- 2.9.5.** The *Contractor* enters quantities, units, rates and prices where none are shown (no rates without quantities should be entered) or corrects them if necessary where they are already entered.
- 2.9.6.** All prices are VAT exclusive however, VAT is claimable upon invoicing.

2.10. Invoicing and Payment

- 2.10.1.** The *Contractor* submits a detailed Forecast Rate of Invoicing (FRI) by the assessment date and thereafter, provides an update every four weeks from the contract start date. The FRI breakdown corresponds to section C2.2 - The Activity Schedule using a detailed Excel spreadsheet and indicates the planned phasing of invoicing and assessment.

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- 2.10.2.** The *Contractor* prepares and submits his assessment of work completed to the *Project Manager* on or before the assessment day. The *Contractor*, *Project Manager*, quantity surveyor, engineer and quality controller/s visually inspect the works to verify the actual progress. The *Project Manager* decides on the actual progress achieved and determines what activities may be assessed and invoiced.
- 2.10.3.** A payment or assessment certificate is supplied with the service entry (SE) and goods receipt (GR) number/s to the *Contractor*, which is signed by both the *Project Manager* and the *Contractor*.
- 2.10.4.** Within one week of receiving a payment or assessment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice showing the amount due for payment equal to that stated in the *Project Manager's* payment or assessment certificate.
- 2.10.5.** The *Contractor* addresses the tax invoice to Eskom Holdings SOC Ltd. and includes on each invoice the following information:
- a. Name and address of the *Contractor* and the *Project Manager*;
 - b. The contract number and title;
 - c. *Contractor's* VAT registration number;
 - d. The *Employer's* VAT registration number 4740101508;
 - e. Description of service provided for each item invoiced based on the Price List;
 - f. The total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT; (add other as required)
- 2.10.6.** The *Contractor* attaches the detailed payment or assessment certificate of the amount due to each tax invoice showing the Price for Work Done to Date for each item in the Price List for work, which he has completed.
- 2.10.7.** The invoices can be submitted using emails to invoiceseskomlocal@eskom.co.za
- 2.10.8.** To facilitate payment, the *Contractor* must ensure the following:
- 2.10.8.1. The Eskom contract number and order number is clearly indicated on your invoice together with the line number on the order being billed for.
 - 2.10.8.2. All electronic invoices must be sent in PDF format only.
 - 2.10.8.3. Each PDF file contains one invoice; or one debit note; or one credit note only as Eskom's SAP System does not support more than one PDF being linked into the workflow at a time.
 - 2.10.8.4. The *Contractor's* e-mail may contain more than one PDF file (e.g. 2 invoices on 2 separate PDF files in one e-mail)
 - 2.10.8.5. For foreign invoices, the *Contractor* is required to physically deliver hard copies of original documents to the respective documentation management centres even though the *Contractor* has e-mailed those invoices
 - 2.10.8.6. A PDF file that was created directly from a system meets the definition of the original document and is allowed (including saving documents from Excel to PDF, Word to PDF etc.)
 - 2.10.8.7. An Invoice that was printed and then scanned to PDF by the *Contractor* is not acceptable as this is not an original tax invoice by SARS definition but a copy.
 - 2.10.8.8. The following wording needs to appear on the invoice: "Your invoice is encrypted to comply with SARS requirements that invoices and statements sent electronically are tamperproof."

- 2.10.8.9. If Cost Price Adjustment (CPA) applies to the invoice, it is recommended that the *Contractor* issue a separate invoice for CPA to allow the rest of the invoice to be paid, while resolving the CPA issues, if required.
- 2.10.8.10. The *Contractor* does not require a goods receipt (GR) number before submitting the invoices. When the GR number is however received, the *Contractor* can send the GR number to the FSS contact centre at FSS@eskom.co.za or 011 800 5060.
- 2.10.8.11. All queries and follow-ups on invoice payments are made by contacting the FSS Contact Centre: Tel: 011 800 5060.
- 2.10.9. Payment is made within 30 days or 14 days after receipt of an acceptable invoice at the address stated in the order and the acceptance of the goods by Eskom. Payments are made on Tuesdays and Thursdays only.
- 2.10.10. If CPA is applicable, the *Project Manager* and the *Contractor* must confirm the increase/decrease with the QS department BEFORE the revised prices are stated on the invoice. The QS and *Project Manager* must confirm the escalation with the Financial Department before it may be implemented.
- 2.10.11. The value stated on the Invoice must be the same as the value stated on the order. If the Invoice value is different from the order value, payment of the invoice may be delayed. If there are any discrepancies on the invoice, it must be rectified with the *Project Manager* BEFORE it is submitted for payment.

2.11. Contract Change Management

- 2.11.1.1. Any item that affects the prices or has the potential to do so, is immediately communicated to the *Project Manager* or the *Contractor* via an early warning and/or followed by a claim for compensation event with a quotation.
- 2.11.1.2. After consideration, the *Project Manager* may agree and the *Contractor* may implement the compensation event accordingly. Not all claims are necessarily compensation events nor do quotes have to be accepted unchanged since the *Project Manager* performs an evaluation and approves justifiable costs only.
- 2.11.1.3. All invoices or documentary proof, calculations, invoices etc. for a compensation event claim are submitted to the *Project Manager* for assessment purposes.

3. Engineering and the *Contractor's* Design

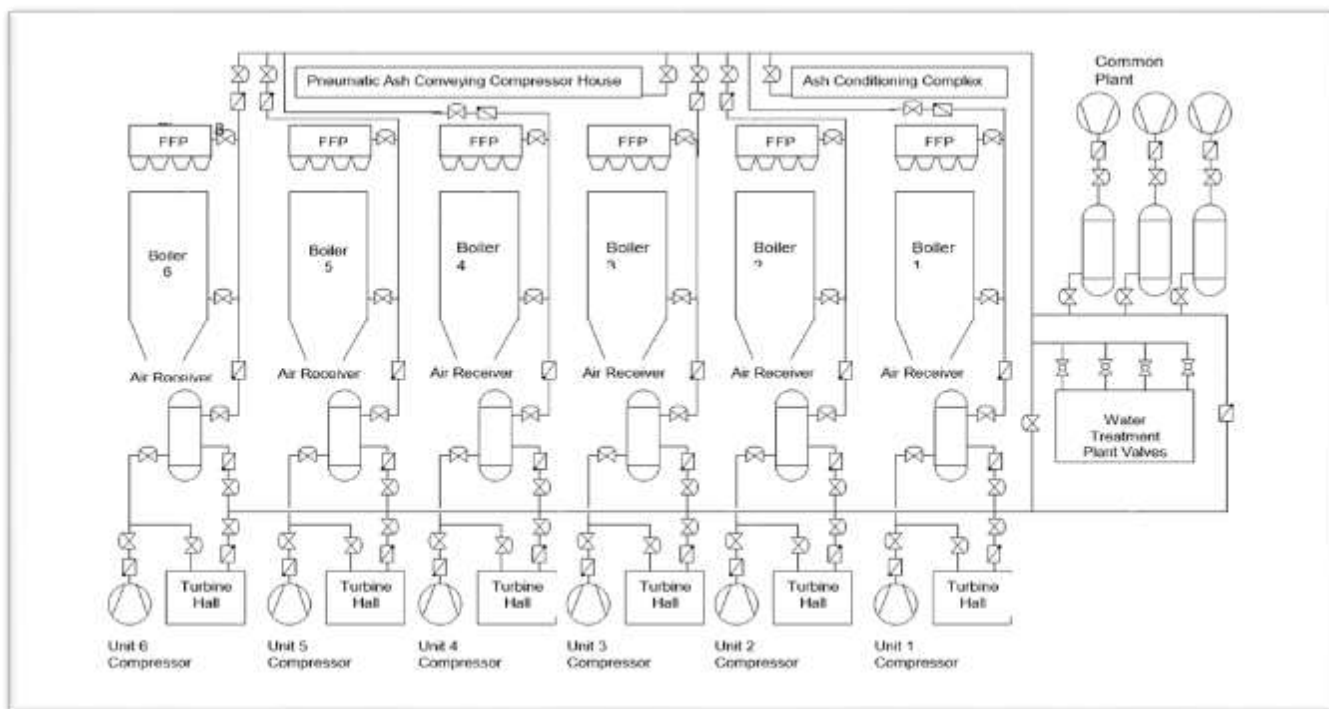
3.1. Employer's Design

3.1.1. Plant Description

- 3.1.1.1. The control air plant is designed to provide instrument air for control applications on the station. The air should meet the following requirements:
 - a. Receiver pressure of 700kPa(g)
 - b. Moisture dew point of minus (-) 40°C better than class 2 according to ISO 8573-1
 - c. Oil-free (oil contamination better than class 1 according to ISO 8573-1)
 - d. Dust Contamination better than class 1 according to ISO 8573-1
- 3.1.1.2. Control air (synonymous with instrument air) is used for several essential systems at the Power Station. The main function of the compressed control air system is to provide an uninterrupted supply of dry, oil-free compressed air to essential consumers.

- 3.1.1.3. The compressor train is responsible for generating the air of the required quality, volume and pressure to the control air receivers after which the air distributes to the various consumers through a network of pipework.
- 3.1.1.4. The location of the nine (9) compressors is as follows:
- Six (6) Unitised Compressors at the Turbine floor, 5ml of each unit.
 - Three (3) Common Plant Compressors on 0ml at the Common Plant building.
- 3.1.1.5. Majuba was designed with a unitised control air system (six (6) control air compressors), which is also provided with three (3) Common Plant control air compressors. During normal operation, Majuba requires seven (7) compressors to operate (with one (1) backup supply to the units and one (1) backup supply for the Common Plant).
- 3.1.1.6. Also, the control air is backed up by the service air system, which consists of an additional two (2) Service air compressors on the Common Plant. The common range system provides redundancy on the system and allows maintenance to be done on the unitised compressors without affecting the operation of the unit.
- 3.1.1.7. The interconnecting pipes between the unit and the common range are fitted with NRV's to prevent air from being "back-supplied" from the unit compressor into the range. This setup ensures that backup from the common range is only realised once the unit pressure drops to below the common range pressure.
- 3.1.1.8. The control air compressors and their auxiliaries interface to the DCS. Unit 3-6 and the three (3) Common Plant compressors feed from a 380V electrical supply and have soft starters. Unit 1 and 2 feed from the 6.6kV electrical supply.
- 3.1.1.9. There are currently nine (9) reinforced concrete plinths (one for each compressor). The layout of the compressed air system is shown in **Error! Reference source not found..**

Figure 1: Control air system



3.2. Parts of the Works which the *Contractor* is to Design

3.2.1. General

- 3.2.1.1. The *Contractor's* design and the works comply with the standards listed in section 6 - Plant and Materials Standards and Workmanship, with all national and international standards required to Provide the Works and with professional engineering practice and standards for Fossil Fuel Fired power plants.
- 3.2.1.2. Drawings, data, or information submitted by the *Employer* to the *Contractor* does not relieve the *Contractor* from the responsibility for the design and execution of the *works*.
- 3.2.1.3. The *Contractor* designs the works for the environmental conditions prevailing at Majuba Power Station Site
- 3.2.1.4. The compressors and dryer assemblies, designed and provided as part of the works, have local Engineering and Maintenance support and repair and maintenance facilities in South Africa. The *Contractor* submits proof of local Engineering and Maintenance support with the design.
- 3.2.1.5. The compressors, dryer assemblies and all related equipment provided as part of the works are standardised across the Majuba Power Station Control Air system. This is to ensure simplified spares holding, maintenance, and engineering requirements.
- 3.2.1.6. Should the *Contractor* require any additional information from the *Employer* for his design, the *Contractor* submits a formal request through correspondence with the *Project Manager*.

3.2.2. Mechanical Design

- 3.2.2.1. The newly upgraded control air plant provides clean, dry, oil-free compressed air to the users at Majuba Power Station, which meets the following requirements:
 - a. Discharge Pressure: 700 – 800 kPa(g)
 - b. Dew Point: minus (-) 40 °C PDP
 - c. Max Oil Content: < 0.1 mg/m³
 - d. Max Particle Size : < 1 micron

3.2.2.2. The Compressors

- a. The *Contractor* supplies nine (9), electrical driven, centrifugal oil-free compressors. Six (6) Unit Compressors, each with a capacity of 22m³/min while the remaining three (3) Common Plant Compressors each has a capacity of 41.3m³/min. The six (6) Unit Compressors will be water-cooled and three (3) Common Plant Compressors will be air-cooled. The six (6) replacement Unit Compressors must use the same auxiliary water flow rate of the original design. The *Contractor* ensures that the pressure drop across the coolers is taken into consideration and ensures that the correct heat transfer occurs so that the compressors' inter-stages are sufficiently cooled.
- b. The three (3) Common Plant Compressors auxiliary cooling supply must be decommissioned, refer to section 1.2.8.8 for more information. For the Common Plant Compressors, which are air-cooled the *Contractor* includes the ducting requirements for cooling as part of the design.
- c. The machines are designed, complete with the instruments and transducers.

- d. All new compressors are supplied with permanent lifting lugs and adequate provisions are made by the *Contractor* for safely lifting and handling the total weight of the compressor assembly including the electrical motor.
- e. The compressors are designed to operate efficiently under all possible site environmental conditions as specified in the table below:

Table 2: Site Environmental Characteristics Parameters

Characteristic	Minimum	Maximum	Normal
Ambient air temperature	-12°C	37.2°C	35°C
Relative Humidity	20%	80%	60%
Altitude	-	-	1720m
Ambient Pressure	82.42 kPa (abs)	82.42 kPa (abs)	82.42 kPa (abs)

- f. All compressors have a permanently fixed stainless steel/trifoliate data plate in a conspicuous place with the following minimum particulars:
 - Name of the manufacturer;
 - Country of Origin;
 - Compressor model;
 - Year of manufacture;
 - Manufacturer's serial number;
 - Design pressure in units of Pascal;
 - Design pressure in unit Pascal;
 - Design temperature for both minimum and maximum in degrees Celsius;
 - Capacity in cubic meters;
 - Input voltage and frequency in units of volts and hertz;
 - Rated power and current in units of watts and ampere respectively;
 - Unique mark of an approved inspection authority as applicable;
 - The hazard category complies with the requirements of SANS 347;
 - Compressor KKS identification number.

3.2.2.3. Intake Air Filters

- a. Each compressor is supplied with an intake air filter.
- b. The new intake filter is located at the same position as the existing intake air filters.
- c. The filter assembly meets the following requirements:
 - The filter is supplied with differential pressure transmitters to measure the pressure drop across each of the two stages.
 - Each filter stage has its pressure transmitter.
 - The differential pressure signal is displayed locally and remotely.

- The measuring range of differential pressure transmitter includes the minimum and maximum expected pressure drop across that filtration stage.
- d. All filters have a permanently fixed stainless steel data plate in a conspicuous place with the following minimum particulars:
 - Name of the manufacturer;
 - Filter model and size;
 - Year of manufacture;
 - Filter KKS identification number.

3.2.2.4. Air Dryer assemblies

- a. Each compressor is fitted with a dedicated desiccant heatless dryer. The dryer assemblies have the following features:
 - The dryer assemblies deliver air with a pressure dew point of at least minus (-) 40°C at all times.
 - The dryer performance characteristics are based on sizing with an inlet air pressure of 700 kPa (g), an inlet temperature of 35°C and an inlet air relative humidity of up to 100%.
 - The compressed air pressure drop across the dryer does not exceed 30 kPa based on an inlet pressure of 700 kPa (g).
 - Each dryer is a packaged unit including an onboard controller. The controllers control the individual dryer discharge pressure dew point at the set point.
 - The dryer has a variable purge discharge control function to economize the dryer air consumption.
- b. If the design noise from the dryer assembly, when in operation exceeds 85 dB, the *Contractor* clearly states this in the design documentation. If this design is accepted by the *Employer*, the *Contractor*, supplies and affix proper signage for hearing protection in the area, after consulting with the *Project Manager* on the exact position for the signage.
- c. The pressure vessels of the dryer assemblies meet all the requirements of the OHS Act, Pressure Equipment Regulations.
- d. Each dryer is fitted with at least three filters, namely the water separator, the oil filter and the after-filter. These filters meet the following requirements:
 - The after-filter has a filter element that removes particles down to 0.1 microns.
 - The oil filter has a filter element that removes oil aerosols down to 0.01 micron.
 - The water separator has a filter element that removes particles down to 3 microns.
 - The pressure drop across each filter does not exceed 30 kPa (g) at which point a filter replacement signal is generated.
 - Each filter is fitted with a digital pressure transmitter, which will have a local display and transmit a signal to the C&I system.

- Each filter has a zero loss water trap. The water separator condensate drain can remove all the water that condenses within the compressor, under all operating conditions.
- e. All the individual dryer units have the following general features as a minimum:
 - Inlet and outlet air connections;
 - Regeneration air outlet;
 - Dryer outlet pressure dew-point control;
 - Pressure dew-point monitor with an alarm;
 - Safety valve/s on dryer units are sized for the capacity of the compressor upstream of the dryer.
 - Installed with permanent lifting lugs and adequate provisions are made for safely lifting and handling the total weight of the dryer.
- f. All dryer assemblies have a permanently fixed stainless steel/trifoliate data plate in a conspicuous place with the following minimum particulars:
 - Name of the manufacturer;
 - Country of Origin;
 - Dryer model and size;
 - Manufacturer's Serial number;
 - Year of manufacture;
 - Design pressure in unit Pascal;
 - Design temperature for both minimum and maximum in degrees Celsius;
 - Capacity in cubic meters;
 - Input voltage and frequency in units of volts and hertz;
 - Power and current in units of watts and ampere;
 - Pressure dew-point;
 - Unique mark of an approved inspection authority as applicable;
 - The hazard category complies with the requirements of SANS 347;
 - Dryer KKS identification number.

3.2.2.5. Pressure Vessels Requirements

- a. Dryer assemblies and filters comprise pressure vessels, which meet all the requirements of Occupational Health and Safety Act Pressure Equipment Regulations and 474-10327
- b. If the dryer assemblies are newly manufactured the pressure vessel design code is the latest version of PD5500, Specification for unfired fusion welded pressure vessels.
- c. The welding of the pressure vessels complies with 240-106628253 – Standard for Welding Requirements on Eskom Plant. Welding-related personnel meet the minimum qualification requirements of 240-106628253 – Standard for Welding Requirements on Eskom Plant. All NDT testing meets the requirements of 240-106628253 – Standard for Welding Requirements on Eskom Plant.

- d. The specification of the flanges meets that of the interfacing piping (existing or new). Each flange nozzle is protected by a wooden blank during loading, transportation, offloading, and installation to protect against damage.
- e. Each dryer and filter vessel (if applicable) have a separate permanently fixed data plate in a conspicuous place on the vessel with the following minimum particulars complying with OHS Act PER:
 - Name of the manufacturer;
 - Country of Origin;
 - Model and size;
 - Manufacturer's Serial number;
 - Year of manufacture;
 - Design pressure in unit Pascal;
 - Design temperature for both minimum and maximum in degrees Celsius;
 - Capacity in cubic meters;
 - Input voltage and frequency in units of volts and hertz;
 - Power and current in units of watts and ampere;
 - Pressure dew-point;
 - Unique mark of an approved inspection authority as applicable;
 - The hazard category complies with the requirements of SANS 347;
 - Dryer KKS identification number.
 - Cooling Water System
- a. The existing cooling water compressor supply and return pipework of 50NB is used for the replacement Unit Compressors.
- b. The existing cooling water compressor supply and return pipework of 50NB is decommissioned at the Common Plant Compressors.
- c. The existing cooling water dryer supply and return pipework of 32NB must be used for the replacement dryer assemblies.

3.2.2.6. Piping System Requirements

- a. The air piping meets the following requirements:
 - Pipes of diameters smaller than 150NB meet the requirements of SANS 62.
 - Pipes larger than 150NB meet the requirements of SANS 719.
 - Flanges connecting to the equipment meet the requirements of the interfacing equipment flanges
 - Flanges connecting adjoining pipes meet the requirements of SANS 1123: Pipe flanges
 - All piping slope in the direction of airflow.
 - Interfaces with users are positioned on the top of the pipe to prevent moisture carry-over.

- All piping is categorised complying with SANS 347 “Categorisation and conformity assessment criteria for all pressure equipment”.
 - Steel piping is hot-dip galvanised and comply with SANS 121 “Hot dip galvanised coatings on fabricated and steel articles – Specifications and test methods” unless otherwise specified in the Works Information.
 - All air piping is sized such that the velocity of air does not exceed 9 m/s and it does not exceed the pressure drop of 2.5 to 50 kPa per 100 m of delivery pipe.
 - The piping and fittings for the compressed air supply and distribution are designed according to the latest version of the OHS Act PER and the approved international standard EN 13480 (All parts).
 - Fittings (elbows, bends, tees and reducers) between 15NB and 50NB are suited for socket welding as far as possible and comply with BS EN standards.
 - Fittings of 65NB and larger are suited for butt-welding and comply with or BS EN standards.
- b. Mixing of codes (ASME or BS EN) is not permitted. The *Contractor* uses only BS EN standards through the system until terminal points.
- c. Screwed fittings are only allowed for 25 NB and smaller.
- d. To satisfy the service conditions the criteria for valve selection are based on the approved international standard EN 13480 (All parts) Piping (20). All valves have a minimum pressure rating of 1 000 kPa and comply with BS EN standards.

3.2.2.7. Isolation Valves on Compressed Air

- a. Isolation Valves larger than 32NB are flanged stainless steel ball valves. Where diaphragm valves are present these diaphragm valves can be retained.
- b. Isolation valves smaller than 25NB are lever operated threaded end stainless steel ball valves
- c. Flanged gate valves are used for all drain and vent valves
- d. The *Contractor* submits the pipe datasheets, pipe schedule as part of the complete design to the *Project Manager* for acceptance. The *Contractor* marks all pipework associated with the works with the description of the medium and direction of flow displayed and visible from a normal operating perspective, complying with SANS 10140-3 and SANS 1091.

3.2.2.8. Corrosion Protection

- a. The compressor and dryer components are externally coated complying with the coating system listed in the table below or the Supplier’s equivalent coating standard. The Supplier’s standard colours may be used.
- b. All internal components are suitably protected against corrosion, considering the environmental conditions. Refer to Table 2: Site Environmental Characteristics Parameters.
- c. All piping is galvanised, except for small bore tubing which is stainless steel.
- d. All piping, fittings and flanges are hot-dipped galvanized complying with SANS 121: Hot-dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods.

- e. Pipes are painted according to 240-145581571 - Standard for the Identification of the contents of pipelines and vessels.

Table 3: Corrosion protection specification for compressors and dryer assemblies

Process	Activity	Density Functional Theory
Surface Preparation:	Abrasive blast-clean to Grade Sa 2,5 (ISO 8501-1).	
Primer Coat	Apply by brush, airless spray or dipping, one coat Single Pack Etch Primer.	15 to 25 micrometres
Undercoat:	After allowing sufficient time for the primer coat to dry, apply by brush or airless spray, one coat of Alkyd Universal Undercoat.	20 to 30 micrometres.
Final Coat:	After allowing sufficient time for the undercoat coat to dry, apply one coat of High Gloss Alkyd Enamel.	25 to 30 micrometres
Total:	Total dry film thickness of coating system:	60 to 85 micrometres
General:	After installation, lining up, grouting etc., all damage shall be repaired and coatings made good to the Engineer's approval	

3.2.3. Control and Instrumentation Design

- 3.2.3.1. The *Contractor* operates the compressor train from the Majuba DCS systems. The *Contractor* requests the operating philosophy and protection settings for the proposed new compressor train, from the original equipment manufacturer (OEM).
- 3.2.3.2. The *Contractor* provides functional system documentation (see VDSS) as part of an upfront system workshop. The functional system documentation submitted for reviews to the *Employer* within 45 days of contract award. The purpose of this package is to verify and ensure the works to be designed and supplied are in line with the envisaged scope and requirements set out in this document. This package may include the following:
- System description document (breakdown of the system)
 - Functional diagrams (providing mechanical functions)
 - Signal & Alarm lists (normal signals and alarms used)
 - Functional logic diagrams (providing control & protection insight)
 - Philosophy documents (Operating alarm control and protection narrative)
- 3.2.3.3. The upfront system workshop will accommodate three (3) of the *Employer's* engineers at the *Contractor's* offices.
- 3.2.3.4. The *Contractor's* design includes the replacement of control wiring and a local control panel. The current local control panel of the plant may be modified by the *Contractor* after acceptance by the *Project Manager*.
- 3.2.3.5. All compressor auxiliaries, including the air dryer and cooling water pump, are supervised by the DCS systems and all the monitored signals will be linked to the station historian by the *Employer's* Engineering staff. The *Contractor* provides the final signal list, which will be linked from the DCS to the station historian, to the *Project Manager* for acceptance before implementation commences.
- 3.2.3.6. The existing signal list from the DCS to the station historian will be modified by the *Employer* with the final signal list provided by the *Contractor* to include the signals provided for the new compressor.

-
- 3.2.3.7. All installed equipment by the *Contractor* is controlled from the Majuba DCS platforms. No stand-alone systems will be accepted or approved.
- 3.2.3.8. The *Contractor* produces the design philosophy (operating, control, protection and alarming philosophy) of the compressors.
- 3.2.3.9. The *Contractor* supplies the Functional Logic Diagram/philosophy that is replicated in the Unitised DCS (Siemens) and the Common Plant DCS (ABB AC450).
- 3.2.3.10. The *Contractor* supplies the alarming philosophy that is replicated in the DCS control platforms, The *Contractor* conforms to alarm rationalisation and aligns with the alarm response procedure supplied by the *Employer*.
- 3.2.3.11. The protection philosophy is submitted to the *Project Manager* for acceptance as part of the design.
- 3.2.3.12. A Local Control Panel (LCP) operates the equipment locally when required. An emergency push button is installed on the LCP as described in section 3.2.4.7, Emergency Pushbutton.
- 3.2.3.13. Majuba Control and Instrumentation C&I Engineering assist the *Contractor* with the interfaces to the respective Unit Siemens DCS Platforms. (See LOSS_CIU).
- 3.2.3.14. The *Contractor* provides the *Employer* as part of the design, with the proposed HMI graphic design, operational constraints and optimising efforts that will be required during the configuration and commissioning phase on the Unit DCS. (See LOSS_CIU).
- 3.2.3.15. The *Contractor* obtains and manages a subcontractor for HMI and Functional Logic Configuration during the configuration and commissioning phase for the Outside plant DCS. (See LOSS_CIO).
- 3.2.3.16. The *Contractor* is responsible to make the necessary design changes to the Common Plant ABB DCS-AC450. Due to the ABB system integrating to other critical plant areas, only HMI Technician(s) or Engineer(s), with the required ABB DCS-AC450 software design knowledge and experience will be given access to the system by the *Employer* and be allowed to make the software changes. Refer to section 4.1.1 - Minimum Requirements of People Employed on the Site, for the minimum qualification requirements for the HMI Technician(s) or Engineer(s). The *Contractor* may choose to outsource/sub contract this part.
- 3.2.3.17. *Contractor* to approve and signs off configuration and commissioning done by the *Employer's* C&I Engineering on the Unit DCS's and the *Contractor*/Subcontractor on the Common Plant DCS.
- 3.2.3.18. The HMI graphics are to be configured according to the *Contractors* HMI Graphics design.
- 3.2.3.19. The *Contractor* ensures that the specialised resources above are also available during the commissioning phase of the project, as required by the *Employer*.
- 3.2.3.20. The *Contractor* reviews and updates all compressor plant-related software and hardware drawings for the Common Plant DCS during the design and installation.
- 3.2.3.21. All field equipment, local control panels and junction boxes comply with 240-56355815 - Field Instrument Installation Standard: Junction Boxes and Cable Termination. All local control panels and junction boxes are:
- IP 65 rated as a minimum
 - Installed with the appropriate earthing, refer to 240-56356396 - Earthing and lightning standard
 - Not installed against any vibration equipment
 - Manufactured from types 316 or 304 stainless steel

- e. Cable entrance and exit from the bottom via additional stainless steel glands and gland plates
- f. Termination connections are 6 mm² and spring-loaded terminals.

3.2.3.22. All C&I trunk and field cables are UVG_ACMV black with white stripe.

3.2.4. Electrical Design

3.2.4.1. The air compressors are equipped with a suitably sized 380V motor capable of driving the compressors to achieve maximum load conditions. The electrical motor is controlled via a 380V soft starter, furthermore, the control air compressors and motors are supplied in tandem as a complete compressor assembly.

3.2.4.2. The *Employer* submits red lined/marked-up drawings and schedules to the *Contractor*, these drawings and schedules indicate the changes that are required to reflect on the revised drawings and schedules.

3.2.4.3. The *Contractor's* electrical and associated electrical components' design and specifications include the following:

3.2.4.4. Low Voltage (LV) Switchgear - Units 1 and 2

- a. The LV switchgear circuits selected for the control air compressors for Units 1 and 2 are reflected in Table 4 below, the specification concerning the components to be utilised is as follows:
 - 380 unit board 1 – 11 BFA06CA001 (LV fuses required – 3 x TM500A)
 - 380 unit board 2 – 21 BFA06AA001 (LV fuses required – 3 x TM500A)
- b. For Units 1 and 2, the *Contractor* ONLY changes the fuses on the abovementioned circuits as the circuits are equipped with the correct isolators and fuse holders.
- c. The *Contractor* designs, supplies and installs all the components of the feeder circuit. Panels are assessed to confirm if the chosen isolators fit in the panel.

Table 4: Compressor electrical supply list

No	Board Name	Circuit	Area
1	380V station essential board 1	01 BNA06CA001	Common Plant
2	380V station essential board 2	02 BNA08BA001	Common Plant
3	380V station services building boards 1	01 BHC07AA001	Common Plant
4	380V unit board 1	11BFA06CA001	Unit 1
5	380V unit board 1	21BFA06AA001	Unit 2
6	380V unit board 1	31BFA06AA001	Unit 3
7	380V unit board 1	41BFA06AA001	Unit 4
8	380V unit board 1	51BFA06AA001	Unit 5
9	380V unit board 1	61BFA06AA001	Unit 6

3.2.4.5. Low Voltage Switchgear - Units 3 to 6

- a. The *Contractor* reviews the current LV switchgear circuit design and establishes if the current switchgear circuitry is appropriate for the new installation.

- b. The *Contractor* proposes modifications required to the current electrical circuitry if needed. Such proposal will be reviewed by the *Employer's* relevant System Engineer. If the proposed option is agreed upon, the *Project Manager* will issue formal instruction to the *Contractor* to proceed with the modification.

3.2.4.6. Low Voltage Switchgear - Common Plant

- a. The power supply for the compressors on the Common Plant is taken from:
 - 380V station essential board 1 – 01 BNA06CA001
 - 380V station essential board 2 – 02 BNA08BA001
 - 380V station services building boards 1 – 01 BHC07AA001
- b. The feeder circuits for these three supplies comprise of 400V, 3 Pole, 630A isolator and 630A fuse.
- c. The *Contractor* designs, supplies and installs all the components of the feeder circuit. The *Contractor* assesses the panels before design submission, to confirm if the chosen isolators fit in the panel.

3.2.4.7. Emergency Pushbutton

- a. An emergency push button is installed for each of the local control panel (LCP) of the control air compressors. The emergency push button (E-stop) is required to immediately trip the compressor when activated and directly interfaces with the electrical control circuitry. Each E-stop must have two (2) separated potential-free normally closed contacts. One E-stop contact is a 24V DC from the switchgear and the other E-stop contact is 24V DC from DCS.

3.2.4.8. Electrical Motors

- a. The *Contractor* designs, manufactures, tests, supplies, delivers, installs and commissions each control air compressor's main drive motor.
- b. The *Contractor* correctly sizes the electrical motors, which operate at a nominal voltage of 380V/400V and is capable of being installed in the area designated for the control air compressors.
- c. The LV electrical motors comply with 36-472 - Procurement of Power Station Low Voltage Electric Motors.
- d. The LV motors are supplied with permanent lifting lugs and adequate provisions are made by the *Contractor* for safely lifting and handling the total weight of the motor.
- e. The LV electrical motors are required to interface with the currently installed cabling systems concerning Units 3-6. The location of the power, star-point and instrumentation terminal and junction boxes do not interfere with the current cabling system.
- f. The *Contractor* notes that the design of the motor and compressor train does not require the extension or re-routing of the current cable infrastructure. The *Contractor* visits the site to obtain and confirm measurements and design information concerning the current electrical system layout.

3.2.4.9. Soft Starters

- a. The design of the nine (9) control air compressors and dryer assemblies include a dedicated soft starter for each compressor.
- b. The 380V electrical motor is driven via the soft starter to reduce the starting current required from the supply boards.
- c. The soft starters are sized according to the electrical motor and compressor technical specifications and are standardized throughout.
- d. The entire soft starter system is designed, installed and commissioned by the *Contractor* with a fully functioning system handed over to the *Employer*. The *Contractor* ensures that the new soft starters are designed to interface with the existing plant/installations.
- e. The soft starters are designed and installed with an interface on the outside of the panels that allow the user to interface with the soft starter.
- f. Training of all site personnel with regards to the operations, maintenance and troubleshooting of the soft starter devices are required.
- g. Common Plant
 - The *Contractor* removes the current soft starters and installs the new soft starters in the same panels. The *Contractor* assesses the current panels to confirm if the chosen soft starters fit in the panels.
 - The *Contractor* installs three (3) compressor and soft starter sets.
- h. Units 1 and 2
 - The *Contractor* notes that currently there are no soft starters installed on these two units.
 - The *Contractor* installs two (2) new compressor and soft starter sets, which includes cabling, new panels to house the soft starters, switchgear as well as C&I interfacing.
- i. Units 3 to 6
 - The *Contractor* removes the current soft starters and installs the new soft starters in the same panels. The *Contractor* assesses the current panels to confirm if the chosen soft starters fit in the panels. If the selected soft starters do not fit in the current panels, the *Contractor* installs the soft starters into newly installed panels.
 - The *Contractor* installs four (4) compressor and soft starter sets.

3.2.4.10. Cabling Works

- a. The cabling works involve the decommissioning of 6.6kV electrical apparatus utilised on Units 1 and 2. The cables as listed in

Table 5 are disconnected and removed from the plant rendering these cables decommissioned.

Table 5: Cable decommissioning table

Cable KKS	Cable from	Cable to
07-12BCA0010QFES	12BCA10AA001	10QFA20AN001 -M01
07-22BCA0010QFES	22BCA10AA001	20QFA20AN001 -M01

- b. The *Contractor* develops and submits a formal decommissioning process procedure, for acceptance by the *Project Manager*. The *Employer's* engineering personnel may provide input on the *Contractor's* request. All electrical drawings, summary sheets and cable schedules are updated to reflect the changes made on the plant.
- c. The control air compressors installed on Units 3 to 6 are driven via a 380V electrical motor of which is energised via a soft starter. A similar design concerning the reticulation and cable routing has been opted for hence this section focuses on the cabling works required at Units 1 and 2 of Majuba Power Station.
- d. The design of the cabling system mimics that of which was implemented on Units 3 to 6, therefore the cable routes for Units 1 and 2 for both the soft starter and the control air compressor motor is stipulated in Table 6. These are the same routes utilized at Units 3 to 6. Plant standardization is achieved by implementing the same cable route design. The installation of additional cable support structures is not anticipated for this particular scope concerning the design opted for, however, the *Contractor* confirms this during the design process.
- e. Table 7 contains the suggested bill of materials that will be required for the cabling works, which is confirmed by the *Contractor* during the design and before procurement thereof starts. The cables selected are adequately rated for the power required to supply both the soft starter and motor. Cable sizing calculations were performed by the *Employer*, which informed the selection of the cables listed in Table 7. The *Contractor* verifies the cable sizes during the design process.
- f. The *Contractor* supplies, delivers, obtains site acceptance through testing, installs and commissions the low voltage power cables at Units 1 and 2 at Majuba Power Station as follows:
 - Cables meet the following specifications:
 - i. Unarmored
 - ii. Low voltage (600/1000V)
 - iii. General PVC insulated with flame-retardant reduced halogen emission PVC outer sheath and bedding (emit a mass of not more than 15% halogen).
 - All low voltage (600/1000V) cables comply with SANS 1507 and SANS 1411 parts 1 and 2.
 - The cable is as per the specifications in Table 7 and below:
 - i. Three cores: Red – Yellow or White – Blue
 - ii. Two cores: Red – Black
- g. The *Contractor* tests all cables before and after installation. A calibrated megohmmeter is utilised to test cables with 110V grade insulation or higher. Low voltage cables are tested at 500VDC. Only insulation readings less than 50MΩ will be accepted by the *Project Manager*. The *Contractor* submits the calibration certificate for the

megohmmeter as well as the cable test certificates to the *Project Manager* for acceptance.

- h. All cable lengths specified in this works information are based on estimates, thus the *Contractor* verifies it on *site* before the design is completed and procurement starts.
- i. The *Contractor* lays the required cables on the respective cable support structures via the route specified in Table 6. The *Contractor* straps the cables onto the cable racks with heavy-duty nylon cable ties.
- j. The *Contractor* lugs all cables with flat type lugs. Hook blade type lugs are preferred for all 2.5mm² cable. The *Contractor* terminates the cables at the allocated switchgear circuit/source equipment with stud bolts (if applicable). All connections are performed as per the recommended torque settings for metric sized bolts with property classes based on ISO 898/1.

Table 6: Cable route information for Units 1 and 2 CAC LV cabling

Cable Description	Cable Rack KKS	From		To		Approximate Distance	Cable Type
UNIT 1							
Aux. Cable (HN1)	10UBX03BQ253	PS CCT	Unit * 380V Unit Board 1 Panel 11BFA06CA001	10QFA20GH001	U1 CAC Soft Starter Cubicle	13.6m	BVV02DCV
Power Cable – SS Cubicle (HM1)	10UBX03BQ253	PS CCT	Unit * 380V Unit Board 1 Panel 11BFA06CA001	10QFA20GH001	U1 CAC Soft Starter Cubicle	12m	BVV03SCV
Power Cable – Motor (HM1)	10UBX03BQ206	10QFA20GH001	U1 CAC Soft Starter Cubicle	10QFA20AN001 – M01	U1 CAC Main Drive Motor	64.7m	BVV03SCV
	10UBX03BQ209						
	10UBX03BQ236						
	10UBX03BQ237						
	10UBX03BQ289						
	10UBX03BQ299						
UNIT 2							
AUX. CABLE (HN1)	20UBX03BQ253	PS CCT	Unit * 380V Unit Board 1 Panel 21BFA06AA001	20QFA20GH001	U2 CAC Soft Starter Cubicle	13.6m	BVV02DCV
Power Cable – SS Cubicle (HM1)	20UBX03BQ253	PS CCT	Unit * 380V Unit Board 1 Panel 21BFA06AA001	20QFA20GH001	U2 CAC Soft Starter Cubicle	12m	BVV03SCV
Power Cable – Motor (HM1)	20UBX03BQ206	20QFA20GH001	U2 CAC Soft Starter Cubicle	20QFA20AN001 – M01	U2 CAC Main Drive Motor	64.7m	BVV03SCV
	20UBX03BQ209						
	20UBX03BQ236						
	20UBX03BQ237						
	20UBX03BQ289						
	20UBX03BQ299						

Table 7: Materials required for the routing of low voltage power cables needed for the Control Air System Upgrade Project

Item	Description	Estimated Quantities
1	BVV02DCV – 600/1000V, Two Core, General PVC Insulated, General PVC Covered, 2.5mm ² , Stranded Copper, General PVC Sheathed Cable	50m
2	BVV03SCV – 600/1000V, Three Core, General PVC Insulated, General PVC Covered, 185mm ² , Stranded Copper, General PVC Sheathed Cable	200m
3	Cable Termination Kit – LV; 185mm ² Cable	4
4	Cable Termination Kit – LV; 2.5mm ² Cable	4
5	Cable Gland - 2.5mm ² ,Two Core Cable	4
6	Cable Gland - 185mm ² ,Three Core Cable	4
7	Industrial Ultra Heavy Duty (Nylon/UV Black) cable ties – L: 70-100cm; W:>= 1.27cm; T: 0.23cm	200

3.2.5. Civil Design

- 3.2.5.1. The *Contractor* executes all civil work according to SANS 1200, SANS 10100 and 240-56364545 - Structural Design and Engineering. Where products are not catered for within these standards, the *Contractor* adheres to material datasheets.
- 3.2.5.1. The *Contractor* performs an on-site investigation and geometrical measurements; i.e. re-bar scanning, concrete strength tests or any other non-destructive testing methods to ascertain the reinforcement within the concrete slab, produces as-built drawings for the concrete slab and determines the load capacity by the back-calculation process.
- 3.2.5.2. The new static and dynamic loading of the compressors do not exceed the existing compressor loads. The maximum weight of the new compressors is 2800kg. The dimensions of the new compressors do not exceed the space availability of the existing plinths.
- 3.2.5.3. Existing civil and structural plant components are analysed complying with SANS 10100-1 to verify their load capabilities before design commences. The *Contractor* utilises SANS 10160-1 for all loading requirements and all design values should be the maximum permissible loads on the structural components.
- 3.2.5.4. The *Contractor* assesses the capacity of the compressor plinths, supporting ground slab and the dryer plinths. If the supports do not have sufficient capacity, the *Contractor* designs a modification for the supports or replace the supports with new structures that meet the load requirements. The design is submitted to the *Project Manager* for acceptance before work starts.
- 3.2.5.5. The design process follows 240-56364545 - Structural Design and Engineering Standard. The steps below outlines the deliverables specified:
 - a. The *Contractor* performs adequate calculations and design checks to show that the existing compressor plinths have the load-bearing capacity for the new compressors with adequate factor of safety. The *Contractor* takes vibrations or dynamic loading into account.
 - b. The *Contractor* performs adequate calculations and design checks to show that the existing dryer plinths have the load-bearing capacity for the new dryer assemblies and that the dryer assemblies fit on the plinths.
 - c. The *Contractor* checks the concrete strength of the plinths if deemed necessary.

3.3. Procedure for Submission and Acceptance of *Contractor's* Design

- 3.3.1. The *Contractor* submits a request to the *Project Manager* to provide KKS coding for the works, refer to section 3.4.1.1, Plant Codification. The *Contractor* updates all design documents with the KKS codes before submitting the document packages to the *Project Manager* for acceptance.
- 3.3.2. The *Contractor* provides the detailed design freeze documentation packages indicated in the VDSS, to the *Project Manager* for review and acceptance.
- 3.3.3. The 240-53113685 - Design Review Procedure is followed for the review of the *Contractor's* design at the end of the detailed design phase. The *Contractor* ensures that at least thirty (30) working days' notice is provided before the design freeze and any acceptance is required. All documentation required for the detailed design review is submitted before the start of the thirty (30) working day notice period. The *Contractor* provides an allowance for this design review in the project programme.

- 3.3.4.** Interim reviews are recommended to ensure that major issues are rectified during the design phase and to prevent delays that could result from an End-of-Phase review being rejected.
- 3.3.5.** The *Contractor* provides a detailed design package comprising of documents and drawings as shown in the VDSS. The *Contractor* ensures that the detailed design is reviewed, approved and signed off by both a mechanical or process engineer, and an electrical or C&I engineer. Both engineers are professionally registered with ECSA.
- 3.3.6.** The detailed design package is presented to the *Employer* in an End-of-Phase review meeting. The review meeting will either accept or reject the design package, where after the design will be frozen. The End-of-Phase review is a milestone and hold point in the project and is approved before moving onto the next phase.
- 3.3.7.** The *Contractor* keeps records of any Engineering changes after the design freeze and documents and motivates changes in a report. This report is submitted to the *Project Manager* for acceptance.
- 3.3.8.** The *Contractor* notes that incomplete design submissions are rejected for re-work and re-submission by the *Contractor*. The *Contractor* allows for time in the schedule to address comments from the review and for rework if required.
- 3.3.9.** The *Contractor* only starts with procurement, fabrication or manufacturing, supply and installation once the design is accepted and written approval to implement the solution is provided by the *Project Manager*.
- 3.3.10.** The final handover package, including all As-built drawings and datasheets for the new control air compressor system, is signed off by the *Employer's* Engineering staff and *Contractor* representative before contract completion.
- 3.3.11.** The *Contractor* is the Design Authority that can approve the design documentation. The *Employers* design reviewers can only accept/not accept documentation issued by the Design Authority.

3.4. Other Requirements of the *Contractor's* Design

3.4.1. Plant Labelling and Codification

3.4.1.1. Plant Codification

- a. KKS coding is applied during the design stage and cross-referenced to all arrangement drawings, schematics, instructions and manuals and where practical to spare parts list/manuals. The *Employer* is responsible to provide the KKS coding, according to 240-93576498 - KKS Coding Standard. The *Contractor* provides an electronic list with the descriptions of all items, components, equipment, etc. that has to be coded, in table format (MS Word or preferably MS Excel). As a minimum the *Contractor* covers the following documents' equipment into the list:
- Mechanical
 - i. Piping and Instrumentation Diagrams (P&IDs)
 - ii. Interface list
 - iii. Process flow diagrams (PFDs)

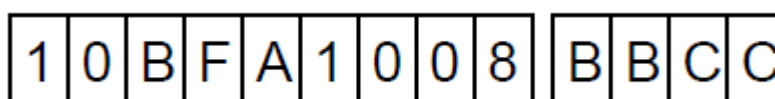
- Electrical
 - i. Single line diagrams
 - ii. Electrical board general arrangements (GA)
 - iii. Electrical board summary sheets
 - iv. Cable schedule
 - v. Updating of the cable route drawings
 - C&I
 - i. C&I architecture drawings
 - ii. C&I Cubicle GA
 - iii. Cable block diagrams
 - iv. Remote control signal lists
 - v. Cable schedules
 - Civil
 - i. Site layouts
 - ii. Building layouts
 - iii. Building sectional layouts
 - iv. Building floor plans per level
 - v. Underground services layouts
 - vi. Cable rack & support
 - vii. Building lists (including room equipment lists)
- b. The *Project Manager* arranges the coding of the plant and submits the coded lists back to the *Contractor*. The *Contractor* allows five (5) days for issuing of KKS coding in the project programme.
- c. The specific KKS code of each item of *works*, equipment, component, measuring point, junction box, cable etc., appears on all documents, instruction manuals, schedules (i.e. load schedules, drive and actuator schedules, instrument schedules, etc.), lists (i.e. board parts lists, alarm lists, signal lists, etc.), drawings (i.e. flow diagrams, loop diagrams, termination diagrams, functional logic diagrams, general arrangement, schematic diagrams, cable block diagrams, etc.) and labels for *works*, equipment and components.
- d. The *Contractor* codes all documentation above, before submission to the *Project Manager* for review and acceptance.

3.4.1.2. Labelling

- a. All new equipment installed by the *Contractor* is labelled appropriately as per the Eskom Plant Labelling Standard, 240-71432150. The *Contractor* is responsible for ensuring familiarity with the standards, specifications and concepts of the coding system as applied by the *Employer*.
- b. The *Contractor* manufactures, supplies and securely fits all new labels onto the plant with the correct backing plates and strapping. The *Contractor* submits a

- sample of the labels for acceptance by the *Project Manager* before manufacturing and supplying the batch/es of labels for installation on the plant.
- c. The *Contractor* may request assistance from the *Employer* via the Plant Codification Section for further clarity.
 - d. No replacement or changes are made to plant labelling or codification outside the battery limits of the *works* unless damaged by the *Contractor* or if stated otherwise by the *Employer*.
 - e. All KKS labels are installed in a similar location for each similar item of the plant across all six (6) Units and at the Common Plant at Majuba Power Station.
 - f. The *Contractor* labels all electrical cables complying with the following:
 - All internal cables are tagged and labelled with KKS numbers provided by the *Contractor*. Internal cables are labelled with standard PVC K-Type flexible cable markers and more than 13 digit carrier strips and attached on both ends with suitable cable ties (T18R or T30R, depending on cable thickness).

Figure 2: An example of a PVC K-Type flexible cable marker with a 13 digit carrier strip.



- Electrical cable number tags are fixed to the cables as follows:
 - i. One tag inside a floor-mounted cubicle, switchboard etc. visible through an open door.
 - ii. One tag below the cubicle, switchboard etc. to permit the identification of the cable from below the fire barrier or other seal of the floor opening above which the board is mounted.
 - iii. One tag at the cable entry into the field mounted equipment (for cubicles with top or side entry or where a cable enters an enclosure from an open run only one tag just below the cable gland is required).

3.4.2. Technical Risk Assessment

- 3.4.2.1. The *Contractor* highlights any foreseen risks, documents and implements mitigating measures. These risks are captured in a risk assessment report and submitted to the *Project Manager*.

3.4.3. FMEA (Failure Mode and Effect Analysis)

- 3.4.3.1. The *Contractor* carries out formal Failure Mode and Effect Analysis (FMEA) on the complete compressor system. The analysis complies with the 240-49230046 - Failure Mode and Effect Analysis (FMEA) Guideline.
- 3.4.3.2. The *Contractor* submits the FMEA to the *Project Manager* for review and acceptance.

3.4.4. System Interfaces

- 3.4.4.1. The *Contractor's* design includes all system interfaces, which are required to provide the Works.
- 3.4.4.2. The *Employer* provides the relevant information defining the system interfaces. The *Contractor* caters for all the identified interfaces in the design.

3.5. Use of *Contractor's* design

- 3.5.1. There are no restrictions on the *Employer's* use of the *Contractor's* design.
- 3.5.2. The *Employer* may use, copy and distribute the *Contractor's* design for any purpose including use for procurement, construction, modification, alteration and demolition of the works.
- 3.5.3. The *Contractor* grants the *Employer* full rights and ownership of the *Contractor's* design, drawings, datasheets, specifications and other documentation obtained as part of the works.

3.6. As-built drawings, operating manuals and maintenance schedules

3.6.1. As-built drawings

- 3.6.1.1. The *Contractor* provides both construction and distinctly marked As-built drawings in Micro Station (DGN) format as well as Tiff and/or PDF formats. Three (3) A1 size, hard copies and an electronic copy of each drawing is submitted to the *Project Manager*.
- 3.6.1.2. The documentation indicated in the VDSS must be available before installation and are necessary to conduct commissioning activities. The creation, issuing and control of all drawings are complying with the latest revision of the Engineering Drawing Standard 240-86973501.
- 3.6.1.3. The *Contractor* includes the *Employer's* drawing number in the drawing title block. Drawing numbers are assigned by the *Employer* as documents/drawings are developed.

3.6.2. Submission and Acceptance of Manuals

- 3.6.2.1. The *Contractor* submits one set of the manuals in draft for final review and acceptance by the *Project Manager*. The *Contractor* allows for time in the schedule to address comments from the review and for rework if required.
- 3.6.2.2. Hand over cannot be done unless the manuals are accepted.
- 3.6.2.3. After acceptance by the *Project Manager*, the *Contractor* submits three (3) sets of the final version of the manuals in hardcopy and three electronic copies (on discs).
- 3.6.2.4. Relevant payments may be withheld by the *Project Manager* until the data pack is submitted by the *Contractor*.

3.6.3. Operating Manuals

- 3.6.3.1. The operating manuals are fully comprehensive and cover all plants and plant equipment installed. The manuals contain at **least** the following:
 - a. High-level plant design philosophy
 - b. Plant general description
 - c. Plant operating principles

- d. Normal plant operating conditions
- e. Abnormal Plant Operations and recovery
- f. Plant Operating limits and set points and performance specifications
- g. Routine plant inspection requirements
- h. Operating procedures:
 - Plant inspections including pre-start and running checks
 - Operating of plant
 - Alarm responses
 - Mechanical and electrical isolations and de-isolations
 - Hazards and precautions

3.6.4. Maintenance Instruction Manuals and Schedules

3.6.4.1. The maintenance instruction manuals are fully comprehensive and cover all plants and plant equipment installed. The manuals are used by the *Employer's* technical staff to evaluate performance, trace faults, adjust, maintain and fully understand the plant and plant equipment. The manuals contain at least the following:

- a. Detailed plant design philosophy
- b. Plant general and functional descriptions
- c. Plant limits and set points and performance specifications
- d. Plant control configuration
- e. Fully detailed maintenance and inspection schedules for plant services at daily, monthly, three-monthly, six-monthly, yearly and any other necessary intervals
- f. Manufacturer's and supplier's detailed maintenance and lubrication instructions
- g. Diagrams and sectional drawings giving part numbers, descriptions, etc.
- h. General maintenance procedures, covering removal, dismantling, inspection, replacement of parts, re-erection, checking, reassembly, re-commissioning and test-running for all equipment.
- i. Hardware manuals and wiring diagrams.
- j. Fault-finding and troubleshooting procedures including the FMECA.
- k. List of recommended spares and materials and related transport and storage instructions
- l. Hazards and precautions

3.6.4.2. The *Contractor* to support Maintenance Strategy Manage Work (MSMW) project by updating the maintenance strategy templates.

4. Procurement

4.1. People

4.1.1. Minimum Requirements of People Employed on the Site

- 4.1.1.1. The *Contractor* provides qualified and competent personnel with the specified minimum qualifications and relevant post-qualification experience for the implementation of all of the *works*. All CV's with relevant qualifications and detailed experience are submitted to the *Project Manager* within four (4) weeks of the start date. All non-South African qualifications are certified by SAQA and proof of certification is supplied. The absence of SAQA certification or non-compliance to any of the *Employer's* requirements results in the *Contractor* immediately removing the affected employee/s for purposes of Providing the Works.
- 4.1.1.2. The *Contractor* appoints either a Contract Manager or a *Project Manager* who possesses documented competencies to manage the duties related to the management of the NEC contract and continuous project management. This person serves as the direct liaison for the *Employer's Project Manager* and also has the authority to make decisions and instruct all other *Contractor's* personnel, as and when required.
- 4.1.1.3. The *Contractor's* Contract Manager or *Project Manager* must have a valid technical National Diploma (e.g. Construction, Industrial, Civil, Mechanical, Electrical or C&I) as a minimum and have completed either a contract or project management qualification and possess proof of attending appropriate training e.g. NEC ECC course. Two years or more related on-job project management or management experience is required in a technical discipline. The Contract Manager or *Project Manager* is defined as the *Contractor's* key person. Attendance on site is required as and when necessary and upon instruction by the *Project Manager*.
- 4.1.1.4. The *Contractor's* Site Manager must have a valid technical National Diploma (e.g. Construction, Industrial, Civil, Mechanical, Electrical or C&I) as a minimum. Qualifications and training in contracts management and NEC3 are advantageous. Two years or more related on-job project management or management experience is required in one of the following technical disciplines: Construction, Industrial, Civil, Mechanical, Electrical or C&I. The Site Manager is defined as the *Contractor's* key person. Attendance on site is required on a full-time basis except by the *Project Manager's* approval to do otherwise.
- 4.1.1.5. Engineers responsible for reviewing, approving and signing off the detailed design package, must have the appropriate undergraduate engineering degree and professional registration with the Engineering Council of South Africa. Engineers are defined as the *Contractor's* key persons. Attendance on site is required as and when necessary and upon instruction by the *Project Manager*.
- 4.1.1.6. Supervisors are qualified and in possession of a valid National Diploma in a technical discipline (Mechanical/Industrial/Construction) and must have undergone supervisory training from a reputable institution. Two years or more of related experience is required. Supervisors must be knowledgeable about the conditions and Scope of Work contained in this contract and capable of overseeing the execution of the Scope of Work. Supervisors are defined as the *Contractor's* key persons. Attendance on site is required on a full-time basis for the appointed RP unless the *Contractor* ensures that a competent stand-in is provided without causing a delay.
- 4.1.1.7. Minimum Qualification Requirements for *Contractor's* Electrical Engineering Technicians: National N Diploma or National Diploma Electrical Engineering with three (3) years or more electrical-related experience.

- 4.1.1.8. Minimum Qualification Requirements for *Contractor* C&I Engineering Technicians: National N Diploma or National Diploma Engineering in Light Current or Control and Instrumentation with 3 years or more C&I related experience. Additionally, the *Contractor* provides personnel for the C&I works on the Outside Plant DCS who have at least three (3) years of experience specifically relating to the software design and the building thereof on the ABB DCS-AC450.
- 4.1.1.9. Minimum Qualification Requirements for *Contractor* Mechanical Engineering Technicians: National N Diploma or National Diploma Mechanical Engineering with three (3) years or more Mechanical related experience.
- 4.1.1.10. Minimum Qualification Requirements for *Contractor* Civil Engineering Technicians: National N Diploma or National Diploma Civil Engineering and familiar with SANS 1200, with three (3) years or more Civil related experience.
- 4.1.1.11. The relevant engineering personnel, as stated above, are required on site as and when the relevant discipline is performed as part of Providing the Works. Persons with lesser qualifications and experience may work under the full-time oversight of the above engineering personnel.
- 4.1.1.12. The minimum qualification requirements for the *Contractor's* Mechanical Artisans are Grade 12 or N3 and a Trade Test and 5 years related experience OR N4 and Trade test with a minimum of three (3) years related experience.
- 4.1.1.13. The minimum qualification requirements for the *Contractor's* C&I artisans are Grade 12 and N6 (C&I Technical) and Trade Test, with 5 years related experience OR a National Diploma (Engineering) Light Current or Control and Instrumentation with three (3) years related experience.
- 4.1.1.14. The minimum qualification requirements for the *Contractor's* Electrical artisans are Grade 12 and N6 (electrical) and Trade Test, with 5 years related experience OR a National Diploma (Electrical) with three (3) years related experience.
- 4.1.1.15. The minimum qualification requirements for the *Contractor's* Civil artisans are Grade 12 and a Diploma in Civil Engineering NQF 5 or Higher OR Trade Tested on Building and Construction, with three (3) years related experience. Civil artisans are also familiar with SANS 1200
- 4.1.1.16. Safety officer/s have a minimum of SAMTRAC or equivalent qualification and incident investigation training. Two (2) years of related experience is required.
- 4.1.1.17. All Quality Controllers for the various disciplines are qualified and in possession of a relevant, valid diploma (e.g. Mechanical, Civil, C&I etc.) with at least three (3) years related experience OR have a valid trade test certificate (e.g. fitter, instrument technician/mechanician etc.) with six (6) years related experience. Attendance on site is required on a full-time basis except by the *Project Manager's* approval to do otherwise.
- 4.1.1.18. Welding inspectors have at least one of the following qualifications as a minimum refer to 7.5 of 240-106628253 (WRB):
- a. SAIW Welding and Fabrication Inspector Level 2
 - b. IIW International Welding Inspector: Comprehensive (IWI- C)
 - c. IIW International Welding Inspector: Standard (IWI- S)
- 4.1.1.19. Welding Supervisors have at least one of the following qualifications as a minimum, refer to 7.4 of 240-106628253 (WRB):
- a. International welding specialist (IWS) in line with IIW document IAB-252R2-14 or

b. International welding practitioner (IWP) in line with IIW document IAB-252R2-14.

4.1.1.20. Welding Supervisors are defined as the *Contractor's* key persons.

4.1.1.21. Welders are all qualified according to BS EN ISO 9606 and be internationally qualified, refer to 7.2.2 of 240-106628253 (WRB). The *Contractor* ensures that proof of qualifications of the welders that perform the work is provided to the *Project Manager* at least three (3) weeks before any manufacturing work starting.

4.1.1.22. The *Contractor* uses in-house skills, where available, or employs suitable candidates using the recruitment process outlined in 4.1.2.1 or sub-contracts the services where necessary while ensuring that the *Employer* is informed and gives acceptance beforehand (see 4.2).

Table 8: Summary of People Requirements:

Designation	Academic Qualification	Minimum Level of Related Experience	Minimum QTY of people
Project / Contract Manager	Technical National Diploma (e.g. Construction, Civil, Industrial, Mechanical, Electrical or C&I) and management qualification (e.g. project management). NEC competency certificate	2 years	1
Site Manager	Technical National Diploma (e.g. Construction, Civil, Industrial, Mechanical, Electrical or C&I).	2 years	1
Engineers	Appropriate undergraduate engineering degree and professional registration with the Engineering Council of South Africa	2 years	1
Engineering Technicians (Civil, Mechanical, Electrical or C&I)	National N Diploma or National Technical Diploma in the relevant technical discipline (Civil, Mechanical, Electrical or C&I)	3 Years	1
Supervisor	Technical Diploma in a technical discipline (Mechanical/Industrial) and Supervisory training	2 years	2
Quality co-ordinator/controller Mechanical	<ul style="list-style-type: none"> Technical diploma (Mechanical /Industrial) OR N4 and Trade test 	3 years OR 6 years	1
Quality co-ordinator/controller C&I	<ul style="list-style-type: none"> Technical qualification (C&I) OR Valid trade test 	3 years OR 6 years	1
Quality co-ordinator/controller Civil	<ul style="list-style-type: none"> Technical qualification (Civil) OR Valid trade test 	3 years or 6 years	1
Safety Officer	SAMTRAC and Incident investigation	2 years	1
Mechanical Artisans	<ul style="list-style-type: none"> Grade 12 or N3 and a Trade Test OR N4 and Trade test 	5 years (N3) or 3 years (N4)	
C&I staff	<ul style="list-style-type: none"> Grade 12 and N6 (C&I Technical) and Trade Test OR National Diploma (Engineering) Light Current or Control and Instrumentation 	5 years N6 or 3 years N Dip	
Civil staff	<ul style="list-style-type: none"> Grade 12 and a Diploma in Civil Engineering NQF 5 or Higher OR Trade Tested on Building and Construction AND familiar with SANS 1200 	3 years	1
Welding Inspectors	<ul style="list-style-type: none"> SAIW Welding and Fabrication Inspector Level 2 OR IIW International Welding Inspector: Comprehensive (IWI- C) OR IIW International Welding Inspector: Standard (IWI- S) 	2 years	1

Designation	Academic Qualification	Minimum Level of Related Experience	Minimum QTY of people
Welding Supervisors	<ul style="list-style-type: none"> International welding specialist (IWS) in line with IIW document IAB-252R2-14 OR International welding practitioner (IWP) in line with IIW document IAB-252R2-14. 	2 year	1
Welders	Internationally qualified to BS EN ISO 9606	1 year	1

Where the minimum quantities of people are not specified in the table above, the *Contractor* enters the planned quantities into a similar table and submits to the *Project Manager* with the organogram.

4.1.2. Supplier Development, Localisation and Initiatives (SDL&I) Requirements

In terms of SDL&I, Local means from within the borders of South Africa unless specified otherwise.

4.1.2.1. Recruitment of General, Semi-Skilled, and Skilled Labour

- a. The *Contractor's* Permanent Core Team, including general, semi-skilled, and skilled labour is only allowed on Site based on the Organogram provided to the *Project Manager* to establish the numbers before this team comes to Site. The *Contractor* provides proof of permanent employment before contract placement, with the *Contractor* or Subcontractor to the *Project Manager* for all Core Team staff members.
- b. The *Contractor* recruits all additional recruits, as a minimum of general labour, semi-skilled labour and where possible skilled labour from Dr Pixley Ka Seme local municipality, using the recruitment process, prescribed below:
 - Job Advertisements are submitted to the *Project Manager* for review and acceptance from the Majuba Recruitment Sub-Committee.
 - The *Contractor* advertises the approved job advertisements for positions in the local newspaper: "The Recorder". Accepted advertisements should reach the newspaper's offices by Tuesday before 16:00, for the advertisement to appear in the Thursday edition of the paper. The Recorder's contact number is 017 735 1532.
 - Closing dates for submission of applications are at least 7 days after the advertisement appeared in the newspaper.
 - The *Contractor* places containers, clearly marked with the advertisement, in each of the local municipal offices:
 - i. Wakkerstroom
 - ii. Volksrust
 - iii. Daggakraal
 - iv. Perdekop
 - v. Amersfoort
 - The *Contractor* collects the containers with applications from the local municipal offices after the closing date and delivers them to site to a location where the CV's will be verified.

- The *Employer* arranges for Members of the Recruitment Sub-Committee to verify CV's collected (by the *Employer*) for purposes of ensuring that applicants are indeed from the local areas.
 - The Recruitment Sub-Committee supplies a verified list to the *Project Manager* as well as to the *Contractor* with all the verified CV's, which is collected by the *Contractor*
 - The *Contractor* shortlists and interviews only verified applicants. A list of successful candidates accompanies the team for verification during site induction. The *Contractor*, as proof that the verification process was followed, keeps shortlisted CV's.
 - If new recruits could not be found after two rounds of advertising, the Stakeholder Forum has to provide approval to recruit from a wider area.
 - In an event that new recruits are not from the defined Dr Pixley Ka Seme municipality, the *Contractor* needs to provide proof that the local municipality could not provide such individuals, i.e. proof of the above process being followed without placement of suitable candidates.
- c. The *Contractor* may not work outside of the above process.

4.1.2.2. Supplier Development, Localisation and Initiatives Plan and Reporting

- a. In addition to recruiting all new recruits as per the process described in section 4.1.2.1, **Error! Not a valid bookmark self-reference.** above, the *Contractor* complies with the SDL&I requirements as set out in the SDL&I report (part of tender returnable).
- b. To comply with the SDL&I requirements, the *Contractor* is required to;
- Provide a high-level SDL&I implementation plan, which stretches for the duration of the contract within one month after the contract *starting date*.
 - As part of this plan, the *Contractor* submits proposals to the *Project Manager* for review and acceptance on planning for employment and training of local labour - refer to SDL&I Matrix.
 - As part of the plan, the *Contractor* submits a Human Resource Plan indicating the number of new jobs that would be created and the number of new jobs that would be retained due to this project.
 - The *Contractor* provides an explanation and action plan for deviation from the proposed plan, if and when applicable.
 - The candidates for skills development are sourced firstly from within the Dr Pixley Ka Seme area, then Gert Sibande District, then Mpumalanga Province, before the rest of RSA is considered.
 - The candidates are either developed directly by the *Contractor*, through the *Contractor's* supply network or the SETA accredited training providers.
 - Candidates are either currently unemployed graduates from FET (Further Education and Training) colleges, universities or matriculants. These candidates must also be representative of the population demographics of the Mpumalanga Province.

- The *Contractor* updates the *Project Manager* as well as the Department of Labour if there is a change in the staff compliment e.g. dismissal, resignation, etc.
- The *Contractor* submits an updated, monthly SDL&I feedback report and monthly job statistics on the 1st day of each month, using the reporting template that is provided by the *Project Manager*.

4.1.2.3. Transportation and Accommodation

- The *Contractor* uses transportation sourced from the Dr Pixley Ka Seme Municipality local taxi association. If company transport is utilised, the *Contractor* submits proof to the *Project Manager* that such vehicle is owned by the *Contractor*.
- Contact details of the Chairpersons of the different associations are confirmed with the *Project Manager* after contract award. Current contact information is as follows:

Area	Chairperson	Contact Number
Amersfoort Taxi Association	Mr Mbonani	072 179 7498
	Mr Tshabalala	079 571 8099
Daggakraal Taxi Association	Mr MC Kubheka	079 381 8594
	Mr Thabethe	076 726 8196
Volksrust, Perdekop and Wakkerstroom	Mr Mdluli	073 997 2705

- Amersfoort and Daggakraal, each have their own Association and Volksrust, Perdekop and Wakkerstroom areas fall under one Association.
- The *Contractor* complies with 32-345 - Eskom Vehicle Safety Specification, whether using company or taxi vehicles, as applicable for *Contractors*.
 - The *Contractor* provides suitable transportation for all personnel to and from Site and also on Site, when necessary.
 - The *Contractor* provides delivery vehicles (trucks or LDV's) to deliver/remove all equipment and materials to/from Site. LDV's are also required to move materials on Site, when required.
 - The *Contractor* ensures that all levels of permanently employed personnel receive accommodation at local guesthouses or lodges and that no employee is asked to source their own accommodation. No accommodation allowances are paid instead of guesthouse or lodge accommodation. Locally employed personnel neither receive accommodation nor shall the *Employer* pay for their accommodation. Monthly invoices are submitted to the *Project Manager* for assessment purposes.

4.1.2.4. Support of Local Small, Micro and Medium Enterprises (SMME)

- The *Contractor* supports local SMME by purchasing equipment, tools and materials locally where such equipment, tools and materials are available.
- The *Contractor* supplies a list of all suppliers used for the procurement of equipment, tools and materials and supplies their B-BBEE certificates upon request.
- Where equipment, tools and materials are not locally available, the *Contractor* provides proof thereof and the proposed alternative supplier(s).

4.2. Subcontracting

4.2.1. Preferred Subcontractors

- 4.2.1.1. The *Contractor* must inform the *Project Manager* when intending to subcontract any part of the works from the *Employer's Works Information*. Such notice is given as soon as the *Contractor* becomes aware of the need to subcontract.
- 4.2.1.2. The *Contractor* may subcontract by using NEC or other types of contract.
- 4.2.1.3. The *Contractor* submits the proposed contract data for each subcontractor for acceptance to the *Project Manager*.
- 4.2.1.4. If the *Contractor* subcontracts work, he is responsible for providing the Works as if he had not subcontracted. This contract applies as if a Subcontractor's employees and equipment was the *Contractor's*. Delays by the Subcontractor are treated as delays by the *Contractor* therefore, the *Contractor* is fully responsible for subcontracted services.
- 4.2.1.5. All Subcontractors need to be accepted by the *Project Manager* before the Subcontractor may be allocated work by the *Contractor* or be brought to work on Site. Therefore, all relevant information including police clearance, proven company expertise (certification), experience, references and CV's and qualifications of skilled workers are required.
- 4.2.1.6. The *Contractor* submits the Subcontract agreement/contract documentation and an evaluation report of Subcontract tenders to the *Project Manager*.
- 4.2.1.7. The *Contractor* only employs competent Subcontractors.
- 4.2.1.8. Where the Subcontractor is required to do physical work on Site, the *Contractor* provides details of the experiences of the mentioned Subcontractor as well as a list of references involving work of a similar nature.
- 4.2.1.9. The *Contractor* indicates on a table as shown below, the names of any Subcontractors (when known) whose services may be used to provide the *works*. The *Contractor* provides a short description of the work it is proposed to sub-contract to each, together with an approximate value of the work to be executed by each.
- 4.2.1.10. Notwithstanding the inclusion of a Subcontractor name below, the *Contractor* obtains the written acceptance of the *Project Manager* before the employment of such Subcontractor.

Subcontractor	Description of work	Approximate value
1.		
2.		
1.		

4.2.2. Limitations on Subcontracting

- 4.2.2.1. The terms and conditions of employment of *Contractors* and Subcontractors must be made available to the *Project Manager* before any work may commence.
- 4.2.2.2. The *Contractor* and Subcontractors comply fully with all local and statutory labour laws (LRA, BCEA, UIF etc.) and agreements and promptly attend to any labour grievances that may arise. The *Contractor* and Subcontractors do not remunerate employees at less than the proclaimed statutory wage (Minimum Wage Act).

- 4.2.2.3. The contract does not create any renewal expectations on either party as referred to in section 186 "B" of the Labour Relations Act.

4.2.3. Attendance on Subcontractors

- 4.2.3.1. It is the *Contractor's* responsibility to ensure that the Subcontractor(s) is present on site when required and completes and supplies a daily Site diary, which includes details such as the labour resources available, starting time, ending time, equipment and materials used, weather conditions, interruptions etc. Refer to section 2.3.4.4, for the minimum requirements for daily diaries.
- 4.2.3.2. The *Contractor* ensures that the diary is submitted by the Subcontractor to the *Project Manager* daily for checking, commenting and signing-off and a copy is supplied. If the daily diary is not signed off by each worker then a separate daily attendance register is supplied.

4.3. Plant and Materials

4.3.1. Quality

- 4.3.1.1. The *Contractor* ensures that all equipment, tools and material that the *Contractor* or Subcontractor uses to execute the works, complies with the SABS and other stated standards.
- 4.3.1.2. All plant and materials sourced and supplied for the installation are new and are free from defects. Reconditioned or refurbished plant and/or materials are NOT regarded as new under any circumstances and may NOT be utilised.
- 4.3.1.3. The *Contractor* does not use plant and materials, which are generally recognised as being unsuitable or otherwise unsuitable for the purpose for which they are intended.
- 4.3.1.4. Only components of high reliability are utilised, with a proven operating history, to enable the plant to achieve the required reliability and availability. Plant and material design, engineering and manufacture comply with the best practice applicable to high-grade products of the type to be furnished, to ensure the efficiency and reliability of the *works* and the strength and suitability of the various parts for the *works*.
- 4.3.1.5. Plant and materials withstand ambient conditions and the variations of temperature arising under working conditions without distortion, deterioration or undue strains in any part.
- 4.3.1.6. All parts are made accurately, and where practicable, to standard gauges to facilitate replacement and repairs. Like parts are interchangeable.
- 4.3.1.7. No repair of defective plant and materials may be permitted without the *Project Manager's* acceptance and any such repair, if accepted, is carried out to the satisfaction of the *Project Manager*.

4.3.2. Plant and Materials Provided "free issue" by the Employer

- 4.3.2.1. The *Project Manager* supplies and installs scaffolding and solid barricading (signage excluded); refer to section 5.1.9.1, Scaffolding, for requirements regarding the installation of scaffolding.

4.3.3. Contractor's Procurement of Plant and Materials

- 4.3.3.1. Absolutely no changes to the current plant configuration are allowed unless authorised by the *Employer*.

- 4.3.3.2. Plant, equipment and materials are procured complying with the specifications listed in the Works Information. Compliance with providing items from the relevant OEM's is essential.
- 4.3.3.3. The *Contractor* only procures plant, equipment and materials as specified in the Works Information. Any accepted change of specifications is notified in writing by the *Project Manager* through the issue of instruction.
- 4.3.3.4. Should any plant, equipment or material specified in the Works Information not be available on the market due to obsolescence or other reason, the *Contractor* recommends a suitable alternative. All alternative items are accepted by the *Project Manager* and an instruction issued by the *Project Manager* before procurement by the *Contractor*.
- 4.3.3.5. The procurement schedule is clearly shown and integrated into the *Contractor's* accepted project programme ensuring delivery of equipment to site in advance of the installation activity.
- 4.3.3.6. All items procured and stored at the *Contractor's* premises or the *Employer's* premises are stored complying with the manufacturer's requirements or material specifications.
- 4.3.3.7. The *Contractor* ensures that plant and materials procured carry a minimum of fifty-two (52) weeks warranty or guarantee period.
- 4.3.3.8. Plant and materials used for the *works* are to bear no labelling other than the plant coding specified by the *Project Manager*.

4.3.4. Delivery to Site

- 4.3.4.1. Delivery, loading, unloading, transporting, rigging, setting out and storage remain the *Contractor's* responsibility to perform safely and timeously by competent personnel.
- 4.3.4.2. The *Contractor* advises the *Project Manager* in advance of all shipments and coordinates with the *Project Manager* the arrival, off-loading and release of such. The *Contractor* promptly unloads shipments and promptly releases carrier equipment from Site.
- 4.3.4.3. All material deliveries are to be performed via the Majuba Stores Department. Delivery notes are to be delivered with the materials to the Majuba Stores Department. Arrangements are made with the *Project Manager* at least 24 hours in advance to arrange for quality inspections of all materials. A copy of the signed delivery note is provided to the *Project Manager* upon delivery.
- 4.3.4.4. The *Contractor* safely and correctly protects, handles, secures, transports and delivers all plant and materials.
- 4.3.4.5. The *Contractor* marks or tags containers, crates, boxes containing plant and materials for the project, using the contract number and project description. Packaging materials remain the *Employer's* property and cannot be removed from site.
- 4.3.4.6. The *Contractor* submits the relevant data sheets and material certificates before the equipment delivery to Site for acceptance by the *Project Manager* or by no later than the date of delivery. Items that have not been accepted, will not be included in the *Contractor's* assessment for payment.

4.3.5. Spares and Consumables

- 4.3.5.1. The *Contractor* provides his consumables as required by him to complete the works.
- 4.3.5.2. The cabling that is left over after the project, will be handed to the *Project Manager* after all the unit cable has been installed and terminated.

4.4. Tests and Inspections before Delivery

4.4.1. General

- 4.4.1.1. All off-site inspections and testing (tests before delivery) conforms to all requirements as stated in Pressure Equipment Regulations
- 4.4.1.2. The *Project Manager* reserves the right to appoint a representative or representatives to inspect all parts during manufacturing and testing and to be present at any of the tests specified in this *works*.
- 4.4.1.3. The *Employer's* representative(s) and/or third-party/independent inspection authority have unhindered access to witnessing all manufacturing and testing processes at the manufacturing facility.
- 4.4.1.4. All off-site tests performed during and after manufacturing and before delivery to the Site must conform to the requirements as stated in Section 1.2, *Employer's* Objectives and Purpose of the Works, Section 3, Engineering and the *Contractor's* Design, of this contract and all relevant standards as listed in section 6, Plant and Materials Standards and Workmanship.
- 4.4.1.5. All off-site tests are conducted and hosted by the *Contractor* and witnessed by the *Employer's* representative(s) and/or third-party/independent inspection authority.
- 4.4.1.6. Where holding points exist on the manufacturing QCP's, no manufacturing activity proceeds if the preceding activity on the manufacturing QCP was not approved by both the *Contractor* and *Employer's* representatives.
- 4.4.1.7. The *Project Manager* carries out quality inspections at his discretion and as per the pre-approved Quality Control Plan (QCP).
- 4.4.1.8. Such tests as may be required by the *Project Manager* are carried out by the *Contractor* during or after manufacturing to prove compliance with the specification independently of any test, which may have been carried out at the manufacturer's facility.
- 4.4.1.9. The *Contractor* provides a test certificate for each test required by the code. Specimen tests used by the *Contractor* are also submitted.
- 4.4.1.10. The *Contractor* provides current calibration certificates for all equipment used during manufacturing and testing as part of the data pack.
- 4.4.1.11. The *Contractor* is responsible for quality assurance and control during manufacturing and testing. Any acceptance, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the *Employer* (including the absence of acceptance) does not relieve the *Contractor* from any responsibility under the *Contract*, including responsibility for errors, omissions, discrepancies and non-compliance.
- 4.4.1.12. The *Contractor* takes note of and responds to any comments made by the *Employer* on the *Contractor's* manufacturing documents. However, the *Project Manager* is not bound to check the *Contractor's* manufacturing documents for any errors, omissions, ambiguities or discrepancies or compliance with the requirements of the Contract. The *Project Manager's* receipt of, or review of, or comment on, the *Contractor's* manufacturing documents does not relieve the *Contractor* from responsibility for the *Contractor's* errors or omissions or departure from the requirements of the standard.
- 4.4.1.13. The *Contractor* provides a testing plan and procedure and submits the plan and procedure to the *Project Manager* for acceptance.
- 4.4.1.14. The *Contractor's* test procedure contains testing criteria as defined in Section 4.4, Tests and Inspections before Delivery and the VDSS as a minimum.

- 4.4.1.15. The *Contractor* is available for testing after normal working hours.
- 4.4.1.16. The *Employer* reserves the right to waive any test/s without consulting the *Contractor*.
- 4.4.1.17. The *Contractor* provides all Equipment, tools and software required for testing and commissioning.
- 4.4.1.18. In the event of incorrect functioning, the *Contractor* determines the cause of the fault and he corrects the fault if the trouble is within the equipment of his supply, or notifies the *Employer*.
- 4.4.1.19. The *Contractor* carries out any required routine maintenance on machinery until a Completion certificate has been issued. The *Contractor* supplies all the required spares during this period.
- 4.4.1.20. The *Contractor* presents the completed Works to the *Project Manager* for a complete inspection, after being successfully commissioned. The *Contractor* carries out repairs on all Defects, in those portions of the Works that the scope of work covered, detected during that inspection.

4.4.2. Inspection and Testing Plans (ITP)

- 4.4.2.1. The *Contractor* develops all relevant inspection and testing plans (ITP) and detailed, specific procedures and submits them to the *Project Manager* for acceptance. The ITP includes all tests and inspections required to ensure that the compressor trains provided under the *works*, inclusive of all interfaces, allow for safe operation.
- 4.4.2.2. The *Contractor* provides timely notification and allows for witnesses to be present at inspections and tests. The *Contractor* carries out the inspection and testing complying with the ITP and the specific procedures for safety and quality assurance.
- 4.4.2.3. The *Contractor* strictly controls any modification of accepted designs or plant and material or wiring after it has been inspected. The *Contractor* re-inspects and re-tests any plant and material or wiring, which has or could have been affected by a modification.

4.4.3. Factory Acceptance and Testing

- 4.4.3.1. The *Contractor* submits a detailed test plan and procedure, which will be used for the Factory Acceptance Testing (FAT) to the *Project Manager* for acceptance, at least thirty (30) calendar days before starting date of the first FAT
- 4.4.3.2. The FAT procedure includes the following:
 - a. Major test activities
 - b. A comprehensive list and description of the individual tests to be performed
 - c. How the tests are to be prepared and conducted
 - d. Test dates and durations
 - e. Checklists on how the test results will be documented
 - f. Acceptance Criteria
 - g. How the identified discrepancies will be managed
- 4.4.3.3. Where FAT activities are not conducted in South Africa, the *Contractor* submits upfront a list and an example from a previous project, for the *Employer* to review and accept before manufacturing will start.

- 4.4.3.4. A FAT is conducted on all the compressor trains supplied to ensure compliance and operability of the equipment supplied. The *Employer's* representatives will inspect and test some parts of the Plant at the *Contractor's* premises before dispatch, where required.
- 4.4.3.5. The *Contractor* advises on the period required for the inspection and testing activities of part of the Plant. The *Project Manager* advises on the parts of the Plant he needs to inspect and/or test and the *Contractor* makes allowance in the delivery time to cater for this requirement.
- 4.4.3.6. The *Contractor* gives the *Project Manager* at least 72 hours (3 calendar days) notice of the date on which any compressor train is ready for inspection and testing.
- 4.4.3.7. The *Contractor* submits the relevant technical datasheets, material certificates, conformance certificates, manufacturer inspection, and test reports of all equipment in electronic copy to the *Project Manager* for acceptance before dispatch to site.
- 4.4.3.8. The *Contractor* ensures that all equipment undergoes detailed quality inspections before dispatch to the site. The detailed quality inspections ensure that the equipment corresponds with both the manufacturer's technical datasheets and contractual requirements.
- 4.4.3.9. The functional tests form part of the factory acceptance test and site integration test and are to include the checking of all measurement loops, interlocks, sequence controls, and analogue controls. Additional to this:
- Tests that are required to be performed on a test bench are performed on a test bench provided by the *Contractor*.
 - The *Contractor* to provide controller, with approved configurations and software to test the *Contractor* supplied Functional logic diagrams and philosophies during factory acceptance testing.
- 4.4.3.10. Inspection and Testing of Electrical Motors:
- The *Contractor* gives the *Employer* not less than seven days' notice of when the inspection may be undertaken. Motors dispatched to site without the required inspection, may be rejected at the *Employer's* discretion. All cost related to transport, re-testing, inspection, etcetera for a rejected motor will be for the *Contractors'* account.
 - For motors of 200 kW and larger, an inspection and test plan is submitted to the *Project Manager* for approval before manufacturing or procurement.
- 4.4.3.11. Type Testing of Electrical Motors:
- The *Employer* and/or authority, independent of the *Contractor*, witness type tests.
 - The first motor of each size and type manufactured will be performance tested to prove compliance with the quoted performance. Type test certificates on identical motors may, at the *Employer's* discretion, be accepted instead of these tests.
 - All performance tests comply with SANS IEC 60034-1 and SANS 1804. The permissible temperature rise motors comply with the limits specified in clause 4.2.3 of 36-472 - Procurement of Power Station Low Voltage Electric Motors
 - The temperature rise of the stator windings is measured by the winding resistance method.
- 4.4.3.12. Routine Motor Tests:
- Each motor is tested at the manufacturer's works for light-run, no-load current, vibration, locked rotor, insulation resistance, high voltage, and winding resistances.

- b. All motors larger than 150 kW are subjected to a light-bearing run for long enough to allow the bearing temperatures to reach equilibrium.
- c. All routine tests comply with SANS IEC 60034-1 and SANS 1804. For motors of 200 kW and larger, an inspection and test plan is submitted to the *Project Manager* for approval.

4.4.3.13. Test Certificates:

- a. Before the delivery date of the motors, routine and type test certificates are submitted to the *Project Manager* for approval.
- b. Type test certificates show power factor and efficiency figures calculated from the test results for 100 %, 75 % and 50 % of full load conditions.
- c. Motor test results are recorded on the *Employer* standard form. The *Contractor's* template is only acceptable if it is comprehensive and covers all the details required by the *Employer*.

4.4.3.14. The following checks during inspections are conducted by the *Contractor* as a minimum:

- a. Visual inspections to verify the mechanical and/or physical integrity of the equipment as well as specifications of the major and/or active components.
- b. For each valve, the verification of the model name and number, pressure rating, temperature rating, material of construction, flange/thread size, face to face length, bore size, pitch circle diameter, "Open" and "Close" markings and directions, data plate, etc.
- c. For all pipes, the verification of the fabrication standard, grade, heat treatment used, non-destructive tests performed (liquid penetrant testing, radiographic testing, corrosion testing), pressure test performed, surface finishes, traceability markings, etc.
- d. For all C&I equipment, the verification of the model name and number, power supply requirements, measurement ranges, output variables, output units, current output, accuracy under the operating conditions, integral displays, protection standards, data plates, etc.
- e. For all other equipment not mentioned above, the verification of the dimensions, material of construction, performance capabilities, data plates, etc.

4.4.3.15. A final FAT report is prepared by the *Contractor* that includes the following as a minimum:

- a. Test procedures used during FAT
- b. Detailed Test results
- c. Discrepancies identified during the tests
- d. Resolution of the discrepancies
- e. Retests conducted and the result thereof
- f. FAT certificate
- g. The *Contractor* submits the Final FAT Report to the *Project Manager* for acceptance.
- h. FAT Completion is achieved upon acceptance of the Final FAT Report by the *Project Manager*.

- 4.4.3.16. The *Contractor* obtains clearance from the *Project Manager* before dispatching the equipment. This factory release inspection does not release the *Contractor* of any of his obligations under the contract.
- 4.4.3.17. No Plant will be released for dispatch without the as manufactured documentation and drawings accompanying them.
- 4.4.3.18. The *Contractor* manufactures, fabricates and assembles all relevant equipment complying with the *Employer's* standards and specifications as listed in section 6 - Plant and Materials Standards and Workmanship.
- 4.4.3.19. The *Contractor* tests all the shop fabricated equipment required for the completion of the *works* and submits the relevant technical datasheets, material certificates, conformance certificates and manufacturer inspection and test reports of all equipment as an electronic copy to the *Project Manager* for acceptance before dispatch to Site.
- 4.4.3.20. The *Project Manager* accepts the *Contractor's* off-site testing plan. The *Employer* decides which tests are witnessed by a representative of the *Employer* and communicates it to the *Contractor*.
- 4.4.3.21. The *Project Manager* reserves the right to request the manufacturer's detailed drawings relating to the proposed materials, heat treatment, machining and surface roughness tolerances to perform a design check.

4.4.4. Inspection and Testing on Site

- 4.4.4.1. Pre-removal inspections are to be conducted in conjunction with the *Employer* to verify the condition of the existing equipment. Appropriate check sheets are developed for the activity by the *Contractor*. The *Project Manager* accepts the format of test certificates and check sheets before construction.
- 4.4.4.2. After installation and before commissioning, the *Contractor* and relevant *Employer's* representatives carry out final quality inspections and the acceptance tests as listed in the Works Information to ensure the correct function of the equipment, the safety of *works* and personnel, and to determine compliance with contractual specifications.
- 4.4.4.3. Post-inspection check sheets are developed by the *Contractor* with the Pre-inspection sheets being used as a baseline for the activity.
- 4.4.4.4. The *Contractor* supplies a programme of all tests that are to be carried out in preparation for commissioning and indicates the details of proposed tests he proposes to perform and how the results of tests are documented.
- 4.4.4.5. The *Contractor* provides current calibration certificates for all test equipment, which are used to perform testing, to the *Project Manager*.
- 4.4.4.6. The *Contractor* provides test certificates for all tests performed (pressure test, NDT, calibration reports, etc.), final inspection reports and safety clearance certificates for all components installed to the *Project Manager* for acceptance.
- 4.4.4.7. Where the results of the performance tests performed don't correlate with expected results (concentration values, flow rates, pressures etc.) and/or the control functions as per the operating philosophy do not meet the specifications guaranteed, the *Contractor*, at his own expense, carries out all necessary adjustments and modifications to the *works* required to obtain the stated tolerances required, forming part of this scope of work.
- 4.4.4.8. Where inspections indicate that the working of an instrument is likely to be suspect, the instrument is adjusted, repaired or replaced by the *Contractor* to the *Employer's* acceptance and a full check to verify the operation and correct calibration is carried out.

- 4.4.4.9. The *Employer* has the right to inspect the system during erection and to be present and witness any test.

5. Construction

5.1. Temporary Works, Site Services & Construction Constraints

5.1.1. *Employer's* Site entry and security control, permits, and Site regulations

5.1.1.1. Site Entry

- a. Site entry is only approved once the following is adhered to:
- All *Contractor* personnel and Subcontractors must have Police clearance certificates, which must be included in the Safety Plan and handed to the *Project Manager* at least 2 weeks before commencement of work. The *Project Manager* reserves the right to refuse entry to all persons whose criminal records indicate that their presence on Site might create an unsafe and insecure environment to Majuba Power Station. The following website can be used to guide the process:
 - <https://certificatesrsa.co.za/police-clearance-certificate-south-africa-zimbabwe/>
 - The *Contractor* and Subcontractors' Safety Plan are approved by the *Employer's* Safety department refer to section 2.3.4,

Documentation Submissions after Contract Award, and to the General Works information.

- All personnel do site-specific induction. The induction is presented on weekdays at 9:00 at a venue outside the station perimeter fence. The *Contractor* books all personnel via an application form, which is sent to the safety department by the *Contractor*.
- The site entry permits have been approved. The *Contractor* fully completes an entry permit for all site personnel Providing the Works. A copy of their medical fitness certificate issued by a medical doctor or a registered occupational hygienist and a certified copy of their ID are attached to the permit. The approved safety file accompanies the personnel to the induction venue for the verification of the copies of the medical fitness certificate against the original and confirmation of an approved safety file. A site induction card is issued, site entry permit is stamped and signed by the Eskom safety officer presenting the induction session. The *Project Manager* completes and signs the site entry permit after which it is approved by the Security department. The site entry permit template can be obtained from the *Project Manager*.
- The *Contractor* applies for temporary vehicle permits for a limited number of vehicles that will be used Providing the Works. Temporary vehicle permit forms are available from the *Project Manager* on request. The *Contractor's* vehicles comply with the requirements as will be allowed on site. The *Contractor* applies for temporary vehicle permits. All vehicles used on site to be roadworthy as per SA traffic law and fitted with safety belts for driver and passengers.

5.1.1.2. Permits, Plant Safety Regulations, Authorised Supervisor Training and Duties

- a. After the contract *start date* and before the planned access date, the *Contractor* nominates and sends at least three (3) competent supervisors or another competent person to attend training at the *Employer's* premises to become a Responsible Person (RP), which is a requirement for the *Employer's* Plant Safety Regulations (PSR).
- b. Additionally, the *Contractor* may send other personnel to be trained as an Authorised Supervisor (AS) (shorter course). The *Contractor's* Site Manager may also attend one of the courses to become acquainted with PSR but this cost is for the *Contractor's* account. The Site Manager is not allowed to act as an RP or AS during work execution due to other key duties and activities to be performed away from the work areas i.e. conflict of duties.
- c. The *Contractor* determines the number and combination of RP's and AS's to be trained. The *Contractor* makes provision for the application of permits for each discipline (mechanical, electrical and C&I) as and when required according to the programme. Leave applications are taken into consideration when determining the number of RP's and AS's to be trained.
- d. Upon getting plant access, the *Contractor* verifies that the respective plant area being worked on, is completely drained/vented (as far as practical), isolated, cleaned and is safe to work on, through the issue and acceptance of a Permit to Work (PTW) by the *Contractor's* Responsible Person (RP) and that all workers are signed on to the RP's Worker's Register. The *Contractor's* RP assumes all full-time

supervision duties or may elect to sign over supervision duties to the *Contractor's* Authorised Supervisor (AS) and both keep a Worker's Register.

The course dates are scheduled as required. The *Contractor* requests the latest schedule from the *Project Manager* after contract award. Table 9: Typical RP and AS training durations

- e. illustrates the typical durations of the respective courses.

Table 9: Typical RP and AS training durations

Training Intervention	Start Date	End Date	Durations
ORHVS 2 and 3 Program	2020/09/14	2020/09/18	5 days
PSR For the Authorised Supervisors	2020/09/28	2020/10/02	5 days
Full Plant Safety Regulations	2020/10/07	2020/10/28	3 weeks
PSR / ORHVS Re-Authorisation Program	2020/11/09	2020/11/13	5 days

- f. The *Contractor* sends the personnel to the first available course held for the duration illustrated, in which the incumbents receive the theoretical training and write an exam for which 80% is required to pass.
- g. Additional time is required thereafter while on Site for plant orientation, practical training and an interview/question session at the Majuba PSR Committee before the persons may become authorised in writing. The theoretical training, plant orientation, practical training and the course is given by the *Employer*.
- h. The *Contractor* makes provision for all relevant costs including the training, accommodation, living-out expenses, meals and travelling for the personnel for the theoretical and practical training components.
- i. If the *Contractor's* personnel fail on the first attempt to pass the exam or interview, the *Contractor's* personnel is allowed to write or be interviewed for a second attempt. If the *Contractor's* personnel don't pass the interview within three (3) months from passing the exam, the theoretical exam has to be re-written. All related cost for the second and possible following attempts to pass the examination or interview is for the *Contractor's* account and is not reimbursed by the *Employer*.
- j. During the works, at least one RP or AS for each discipline (as required) must be in full-time attendance to supervise the work on Site at all times and cannot be allowed to perform any other work, while supervising others. Training and authorising at least three RP's and additional AS's ensures that the *Contractor* has sufficient supervisory staff although more personnel may be trained. If this supervision requirement is not met, the work is immediately stopped and the *Contractor's* delay affects the programme, which may result in delay damages being claimed by the *Project Manager* if the *completion date* on the Accepted Programme is not met.
- k. All the necessary isolations are made by the *Employer's* personnel before the commencement of the *works* to ensure that it is safe to work in and around the Site. The *Contractor's* RP verifies daily that the PTW is in force and all workers sign onto the RP's workers register. When both RP and AS are used, the AS signs on the RP's workers register before all other workers sign onto the AS's workers register.

5.1.2. Restrictions to Access on Site, Roads, Walkways and Barricades

- 5.1.2.1. The *Contractor* only uses established roads and walkways.
- 5.1.2.2. The *Contractor* does not cross any barricades except where access was granted by the *Project Manager*.

- 5.1.2.3. The *Contractor* only accesses the working areas associated with the works. The *Contractor* requests access to other areas from the *Project Manager*.
- 5.1.2.4. Parking inside the Power Station Boiler or Turbine houses is only allowed for loading and offloading purposes.

5.1.3. People Restrictions on Site; Hours of Work, Conduct and Records

5.1.3.1. Hours of work

- a. Majuba Power Station working times are:
- Monday to Thursday 07:30 - 16:45
 - Fridays 07:30 - 12:30
- b. The *Contractor* must, as a minimum, schedule work according to these times unless restrictions and/or interfaces with other parties necessitate alternative times.
- c. The *Contractor* may request to work alternative times and do so only upon acceptance by the *Project Manager* while ensuring that a minimum of forty hours per week are worked per week.
- d. The *Contractor* may work additional hours over weekdays and weekends by agreement with the *Project Manager*, such as when plant availability is limited due to production requirements/risks or more especially when the *Contractor's* progress is behind schedule. The *Contractor* ensures that any overtime is managed according to legislation by the Department of Labour. The *Project Manager* does not pay for overtime worked by the *Contractor* to Provide the Works.

5.1.4. Health and Safety Facilities on Site

- 5.1.4.1. Minor first aid requirements are provided for by the *Contractor*. Should these prove to be inadequate, for example in the event of a major injury, the *Employer's* Medical Centre and facilities are available for use. Emergency services can be reached by dialling 9222 from any site phone. Alternatively, one of the following numbers can be dialled:
- a. Medical centre 017 799 2138
- b. Fire and rescue 017 799 3192
- c. Electrical Operating Desk (EOD) 017 799 3803 (all hours)
- 5.1.4.2. The *Employer* is entitled however to recover the costs incurred in respect thereof from the *Contractor* or Subcontractor.
- 5.1.4.3. The *Employer's* Emergency Medical Services for after-hours is available for major injuries and life-threatening injuries, including ambulance transportation.

5.1.5. Title to Material from Excavation and Demolition

- 5.1.5.1. All other scrap metal is disposed of at the *Employer's* steel waste bins on site.
- 5.1.5.2. All material from excavation or demolition remains the property of the *Employer* and is disposed of as indicated in section 1.2.8, Decommissioning and Removal of Existing Plant by the *Contractor*. Where not stated elsewhere in the Works, the *Contractor* dispose of material from demolition either on or off site as per the *Project Manager's* instructions.
- 5.1.5.3. All material included in the *Project Manager's* assessment or stated in the Works Information, whether used or unused, remains the property of the *Employer*.

- 5.1.5.4. Any materials on site, which are the *Contractor's* property may only be removed after agreed by the *Project Manager*.

5.1.6. Co-operating With and Obtaining Acceptance of Others

- 5.1.6.1. Other *Contractors* may be working in the same area as the work of this contract. In this regard, the *Contractor* coordinates his work with the *Project Manager* to maintain harmonious working conditions on Site.
- 5.1.6.2. During the progress of the works, the *Contractor* provides access to others who also execute work in the same area, on an "as and when required" basis.
- 5.1.6.3. The *Contractor* makes his assessment of the problems and difficulties, which may be encountered for providing access to and interfacing with others, this includes access difficulties experienced during the construction or commissioning phase.

5.1.7. Publicity and Progress Photographs

- 5.1.7.1. The taking of photographs in the Power Station including the project *works* is restricted and subject to the approval of a formal request to take photographs.
- 5.1.7.2. For the progress reporting requirements, the *Project Manager* may prohibit the taking of such photographs and or require that all such photographs be taken by an official *Employer* photographer. In the latter event, the *Contractor* is required to make arrangements directly with the photographer for the taking of the photographs required by the *Contractor* for the progress reporting requirements.

5.1.8. Contractor's Equipment (Including Temporary Works).

- 5.1.8.1. The *Contractor* provides all equipment, tools and special tools that are required to execute and complete the *works*.
- 5.1.8.2. The *Contractor's* equipment does not impair the *Employer's* operations or access to the plant.
- 5.1.8.3. The *Contractor* provides all or any temporary or expendable materials required for the storage of material.
- 5.1.8.4. The *Contractor* declares all materials, equipment and tools via a prepared, pre-printed list upon arrival at the main security entrance, where a removal permit is issued by Security personnel.
- 5.1.8.5. The *Contractor* keeps an inventory of their equipment on Site.
- 5.1.8.6. Proof of Site entrance (approved list or permit) needs to be provided before equipment can be removed from Site.
- 5.1.8.7. The *Contractor* keeps these records and provides copies of all equipment and tools lists to the *Project Manager* upon their first entry to site. If the *Contractor's* records are lost, the *Project Manager* may issue a gate release permit only upon the *Contractor* proving ownership, or the *Contractor* may have to leave the equipment behind on Site.
- 5.1.8.8. The *Contractor* is responsible for the safeguarding, care and security of all items on Site whilst in the *Contractor's* custody and control, until Completion of the whole of the *works*.
- 5.1.8.9. Any electrical equipment or appliances used by the *Contractor* conforms to the applicable OHS Act safety standards and is maintained in a safe and proper working condition and their condition recorded on a monthly inspection check sheet. The *Project Manager* may

stop the *Contractor's* use of any electrical equipment, or appliance, which does not conform to the foregoing.

- 5.1.8.10. Off-loading and handling equipment, such as cranes, forklifts or other yellow plant is neither available on Site, nor provided by the *Employer* for the *Contractor's* use and if required, is provided by the *Contractor*. This includes the crane(s) and related equipment associated with the activities in the Works Information.
- 5.1.8.11. The *Contractor* sets up any additional safety barriers/screens and signage around the plant area being worked on.
- 5.1.8.12. The *Contractor* supplies and installs temporary local lighting complying with the requirements of the OHS Act, as amended. The *Project Manager* provides no local lighting. All construction lighting is the responsibility of the *Contractor*.
- 5.1.8.13. The *Project Manager* may assist the *Contractor* where possible with the off-loading of equipment, plant and material but the responsibility for off-loading remains with the *Contractor*.

5.1.9. Equipment Provided by the *Employer*

5.1.9.1. Scaffolding

- a. The *Contractor* establishes scaffolding requirements and requests the *Project Manager* in writing to erect scaffolding and barricading, wherever necessary. Planning is required three (3) days in advance for new scaffolding/barricading and at least 24 hours in advance for any modifications. Scaffolding and barricading cannot be erected, moved, disassembled or modified by the *Contractor*. Safety harnesses must be worn by all the *Contractor's* personnel to access scaffolds via ladders and in all areas when working at heights.
- b. The *Project Manager* only provides solid barricading, signage is not included.

5.1.10. Site Services and Facilities

5.1.10.1. Site Yard

- a. The *Contractor* has an office on Site for the duration of the contract to facilitate the proper coordination and execution of the works.
- b. A site is made available to the *Contractor*, within the Power Station security area. The proposed site may be shown to the *Contractor* during Site meeting or clarification meeting. The yard is shared with other *Contractors* and is equipped with an office, kitchen, ablution facilities and change rooms. The yard is used by the *Contractor* for the establishment of his offices, ablution, change-rooms, workshop and stores. Refer to section 5.1.11 - Facilities provided by the *Contractor* for additional services and facilities to be provided by the *Contractor*.
- c. The *Contractor's* yard is subject to periodic inspection by the *Project Manager* or *Supervisor* and Safety Risk Officers.

5.1.10.2. Supply of Electricity

- a. Electricity supply is made available for construction purposes free of charge from installed power points, which is indicated by the *Project Manager*. The *Contractor* is responsible for the provision of the reticulation system from the point of supply. Both 220 (AC) Volt and 380 (AC) Volt are available on request. All points of supply requested by the *Contractor* are provided in terms of quantity and location at the discretion of the *Project Manager*.
- b. No guarantees of power supply or quality are given and power supply breaks of any duration may occur without warning, while planned outages are also a possibility. The *Contractor* makes arrangements at his own expense to improve continuity and quality of power, where necessary for any reason and no claim of any nature relating to power failures are considered.
- c. No connection is made to the permanent installation at the Power Station without the prior acceptance of the *Project Manager*.
- d. The power supply is managed to comply with the latest revision of the Eskom safety regulations i.e.:
 - 32-846, Operating Regulations for High-Voltage Systems
 - 36-681, Generation Plant Safety Regulations

- e. A Certificate of Compliance (COC) for the site installation is provided by the *Contractor* before power being switched on.

5.1.10.3. Water

- a. Water is made available on request free of charge from water supply points on Site.
- b. The *Contractor* supplies at his own cost all the necessary connections, fittings, piping work, temporary plumbing and pumps necessary to lead water from the *Employer's* points of supply to the various points where it is required.
- c. The *Contractor* is responsible for maintaining this equipment until Completion of the *works*.
- d. The *Project Manager* does not guarantee continuity of supply and the *Contractor* makes his provision for standby supplies to maintain continuity of work.
- e. Claims of any nature relating to the discontinuity of water supply are not considered.

5.1.10.4. Roads

- a. Main access roads are surfaced and may be used by the *Contractor* with the necessary care. The *Employer* maintains the Site roads, described above, to a fair condition but construction work may occasionally cause gravel road detours to be used. Any costs incurred by the *Project Manager* from damage caused to underground services, structures, etc. as a result of the *Contractor* not using the prescribed routes, is recovered from the *Contractor*.
- b. The *Contractor* provides temporary access points from the prescribed routes and roads to the points where the *Contractor* is required to perform work, having first obtained permission in writing from the *Project Manager*.

5.1.10.5. Ablution Facilities

- a. Ablution facilities are provided on the four corners of the Power Station, which is close to the working area.
- b. Any *Contractor* employee found using the plant or veld to relieve himself/herself, is immediately instructed to be taken off site.

5.1.10.6. Take Away Meals

- a. The *Contractor* or any of the *Contractor's* employees or Subcontractors may purchase take away meals from the fast-food outlet on Site, if available. Driving off Site to purchase meals is not preferable and it should not delay the progress of the project.

5.1.11. Facilities provided by the *Contractor*

5.1.11.1. Contractor's Yard, Offices, Workshops and Stores

- a. The *Contractor* conducts site establishment once off for the entire *works* at the identified *Contractor's* yard on site. The yard is located approximately one kilometre from the Compressor Plant and is equipped with facilities, which might be shared by other *Contractors*. The facilities include a kitchen, ablution blocks and change rooms for male and female staff, but does not include shower rooms.

- b. The *Contractor* maintains and services the site yard. The *Employer* hands over the site to the *Contractor* after a walk down is conducted, noting down defects and or condition of the site and equipment. The *Contractor* hands over the site in the same or better condition than it was received after completion and during site de-establishment.
- c. Earthworks and Storage Facilities
 - The *Contractor* provides everything required for earthworks including providing adequate drainage etc., as necessary, for his entire operation throughout the occupation and under all weather conditions.
 - The *Contractor* includes for all further treatment or maintenance of the yard areas that he considers necessary in the site establishment rates for his operation throughout the occupation and under all weather conditions. Application of weed and vegetation control is compulsory.
 - All earthworks, drainage, and everything else installed by the *Contractor* to make the site useable and accessible become the property of the *Employer*.
 - The *Contractor* supplies, delivers and positions a 6 m x 2.4 m mobile **storage container** as per the *Project Manager's* instruction, which as a minimum complies with the following specifications:
 - i. 6 m x 2.4 m "B Grade" wind and watertight shipping container
 - ii. Painted outside with super universal enamel tint base TSE 2000 colour deep base and inside with super universal enamel white.
 - iii. 3 mm Black rubberising installed on the floor
 - iv. Electrical distribution board including 32 A single-phase MCB including:
 - 1 x 32 A single-phase earth leakage (30 mA sensitivity)
 - Internal compliance certificate
 - 1 x 16 A MCB for lighting
 - 1 x Light switches installed with wiring
 - 2 x 1.2 m Double led light installed with wiring (4')
 - The *Contractor* is not required to connect the storage container to the electrical supply. If the *Contractor* requires an electrical connection to the container, then all electrical connections including cabling and related equipment to comply with 240-55714363 - Coal-Fired Power Stations Lighting and Small Power Installation and 240-56227443 - Requirements for Control and Power Cables for Power Stations.
- d. The *Contractor* maintains such establishment for the duration of the works for the contract period.
- e. The *Contractor* includes all security and access arrangements.
- f. The *Contractor* establishes a control system for all waste and refuse to be collected and disposed of in compliance with the regulations.
- g. The *Contractor* removes all temporary fittings and fixtures, excluding the items listed under exclusion below, from site as part of site de-establishment. The *Contractor* ensures that proper housekeeping is done when de-establishing site.

- h. The exclusions become the property of the *Employer* as part of the *works* and are as follows:
 - 6 x 2.4 m mobile storage block
- i. The *Project Manager* gives acceptance so that the disconnections may be done and that connection points are left blanked-off and/or safe before the *Contractor* leaves site.

5.1.11.2. Telecommunications

- a. Neither a network point nor a telephone is available on site. Should the *Contractor* require one, he makes arrangements with relevant authorities. Arrangements may also be made to use the telephones of the station if they are available. Calls from these are charged for at prevailing GPO/Telkom rates.
- b. Should the *Contractor* wish to use radio communication equipment on Site, he requests the *Project Manager*.

5.1.12. Control of Noise, Dust, Water and Waste

- 5.1.12.1. The *Contractor* maintains a high standard of cleanliness during the conduct of his activities at the Power Station. This includes areas of work, allocated for storage of materials, Site offices etc. to the satisfaction of the *Project Manager*. The *Contractor* keeps these areas clean and free from the accumulation of waste materials and refuse regardless of the source.
- 5.1.12.2. The *Contractor* ensures during sweeping and dusting that a minimum amount of dust is liberated into the atmosphere. Cleaning by vacuum cleaners is preferred and the use of compressed air for cleaning plant and personnel is strictly prohibited.
- 5.1.12.3. The *Contractor* is responsible for the prompt removal of all waste to the correct waste disposal facility.
- 5.1.12.4. Bins and containers are emptied and the waste removed to the designated area at least once a week. All the temporary storage areas for bins and containers are kept tidy and do not constitute a nuisance to others. The *Contractor* takes all required steps to avoid spillage of waste alongside the bins and containers during removal and disposal thereof.
- 5.1.12.5. No burning of waste is allowed at the Power Station.
- 5.1.12.6. Hazardous waste is dealt with complying with the safety, health and/or environmental requirements of the *works* and the *Contractor* is solely responsible for the proper disposal thereof.
- 5.1.12.7. The *Contractor* removes all scrap metal components, excluding the old compressors, dryer assemblies, instrumentation, electrical boards, -breakers and cables, from the plant and takes them to the skips or laydown area allocated on site. All hazardous waste e.g. contaminated metals and plastic, sludge, rubble, electronic waste etc. is removed by the *Contractor* off site to a registered, hazardous waste site and the relevant disposal certificates supplied. General waste is disposed of by the *Contractor* in skips and bins located on site.
- 5.1.12.8. Items containing copper is stripped by the *Contractor* and the copper is taken to the laydown area next to the main security gate entrance, approximately 1km from the plant.

5.2. Completion, Testing, Commissioning and Correction of Defects

5.2.1. Work to be done by the Completion Date

- 5.2.1.1. The *Contractor* ensures that all work is completed on or before the *completion date*, except for the work listed below which may be done after the *completion date* but before the date stated in the table.
- 5.2.1.2. The *Project Manager* cannot certify Completion until all the work has been done and is free of Defects, which would have, in his opinion, prevented the *Employer* from using the works and others from doing their work.
- 5.2.1.3. Acceptance of the “As-built” documentation is a pre-requisite for commissioning to be done and to certify completion of the works.

Item of work	To be completed by
As-built drawings of Plant and peripheral equipment installed	Within 90 days after Completion
Performance testing of the <i>works</i> in use as specified in section 5.2.8 of this Works Information.	See performance testing requirements.

5.2.2. Use of the *Works* before Completion has been Certified

- 5.2.2.1. Completion is according to the Sectional Completion in the *Employer's* Data.

5.2.3. Materials Facilities and Samples for Tests and Inspections

- 5.2.3.1. The *Contractor* provides all facilities, test equipment and material to perform the Factory Acceptance Testing.

5.2.4. Commissioning

- 5.2.4.1. The *Contractor* is responsible for the drawing up of commissioning and testing plan and schedule for each system, in conjunction with the input of the *Employer's* engineering, maintenance and operating personnel before the completion of that section of the work and submits it to the *Project Manager* for review and acceptance.
- 5.2.4.2. The *Contractor's* commissioning plan complies with the requirements of 240-56356376 - On-Site Commissioning for Low-Pressure Systems.
- 5.2.4.3. The *Contractor* submits procedures for the testing and commissioning of installed equipment to the *Employer*. (See VDSS). The *Project Manager* accepts these procedures before being used for testing and commissioning purposes.
- 5.2.4.4. Commissioning and testing are conducted by the *Contractor* with support from the *Employer's* engineering, maintenance, project and operating personnel.
- 5.2.4.5. Upon completion of the work done on each system and before de-isolation and commissioning of the plant, the *Contractor* confirms that the plant is fit for use and verifies that all re-assembled and newly installed components are correctly installed, including the directions checks, directions of flows, alignments, bolt tightness/torqueing etc. and that they match the existing plant configurations with the necessary plant labels installed.
- 5.2.4.6. The *Contractor's* test procedure contains testing criteria as defined in Section 4.4, Tests and Inspections before Delivery, and the VDSS as a minimum.

- 5.2.4.7. The plant is also cleaned of waste, scrap and debris and equipment removed. Scaffolding that does not affect the operation of the plant may be left until the plant commissioning is completed.
- 5.2.4.8. Thereafter, the *Contractor* submits all completed QCP's, datasheets, material certificates, operating and maintenance manuals, design drawings etc. to the *Project Manager* to first verify that commissioning may be planned.
- 5.2.4.9. In addition, the *Contractor* submits a complete list of numbered schematic, wiring and cable diagrams, which are a true record of the Plant and Equipment as installed and certifies that the works have been wired complying with these diagrams.
- 5.2.4.10. An erection check/plant walk is arranged between all the relevant parties and a snag list generated for immediate rectifications to be done by the *Contractor*.
- 5.2.4.11. The *Contractor* requests the RP to provide a Sanction for Test (SFT) so that isolations may be removed. All commissioning activities may be performed under the SFT.
- 5.2.4.12. The *Contractor* verifies the signals from all electrical and Control & Instrumentation (C&I) components to the control desk with the *Employer's* C&I maintenance department.
- 5.2.4.13. The *Contractor* conducts both cold and hot commissioning together with the *Employer's* personnel.
- 5.2.4.14. The *Contractor*, at the time of commissioning, has the agreement, or the attendance of the *Project Manager* involved in a particular phase, before proceeding with commissioning. Consequently, the *Contractor* must assure himself as to the safety of his Plant and Equipment in respect of any particular commissioning test and in the event of damage, accept responsibility for such Plant and Equipment.
- 5.2.4.15. The *Contractor* co-operates fully with the *Project Manager* and the *Employer's* C&I representatives in the commissioning the whole of the works for which he supplies the portion of Plant and Equipment specified in this Works Information. The *Contractor* assists the *Employer's* C&I representatives in the optimisation of all controls and notifies the *Project Manager* when the controls have been completed to the *Contractor's* satisfaction before offering the works for take over. Actions needed to be performed on the DCS to achieve the commissioning requirements, is performed by the *Employer's* C&I representative. These activities include HMI indication verification, alarm verification, HMI range checks etc. This is applicable to the Unitised DCS and Common Plant DCS.
- 5.2.4.16. Calibrations of all instrumentation form part of the works and calibration sheets must be provided and signed by both parties and included as part of the data pack for the works.
- 5.2.4.17. As a minimum, the cold commissioning activities conducted by the *Contractor* consists of:
- Electrical and instrumentation loop check activities defined in *IEC 62382*
 - All field equipment checks.
 - Interlocks or Protections checks
 - Sequence controls checks
 - Actuator/Valve stroking
 - 4-20 mA injection - At least three set-points including 0
- 5.2.4.18. It is the *Contractor's* responsibility to check that each measuring loop falls within the specified loop accuracy.
- 5.2.4.19. The *Contractor* complies with all the *Employer's* safety and site regulations, which all *Contractors* are to conform to at Majuba Power Station.

- 5.2.4.20. The safety clearance certificate is the certificate issued by the *Employer* to the *Contractor*, stating that from the time and date stated on the certificate the specified machinery is under the *Project Manager's* control. Further access to the machinery is only permissible through the *Employer's* permit system.
- 5.2.4.21. The *Contractor* ensures that proper housekeeping is done again before re-instating the plant through the RP(s) clearing the PTW.
- 5.2.4.22. The plant is considered "in operation" once the RP clears the PTW and the *Contractor* may not perform any more activities on that plant unless a new PTW is applied for and accepted.
- 5.2.4.23. The *Contractor* presents the completed Works to the *Project Manager* for a complete inspection, after being successfully commissioned. The *Contractor* carries out repairs on all Defects, in those portions of the Works that the scope of work covered, detected during that inspection.

5.2.4.24. Acceptance Testing

- a. The *Contractor* provides the following documentation packages indicated in the VDSS, to the *Project Manager* as part of site acceptance testing:
- Site Integration Test (SIT) Completion Documents
 - Construction Completion and Design Review (Mechanical inspection)
 - Operation Acceptance Testing (OAT) Completion Documents

5.2.4.25. Commissioning Completion

- a. Conformity of the installation to the design documentation shall be assessed and certified upon completion of the commissioning phase. All hot commissioning and performance tests are completed and captured. All necessary test and calibration certificates to form part of the Operational Acceptance Testing document file.
- b. The *Contractor* approves the following for all compressor systems, as indicated in the LOSS:
- All commissioning check sheets and tests
 - The operational acceptance test report
 - Alarm list and response procedures.

5.2.5. Start-up Procedures required to put the Works into Operation

- 5.2.5.1. The start-up of the compressors requires the entire train to be available. The *Contractor* provides a new start-up procedure to the *Project Manager* for acceptance.
- 5.2.5.2. A risk assessment is performed by the *Employer* and *Contractor* before the activity to ensure all risks are identified and mitigated. The *Contractor* is available on site during the start-up process of each of the control air compressors.
- 5.2.5.3. The *Contractor* refers to the OEM manuals provided for details on start-up of the plant during the commissioning of the various plant systems.

5.2.6. Take Over Procedures

- 5.2.6.1. When a plant section is commissioned, the *Project Manager* may accept the plant and arrange for the takeover. Such acceptance affects the transfer of the asset and the control of the plant from the *Contractor* to the *Employer*.
- 5.2.6.2. During initial testing and commissioning of the plant up to guarantee performance testing, the plant is deemed to be in beneficial occupation.

5.2.7. Access given by the *Employer* for Correction of Defects

- 5.2.7.1. The defect(s) is/are reported to the *Contractor* as soon as the *Project Manager* becomes aware thereof.
- 5.2.7.2. An opportunity is arranged by the *Project Manager* for the repair and the *Contractor* is notified at least 48 hours in advance of the opportunity to repair the defect(s).
- 5.2.7.3. It is the *Contractor's* responsibility to get the Safety Plan checked and approved again, if necessary and to apply for Site access permits before any work can commence on Site.

5.2.8. Performance Tests after Completion

- 5.2.8.1. During the commissioning of each of the three cation exchange vessels, the performance and the water qualities produced is measured against the design operating criteria as stated in Section 3, Engineering and the *Contractor's* Design.
- 5.2.8.2. The *Contractor*, as part of his tender, provides a guarantee on the cation exchanger vessels; which includes the lining systems.
- 5.2.8.3. The performance of the compressors are assessed on the following:
 - a. A flow measurement test is carried out and is compared with the factory tests and deemed acceptable if it meets the required flowrate as per compressor design flowrate:
 - Unit Compressors' flow rate is 22 m³/min
 - Common Plant compressors' flow rate is 41.3 m³/min
 - b. Vibration analysis is done according to BS ISO 14839-3:2006 Mechanical vibration - Vibration of rotating machinery equipped with active magnetic bearings - Part 3: Evaluation of stability margin.
 - c. A natural surge test is done ensuring that the compressor surges at the design surge pressure as per compressor design.
 - d. A throttle surge test determining the throttle range of the compressor at an operating pressure of 700 kPa (g). The *Contractor* verifies that the inlet valve controls between the design point and near the surge point. An inlet valve throttle range modulation curve is developed from this test.
 - e. Performance testing of the interstage coolers to verify adequate heat transfer as per OEM specification.
 - f. On-site pressure testing of pressure vessels as per the PER.
 - g. Vary inlet valve position between 35%-100% and check the kW of the motor to verify that the power of the motor is as per design for a certain load.
 - h. Perform an integrated system functional test for the compressor train.

- i. The following tests are applicable for the compressors before accepting the compressors:
 - ISO 1217:2009, Displacement compressors – Acceptance tests
 - ISO 5389:2005, Turbo-compressors - Performance test code
 - ISO 7183:2007, Compressed air dryer assemblies - Specifications and testing
 - ISO 12500:2007-Part 1 to 3, Filters for Compressed Air – Test Methods
 - ISO 8573-Part 1 to 9, Compressed Air - Contaminants and purity classes – Test Methods
 - j. The interface to existing equipment does not compromise the functionality or life of any plant equipment.
- 5.2.8.4. During the proving/defects period, the *Contractor* optimises all aspects of the operation of the plants and is responsible for any defect resulting from faulty design, material and workmanship and remedy such defects at his own expense and as soon as possible when called upon to do so by the *Employer*.
- 5.2.8.5. Any outage of sections of the plants required by the *Contractor* during this period is, as far as practicable, arranged to suit the convenience of the *Employer*.
- 5.2.8.6. After completion, during the defects period, the *Contractor* continues to monitor all installed compressors for compliance to performance and design criteria. Any plant/setting changes or other required optimisation changes after completion complies with section 3.3.7.

5.2.9. Training and Technology Transfer

- 5.2.9.1. The *Contractor* provides training to the *Employer's staff* on the newly installed control air system with all its components at a training venue on site, supplied by the *Employer*. Separate training packages are developed to suit the Operating, Maintenance, and Engineering departments' specific needs. The *Contractor* arranges separate training sessions for each department. The training packages contain at least the following:
- a. Operator training
 - Operation, maintenance and troubleshooting
 - b. Maintenance training
 - Covers all different disciplines, i.e. Mechanical, Electrical and Control and Instrumentation.
 - Hardware and software configuration
 - Engineering, operation, maintenance and troubleshooting.
 - Software and tools required for installation, configuration, maintenance and troubleshooting.
 - Covers day-to-day maintenance which will be done during the first 52 weeks by the *Employer's* appointed staff or contractor.
 - c. Engineering training
 - Covers all different disciplines, i.e. Mechanical, Electrical and Control and Instrumentation.

- Design philosophy, system architecture, configuration specifications and plant layout
 - Hardware and software configuration
 - Engineering, operation and troubleshooting
 - Software and tools required for configuration, maintenance and troubleshooting.
- d. The *Contractor* provides the training before the final assessment is done for completion.
- e. As proof of training provided to the *Employer's* staff, the *Contractor* submits signed attendance registers to the *Project Manager*, for retention release.

5.2.9.2. Training Documentation

- 5.2.9.3. The *Contractor* provides all course material including manuals in both hard copy and an electronic copy (Microsoft Word document) to the *Project Manager* for review and acceptance before training is arranged and commences. The *Contractor* allows for time in the schedule to address comments from the review and for rework if required.
- 5.2.9.4. The course material is in English and includes any third party documentation required to install, operate and maintain the system.
- 5.2.9.5. Printed and electronic copies of the training documentation are supplied for each trainee plus three (3) additional hardcopy master sets and three (3) electronic copies on disks, for storage in the Majuba Documentation Centre. The *Contractor* makes provision for the following numbers of trainees per department:

Department	Estimated no of trainees
Operating	3
Maintenance	10
Engineering	5

- 5.2.9.6. All training documentation provided by the *Contractor* is customised for Majuba Power Station's installed system.
- 5.2.9.7. Training manuals are updated electronically by the *Contractor* for each set point change or approved modification to the design, up to the date of issue of the Defects Certificate for the whole of the works. The *Contractor* provides three (3) updated electronic copies on disks before the issuing of the Defects Certificate.

6. Plant and Materials Standards and Workmanship

The *Contractor* complies with all relevant regulations, procedures, and specifications, as and when revised, including the following:

Table 10: List of National and Eskom Specifications

Title	Reference Number	Publicly available
National SHEQ Specifications:		
National Water Act, Act 36 of 1998, as amended	Act 36 of 1998	Yes
Occupational Health and Safety Act and Construction Regulations, as amended	Act 85, 1993	Yes
National Key Points Act	Act 102 of 1980	Yes

Title	Reference Number	Publicly available
Compensation for Occupational Injuries and Diseases Act, Act 130 of 1993	Act 130 of 1993	Yes
Environmental Conservation Act (Act No. 73 of 1989)	ECA Act No. 73 of 1989	Yes
Quality Management Systems	ISO 9001; 2015	Yes
GN R225 in terms of the National Road Traffic Act 93 of 1996	NRTA Act 93 of 1996	Yes
National Environmental Management Act (No 107 of 1998)	NEMA No 107 of 1998	Yes
National Environmental Management: Waste Act (No 59 of 2008)	NEMWA No 59 of 2008	Yes
Environmental management systems – Requirements with guidance for use.	SANS/ISO 14001:2015 Edition 3	Yes
Eskom SHEQ Specifications:		
Emergency Planning	32-123 (Rev 3)	No
Eskom Vehicle Specification	32-345 (Rev 5)	No
Environmental, Occupational Health and Safety Incident Management Procedure	32-95 (Rev 9)	No
OHS Incident Management Definitions (goes with 32-95)	240-131838225	
Eskom <i>Contractor</i> Health and Safety requirements standards	32-136 (Rev 3)	No
Eskom Waste Management Standard	32-245 (Rev 3)	No
Eskom Working at Heights Procedure	32-418 (Rev 1)	No
Eskom Generation Plant Safety Regulations (PSR)	240-150642762	No
SHE Requirements for the Eskom Commercial Process	32-726	No
Eskom Safety, Health, Environmental and Quality Policy	32-727 (Rev 2)	No
Operating Regulations for High-Voltage Systems	240-114967625	No
Eskom Smoking Policy	32-1126	No
Supplier Contract Quality Requirement's Specification (previously QM 58)	240-105658000	No
SHE Compliance Obligations/ Legal and Other Requirements and Evaluation of Compliance Procedure	240-91214073 (Rev 2)	No
Employees' Right of Refusal to Work in an Unsafe Situation Procedure	240-43848327	No
Eskom Life Saving Rules, Directive	240-62196227	No
MPS Environmental Management Requirements for <i>Contractors</i> and Suppliers	ENV/GEN/SPEC/01	No
Majuba Waste Management	ENV/GEN/WI/12	No
National Technical Specifications:		
Electric welded low carbon steel pipes for aqueous fluids (large bore)	SANS 719	
Hot Dip Galvanized Coatings on Fabricated Iron and Steel Articles –Specifications and Test Methods	SANS 121	
Guide to Compressed Air Systems	GGG0365	
Code of Practice	SABS 0147	
Standard specification for the identification of contents of pipelines and vessels	NWS 1059	
Pressure Equipment Regulations 2009	PER	
Turbo-compressors Performance Test Code	ISO 5389-2005	
Quality Standards for Instrument Air	ISA 7_0_01-1996	
Categorization and conformity assessment criteria for all pressure equipment	SANS 347:2010	

Title	Reference Number	Publicly available
Steel pipes and fittings 150mm and below	SANS 62	
Pipe Flanges and Flanged Fittings	BS EN 13480 (All parts).	
Specification for unfired fusion-welded pressure vessels, 2009 Ed	PD5500:2015	
Vessels under Pressure and Pressure Equipment Regulations Compliance Management Position Paper	474-10327	
Automation Systems in the Process Industry - Electrical and Instrumentation Loop Check	IEC 62382	Yes
Pipe flanges	SANS 1123	Yes
Identification of Colour Markings	SANS 10140	Yes
National colour standard	SANS 1091	
Electric cables with extruded solid dielectric insulation for fixed installations	SANS 1507	
Materials of insulated electric cables and flexible cords	SANS 1411 parts 1&2	
Rotating Electrical Machines	SANS IEC 60034-1	
Induction Motors	SANS 1804	
Eskom Technical Specifications:		
Mechanical		
Compressed Air standard	240-105929255	No
Pressure Equipment Regulations Compliance Manual	240-154283718	No
Standard for the Identification of the contents of pipelines and vessels.	240-145581571	
Standard for Welding Requirements on Eskom Plant	240-106628253	No
Control and Instrumentation		
Field Instrument Installation Standard	240-56355754	No
Field Instrument Installation Standard: Junction Boxes and Cable Termination	240-56355815	No
Human Machine Interface Design Requirements Standard	240-56355728	No
Process Calibration Equipment Standard	240-56355535	No
Temperature Measurement Systems Installation Standard	240-56355888	No
Alarm Management System Guideline	240-56355466	No
Environmental Conditions for Process Control Equipment Used at Power Stations Standard	240-56355731	No
Civil and Structural Engineering		
Standardized specification for civil engineering	SANS 1200	
The structural use of concrete Part 1: Design	SANS 10100-1	
The structural use of concrete Part 2: Materials and execution of work	SANS 10100-2	
Basis of structural design and actions for buildings and industrial structures Part 1- Basis of structural design	SANS 10160-1	
Structural Design and Engineering Standard	240-56364545	No
Electrical Engineering		
Procurement of Power Station Low Voltage Electric Motors specification	240-57617975	No
Requirements for Control and Power Cables for Power Stations Standard	240-56227443	No
Earthing and Lightning Protection Standard	240-56356396	No
Transport of Power Station Electric Motors	240-56361435	No

Title	Reference Number	Publicly available
Storage of Power Station Electrical Motors.	MAINT/EMD 101 48	No
Other		
KKS Coding Standard	240-93576498	No
Plant Labelling Standard	240-71432150	No
Project Plant Specific Technical Documents - Handover Works Instruction	240-124341168	
Project Documentation Deliverable Requirement Specification.	240-65459834	
Technical Documentation Classification and Designation Standard	240-54179170	
Project/ Plant Specific Technical Documents and Records Management Work Instruction	240-76992014	
Engineering Drawing Standard – Common Requirements	240-86973501	No
Design Review Procedure	240-53113685	No
Detail Design Report Template	240-49910707	No

7. List of drawings

7.1. Drawings issued by the *Employer*

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

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

Drawing number	Revision	Title
0.66/38771 Sheet 1	6	Unit 1 Control Air Plant Centrifugal Compressor CVA (P & ID) For Compressor Train (QFA)
0.66/38771 Sheet 2	6	Control Air Common Plant Centrifugal Compressor CVO (P & ID) for Compressor Trains (1QFA)
0.66/94387 Sheet 1	6	Unit Control Air - Compressor Train (DMF 0QFA)
0.66/94387 Sheet 2	6	Unit Control Air - Dryer Train (DMF 0QFA)
0.66/36927	0	Schematic Diagram +6 1BFA unit 6 380V board 1 SC12-CFS
Not applicable	2019	Eskom Title Block – to be used for all new drawings

PART 4: SITE INFORMATION

Document reference	Title	No of pages
C4	This cover page	1
	Site Information	4
Total number of pages		5

8. SITE INFORMATION

Core clause 11.2(16) states, "Site Information is information which

- describes the Site and its surroundings and
- is in the documents which the Contract Data states it is in."

In Contract Data, reference has been made to Part 4 of the contract for the location of Site Information.

8.1. Site description

8.1.1. The Site is situated within the Eskom, Majuba Power Station (MPS) premises, situated on the farms Roodekoppies 67HS and Witkoppies 81HS, approximately 15 km southwest of the town of Amersfoort, along the R35 route, in in the Gert Sibande Municipal District of Mpumalanga.

8.1.2. The approximate coordinates of the access gate for the station are as follows:

- | | | |
|----|-----------|-------------------|
| a. | Latitude | 27° 06' 12, 28" S |
| b. | Longitude | 29° 46' 42, 34" E |

8.2. Site Geography

8.2.1. The elevation of the Power Station Site is approximately 1 709 meters above mean sea level. The 0.00 mm datum is 1 709.400 meters above MSL, being the turbine house ground floor level.

8.2.2. Topography may generally be described as rolling countryside interspersed with prominent hills. The natural flora consists of veld grass with very few scattered non-indigenous trees.

8.2.3. There are no design requirements or other considerations for seismic activity.

8.3. Plant Access

8.3.1. The *Project Manager* grants access to the relevant section of the plant by issuing an Access Certificate.

8.3.2. All plant is regarded as alive and in operation at all times unless the relevant isolations have been effected by the Majuba Operating Department and a Permit to Work (PTW) has been issued and accepted by the Responsible Person after verifying the isolations.

8.3.3. The *Contractor* must have the Permit to Work, signed Risk Assessment and completed Worker's Register before beginning with any work. The hazards identified must be incorporated into the *Contractor's* risk assessment and adequate precautions taken.

8.3.4. Plant access may be withdrawn by the *Project Manager* at any time or work may be stopped without compensation should the *Contractor* be working unsafely.

8.4. Road Access

- 8.4.1. From Standerton, take the national route R23 (P4-6) to Perdekop, the P97-1 towards Amersfoort, turning off right onto the link road 12 km before Amersfoort.
- 8.4.2. From Volksrust, travel north along the N11 (P26-1) towards Amersfoort, turning left onto the link road 17.5 km before Amersfoort.
- 8.4.3. From Amersfoort, take the Morgenzon road west of Amersfoort, turning south-west onto the (P97-1) towards Perdekop, then turning left onto the link road 12 km.

8.5. Rail Access

- 8.5.1. At present, the nearest Railway Station is Perdekop, although Transnet, prefer Standerton for heavy loads and containers. From here, Transnet performs road deliveries to Site. All transportation facilities at the stations are arranged by the *Contractor* as required.

8.6. Air Access

- 8.6.1. The Site has a surfaced and licensed airstrip with a parking facility, adjacent to the Power Station guest house. The airstrip is bitumen surfaced and is 1 500 m long and 15 m wide with 25 m wide gravel shoulders on each side.
- 8.6.2. The strip has been designed for a load classification number of 40 and caters for aircraft up to and including the DC3 Dakota. The airstrip has approach and landing lights, and a non-directional radio navigation beacon has been installed. The beacon frequency is 512 kHz at 29° 44' 30" E, 27° 03' 30" S, tone coding 2 K10A2a, recognition code MAJ, the radius of operation 100 nautical miles. Permission to use the airstrip facility is sought from the *Employer* at MPS.

8.7. Climate

- 8.7.1. The Amersfoort area has a climate of hot summers and cold winters, which is typical for that part of the Highveld.
- 8.7.2. The Weather Bureau's general description of the climate in the Highveld includes the following:
- 8.7.3. The winter months are normally dry and about 85% of the annual rainfall falls in the summer months. Generally, winds are light except for short periods during thunderstorms. Very occasionally tornadoes do occur and cause tremendous damage if they happen to strike a populated area. The annual average number of thunderstorms varies from about 75 in Mpumalanga to 100 in Lesotho. These storms are often violent with severe lightning and strong (but short-lived) gusty, south-westerly winds and are sometimes accompanied by hail.

8.8. Barometric Pressure

- 8.8.1. The mean barometric pressure is 82.42 kPa (Corresponding to 1 709 metres above sea level).

8.9. Temperature

Average daily maximum dry bulb	January	28.2 °C
	July	18.1 °C
Maximum dry bulb recorded	January	37.2 °C
	July	26.1 °C
Average daily minimum dry bulb	January	13.0 °C
	July	- 3.6 °C
Minimum dry bulb recorded	January	3.3 °C
	July	- 12.8 °C

8.10. Precipitation

8.10.1. Rainfall

- 8.10.1.1. Average Annual Rainfall of the Highveld, mainly occurring as a result of thunderstorms and showers, ranges from 900 mm in the east to 650 mm in the west and is approximately 690 in Amersfoort. The rainy season is generally from October to March with peak rains falling in December and January. Heavy rainfalls of 125 to 150 mm (or more) occasionally fall in a single day.

8.10.2. Hail

- 8.10.2.1. This region has about the highest frequency of hail in South Africa. About 4 to 7 occurrences (depending mainly on altitude) may be expected annually at any one spot, whilst occasionally hailstones can be the size of hen's eggs or tennis balls and can cause tremendous damage.

8.10.3. Snow

- 8.10.3.1. Snowfalls are experienced during most winters in the Amersfoort area. During snowfalls and immediately afterwards working conditions are extremely unpleasant and movement on the Site is difficult.

8.11. Relative humidity

8.11.1. Average maximum 83%

8.11.2. Average minimum 22%

8.12. Wind Velocity

8.12.1. Basic design wind speed = 43.5 m/s

8.12.2. Design wind pressure 0.925 kPa at 10 m above ground.

8.13. Seismic Data

8.13.1. There are no design requirements for seismic activity.

8.14. Weather data

8.14.1. All weather data has been obtained from records developed by the nearest official weather station situated at Volksrust, the climate of which is reasonably representative of the area. Any further specific details of the local climate are obtainable from the Weather Bureau directly.

8.14.2. Wind data has also been reviewed in consultation with the CSIR.

8.14.3. If anyone of the weather measurements recorded by the *Contractor* within a calendar month, before the completion date for the whole of the works and at the place stated in this Contract Data is shown to be more adverse than the amount stated below, then the *Contractor* may notify a compensation event which is the difference between the weather data and the *Contractor's* weather measurement.

Table 1: Historical One-in-Ten Year *weather data*

Month	Cumulative rainfall (mm)	Number of days with rain more than 10 mm	Number of days with min air temp < 0 °C	Number of days with snow lying at 09:00 CAT
January	202	7	0	2
February	158	7	0	3
March	122	5	0	2
April	115	4	2	2
May	43	3	8	4
June	29	2	22	6
July	36	2	21	7
August	36	2	11	7
September	64	3	4	6
October	148	6	2	5
November	167	8	0	2
December	177	7	0	3