NEC3 Engineering & Construction Contract

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

and **[Insert at award stage]**
(Reg No. _____)

for **REFURBISHMENT OF KRIEL PS GENERATOR CIRCUIT BREAKER (GCB) COMPRESSOR PLANT CONTROL CIRCUIT AT UNITS 1 & 4 FOR A PERIOD OF 12 MONTHS.**

Contents:		**No of pages**
Part C1	**Agreements & Contract Data**	**20**
Part C2	**Pricing Data**	**6**
Part C3	**Scope of Work**	**49**
Part C4	**Site Information**	**3**

CONTRACT No. **[Insert at award stage]**

Part C1: Agreements & Contract Data

Contents:

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:

REFURBISHMENT OF KRIEL PS GENERATOR CIRCUIT BREAKER (GCB) COMPRESSOR PLANT CONTROL CIRCUIT AT UNITS 1 & 4 FOR A PERIOD OF 12 MONTHS.

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.

Options B	The offered total of the Prices exclusive of VAT is	**R**
	Sub total	**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 (if 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

Note:

1. This part of the Offer & Acceptance would not be required if the contract has been developed by negotiation between the Parties and is not the result of a process of competitive tendering.
2. The extent of deviations from the tender documents issued by the Employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender.
3. A tenderer's covering letter must not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid be the subject of agreement reached during the process of Offer and Acceptance, the outcome of such agreement shall be recorded here and the final draft of the contract documents shall be revised to incorporate the effect of it.

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 Employer**
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*

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

Clause	Statement	Data
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option	
		A: Priced contract with activity schedule
	dispute resolution Option	**W1: Dispute resolution procedure**
	and secondary Options	
		X2 Changes in the law
		X7: Delay damages
		X16: Retention
		X18: Limitation of liability
		Z: *Additional conditions of contract*
	of the NEC3 Engineering and Construction Contract, April 2013 (ECC3)	
10.1	The *Employer* 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 *Project Manager* is: (Name)	**Kgomotso Ngweye**
	Address	**Kriel Power Station Private Bag x5009 Kriel 2271**
	Tel	
	Fax	**086 667 1588**
	e-mail	
10.1	The *Supervisor* is: (Name)	**Simo Zondi**
	Address	**Kriel Power Station Private Bag x5009 Kriel 2271**

	Tel No.	
	Fax No.	**N/A**
	e-mail	
11.2(13)	The *works* are	**COMPRESSOR A & B ELECTRICAL PANEL** • Wire new electrical panel for compressor A away from site. • Deliver newly wired electrical panel compressor A to site. • Remove old electrical panel compressor A from its position while compressor B is in service and running on manual to maintain the Pressure. • Install new electrical panel compressor A on the position. • Supply and install new eight pressure switches. • Supply and install new five water traps. • Supply and install new eight pressure gauges. • Supply and install cabling to auxiliaries e.g., pressure switches, water traps and other interconnected panels. • Commission the compressor A electrical panel. • Test that the compressor runs both on auto and Test.
11.2(14)	The following matters will be included in the Risk Register	- **Unavailability of plant** - **Delays in design approval**
11.2(15)	The *boundaries of the site* are	**Kriel Power Station Units**
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 *law of the contract* is the law of	**the Republic of South Africa**
13.1	The *language of this contract* is	**English**
13.3	The *period for reply* is	**2 weeks**
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 *completion date* for the whole of the *works* is	**31 March 2026**

11.2(9)	The *key date*s and the *condition*s to be met are:	***Condition* to be met**		***key date***
		1	**Wire new electrical panel for compressor A away from site.**	
		2	**Deliver panel A to site**	
		3	**Install panel A on Site**	
		4	**Wire new electrical panel for compressor B away from site.**	
		5	**Deliver panel B to site**	
		6	**Install panel B on Site**	
30.1	The *access dates* are:	**Part of the Site**		**Date**
		1	**Site establishment**	**Within 10 days of contract award**
		2	**Safety file Approval**	**5 days after contract award**
		3	**Induction and access permit**	**2 days after safety file approval**
31.1	The *Contractor* is to submit a first programme for acceptance within	**Two weeks of the Contract Date.**		
31.2	The *starting date* is	**Contract signature date (date of the last party signing the contract)**		
32.2	The *Contractor* submits revised programmes at intervals no longer than	**One (1) week**		
35.1	The *Employer* is not willing to take over the *works* before the Completion Date.	**If the defects are more than 50% of the section completed**		
4	**Testing and Defects**			
42.2	The *defects date* is	**52 weeks after Completion of the whole of the *works*.**		
43.2	The *defect correction period* is	**One week**		
	except that the *defect correction period* for	**Failure of equipment during commissioning is 2 days**		
	and the *defect correction period* for	**Failure of the whole system is 2 days**		

5	**Payment**	
50.1	The *assessment interval* is	**on the 25th day of each successive month.**
51.1	The *currency of this contract* is the	**South African Rand.**
51.2	The period within which payments are made is	**1. 30 days for Contracts with a value less than R50M.** **2. 60 days for Contracts with a value greater than R50M.**
51.4	The *interest rate* is	**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** **(ii) the LIBOR rate applicable at the time for amounts due in other currencies. LIBOR is the 6 month 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 *mutatis mutandis* 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.**
6	**Compensation events**	
60.1(13)	The place where weather is to be recorded is: The *weather measurements* to be recorded for each calendar month are,	**Areas surrounding Kriel Town; these include Kriel Power Station, Matla Power Station, Rietspruit, adjacent farm areas, etc.** **Temp –** Average **m**onthly Temperatures in degrees. Number of days with min air temp will also be recorded. **Pressure –** Average atmospheric pressure is the weight of the atmosphere overhead measured in Millibars. **Rainfall –** cumulative monthly rainfall in millimetres (sum). The number of days with rain more than 10mm will be recoded. **Wind –** Average monthly wind speed measured by metre per second (m/s). **RH (%) -** Ratio of the partial pressure of water vapour to the equilibrium vapour pressure of water at a given temperature (average %).

		and these measurements:
	The *weather measurements* are supplied by	**Eskom Research, Testing and Development (RT&D)**
	The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:	**Kriel village monitoring site which is located ±7.8km east of Kriel Power Station and is about 12km east-north-east of Matla Power Station respectively. It is situated centrally in the Kriel Town, on Eskom property at co-ordinates - 26.251193, 29.256426**
	and which are available from:	**RT&D and included in Annexure A to this Contract Data provided by the *Employer***
60.1(13)	Assumed values for the ten year return *weather data* for each *weather measurement* for each calendar month are:	**As stated in Annexure A to this Contract Data provided by the *Employer*.** **Note: If this arrangement is used, delete the rows above for 60.1(13) and delete this note.**
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 *Employer*'s risks	**1. Labour Unrest** **2. Covid 19 restrictions** **3. Unavailability of Plant**
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.**
60.6	The *method of measurement* is	**as stated in Part C2.1, Pricing Assumptions.**
11	**Data for Option W1**	
W1.1	The *Adjudicator* 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).**
	Address	**To be known once the dispute arises**
	Tel No.	**To be known once the dispute arises**

	Fax No.	**To be known once the dispute arises**
	e-mail	**To be known once the dispute arises**
W1.2(3)	The *Adjudicator nominating body* 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 *tribunal* is:	**arbitration.**
W1.4(5)	The *arbitration procedure* 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 - if the Parties cannot agree a choice or - if the arbitration procedure does not state who selects an arbitrator, is	**the Chairman for the time being or his nominee of the Association of Arbitrators (Southern Africa) or its successor body.**
12	**Data for secondary Option clauses**	
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.**
X7	**Delay damages (but not if Option X5 is also used)**	
X7.1	Delay damages for Completion of the whole of the *works* are	**R10 000 per day up to a limit of 10% of the contract value**
X16	**Retention (not used with Option F)**	
X16.1	The *retention free amount* is	**90%**
	The *retention percentage* is	**10%**
X18	**Limitation of liability**	
X18.1	The *Contractor*'s liability to the *Employer* for indirect or consequential loss is limited to:	**R0.0 (zero Rand)**
X18.2	For any one event, the *Contractor*'s liability to the *Employer* for loss of or damage to the *Employer*'s property is limited to:	**the amount of the deductibles relevant to the event**
X18.3	The *Contractor*'s liability for Defects due to his design which are not listed on the Defects Certificate is limited to	**The greater of** • **the total of the Prices at the Contract Date and** • **the amounts excluded and unrecoverable from the *Employer*'s assets policy for correcting the Defect (other than the**

		resulting physical damage which is not excluded) plus the applicable deductible as at contract date.
X18.4	The *Contractor*'s total liability to the *Employer* 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.** **The *Contractor's* total liability for the additional excluded matters is not limited.** **The additional excluded matters are amounts for which the *Contractor* is liable under this contract for** • **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 *end of liability date* is	**(i) 5 years after the *defects date* for latent Defects and** **(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.** **A latent Defect is a Defect which would not have been discovered on reasonable inspection by the *Employer* or the *Supervisor* before the *defects date*, 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.**
Z	**The *Additional conditions of contract* are**	**Z1 to Z15 always apply.**

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 *Contractor* 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 *Contractor*, 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 minim limit of indemnity
Loss of or damage to the *works*, Plant and Materials	The replacement cost where not covered by the *Employer*'s insurance The *Employer*'s policy deductible, as Contract Date, where covered by the *Employer*'s insurance
Loss of or damage to Equipment	The replacement cost
Liability for loss of or damage to property (except the *works*, Plant and Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor*) 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 *Employer*'s insurance The *Employer*'s policy deductible, as Contract Date, where covered by the *Employer*'s insurance <u>Other property</u> The replacement cost <u>Bodily injury to or death of a person</u> The amount required by applicable l
Liability for death of or bodily injury to employees of the *Contractor* arising out	The amount required by the applicat

of and in the course of their employment in connection with this contract	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 l 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 *Employer*'s 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 A: One-in-ten-year-return *weather data* obtained from SA Weather Bureau for [weather station]

If any one of these *weather measurements* recorded 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.

- The assumed 1 in 10 year rainfall figures are:

	• *Weather measurement*				
Month	**Cumulative rain (mm)**	**No of days with rainfall > 10mm**	Number of days with min air temp **<** 0 deg.C	Number of days with snow lying at 08:00 CAT	[Other measurements if applicable]
January	200	6	**[•]**	**[•]**	
February	150	6	**[•]**	**[•]**	
March	120	5	**[•]**	**[•]**	
April	110	4	**[•]**	**[•]**	
May	40	3	**[•]**	**[•]**	
June	20	2	**[•]**	**[•]**	
July	30	2	**[•]**	**[•]**	
August	30	2	**[•]**	**[•]**	
September	60	3	**[•]**	**[•]**	
October	140	6	**[•]**	**[•]**	
November	160	7	**[•]**	**[•]**	
December	170	6	**[•]**	**[•]**	

Relative Humidity

The average relative humidity on an annual base are as follows:
08:00 = 80%
14:00 = 52%
20:00 = 73%

Only the difference between the more adverse recorded weather and the equivalent measurement given above is taken into account in assessing a compensation event.

C1.2 Contract Data

Part two - Data provided by the *Contractor*

Notes to a tendering contractor:

1. Please read both the NEC3 Engineering and Construction Contract (April 2013) and the relevant parts of its Guidance Notes (ECC3-GN)[1] in order to understand the implications of this Data which the tenderer is required to complete. An example of the completed Data is provided on pages 156 to 158 of the ECC3 (April 2013) Guidance Notes.
2. The number of the clause which requires the data is shown in the left hand column for each statement however other clauses may also use the same data
3. Where a form field like this [ ] appears, data is required to be inserted relevant to the option selected. Click on the form field ***once*** and type in the data. Otherwise complete by hand and in ink.

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

Clause	Statement	Data
10.1	The *Contractor* is (Name): Address Tel No. Fax No.	
11.2(8)	The *direct fee percentage* is The *subcontracted fee percentage* is	**%** **%**
11.2(18)	The *working areas* are the Site and	
24.1	The *Contractor's* 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 .**

[1] Available from Engineering Contract Strategies Tel 011 803 3008, Fax 011 803 3009 or see www.ecs.co.za

11.2(3)	The *completion date* 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 *Contractor*'s design is in:	
31.1	The programme identified in the Contract Data is	
A	**Priced contract with activity schedule**	
11.2(20) 11.2(30)	The *activity schedule* is in The tendered total of the Prices is	 **(in figures)** **(in words), excluding VAT**
	Data for Schedules of Cost Components	*Note "SCC" means Schedule of Cost Components starting on page 60, and "SSCC" means Shorter Schedule of Cost Components starting on page 63 of ECC3 (April 2013).*
A	**Priced contract with activity schedule**	**Data for the Shorter Schedule of Cost Components**

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 *activity schedule*	3

C2.1 Pricing assumptions: Option A

1. 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.

2. 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.

3. 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*.

4. 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.

An activity schedule could have the following format:

Item No.	**Programme Reference**	**Activity description**	**Price**

C2.2 the *activity schedule*

Use this page as a cover page to the *Contractor*'s *activity schedule*.

Eskom Kriel Power Station Design, Manufacture, Supply and Installation of 2 x 15Kw Compressor automatic control system "							
No	**Description**	**UOM**	**Unit 1**	**Unit 4**	**Quantity**	**Rate**	**Total Price**
1	Site establishment and Site Safety requirements for a team on site for the duration of Installation and commissioning	Sum			1		
2	Engineering and design of 2 x dual 15KW compressor control system with dual 15KW new panels using PLC this including the following ➢ Engineering studies ➢ Engineering calculation ➢ CAD drawings generation ➢ PLC Logic and program ➢ configuration/design"						
	Basic design	Sum			1		
	Detail design	Sum			1		
	Engineering Manuals - Documentation pack - Operation and maintenance Manuals	Sum			1		
3	Supply Dual Compressor Electrical feeder panel as per design Equipped with the following: 1) Dual 15Kw Feeder DOL for Compressor 1 & 2 2) 50KA main Switch isolator 3) Electronic Overload (10-100A) 4) Digital Meeting System to Sync with PLC 5) IP65 Enclosure with Automated cooling system 6) Dual Supply AC controller		1	1	2		

4	Supply Siemens S7 PLC panel with the following - S7 PLC with CPU - Analogue input - Analogue outputs - HMI - IP65 Enclosure with force cooling - Dual supple DC convertor		1	1	2		
5	Supply control and Instrumentation parts for pressure and flow data capturing as follows - Pressure reducing valve receiver - Pressure Transmitter - Isolation and reducing Valve receiver - Pressure Transducers (4-20mA) - Temperature transmitters	lot			1		
6	Upgrade compressor crank pressure switch and associated mechanical parts to accommodate new automation system for drainage and condensation moderation		2	2	4		
7	Supply Compressor filters and mechanical parts. - Filters - Valves - Gauges	Lot			1		
8	Factory acceptance test for the system	Lot			1		
9	**Supply new cable**						
9.1	Power cable for each 15KW Motor	Lot	1	1	2		
9.2	Control and monitoring cables from transmitters/ transducers valve to PLC	Lot	1	1	2		
9.3	HMI cable to control room	Lot	1	1	2		
10	**Installation of new cabling**						
10.1	Power cable for each 15KW Motor	Lot	1	1	2		
10.2	Control and monitoring cables from transmitters/ transducers valve to PLC	Lot	1	1	2		

10.3	HMI cable to control room	Lot	1	1	2		
11	**The System**						
11.1	Decommissioning of the system	Lot	1	1	2		
11.2	Installation of the system	Lot	1	1	2		
11.3	Commissioning of the system	Lot	1	1	2		
Grand Total cost							

PART 3: SCOPE OF WORK

Document reference	Title	No of pages
	This cover page	1
C3.1	*Employer*'s Works Information	47
C3.2	*Contractor*'s Works Information	1
	Total number of pages	49

C3.1: EMPLOYER'S WORKS INFORMATION

Contents

1 Description of the *works*

1.1 Executive overview

18kV Generator Circuit Breakers uses an air blast type Breaker, which contains its own cooling system for each unit. The Breaker is air blasted using compressed air to an open or closed position and in this way makes a connection between the unit and the grid. The Breaker is opened during outages and at this time the outage philosophy maintenance should be conducted. Once in a closed position the breaker will remain closed until the unit comes off for an Outage unless a trip signal is received.

The compressed air supply is provided by a compressor plant installed for Units 1-3 (North Units) and for Units 4-6 (South Units) respectively. The compressed air plant supplies compressed air at 15MPa on for units 4-6 and at 5Mpa for units 1-3.

At any given time, two compressors should be running to boost the air pressure to above 15MPa for south units or 5Mpa for north units. If the pressure has reached the maximum value on the air receivers, a signal will be sent to stop the compressors and restart them as and when the pressure gets to below the set values.

1.2 *Employer*'s objectives and purpose of the *works*

The purpose of the Scope of Work is to ensure that necessary maintenance is conducted on the 18KV compressor system to enhance the reliability and availability of the compressed air supply.

1.3 Interpretation and terminology

- **System Engineer**: Compile the scope of work, review and approve quality control plan (QCP), monitor the work, and ensure successful completion of the project.
- **Site Quality Inspector:** Review and approve the QCP. Monitor the works and ensure quality deliverables are realised.
- **Maintainer:** Develops QCPs for approval by the System engineer and site Quality inspector, executes the employer's scope of work, provides updated drawings where required.

The following abbreviations are used in this Works Information:

Abbreviation	Meaning given to the abbreviation
AKZ	Anlangen Kenn Zeichnung
DC	Direct Current
DCS	Distributed Control System
FAT	Factory Acceptance Test
GCB	Generator Circuit Breaker
HMI	Human Machine Interface
HV	High Voltage > 1000 V AC/DC
IEC	International Electro Technical Commission
LV	Low Voltage < 1000 V AC/DC

OEM	Original Equipment Manufacturer
QCP	Quality Control Plan
QMP	Quality Management Plan
RTS	Return to Service
SAT	Site Acceptance Test
VT	Voltage Transformer

2 Management and start up.

2.1 Management meetings

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the *works*. Records of these meetings shall be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the *conditions of contract* to carry out such actions or instructions.

Regular meetings of a general nature may be convened and chaired by the *Project Manager* as follows:

Title and purpose	Approximate time & interval	Location	Attendance by:
Risk register and compensation events	Discussions to take place as soon as a risk is notified	Kriel Soweto VC Boardroom	*Contractor*, *Project Manager,* Co-ordinator and Contracts Supervisor
Overall contract progress and feedback	Weekly basis during installation Wednesdays 10:00-11:30	Kriel Soweto VC Boardroom	*Project Manager*, *Contractor,* Co-ordinator and Contracts supervisor
Daily feedback Progress	Daily 09:00am	Project manager's Office	Outage Execution Manager, Planner, *Project Manager,* Co-ordinator and Contract Supervisors
Daily Safety Toolbox Talks	Daily before work starts on site with signed attendance registers by *Contractor's* employees and signed off minutes by the *Contractor*'s Site Manager	*Contractor*s Yard	*Contractor* and his employees

Contractor Monthly Safety Meeting	Once a month on Wednesdays during Contractors SHEQ meeting 14:00-16:00	Kwanala Hall	Project Site Manager Safety Officers,

If the *Contractor* can't attend any meeting his feedback should be formally communicated through to the *Project Manager.*

The *Contractor* will provide a detailed feedback report on a daily basis during Outages providing accurate feedback on the status of *service* carried out by the *Contractor*. This report should indicate accurate progress of *service* and if any constraints are experienced, the *Contractor* to communicate with the *Project Manager* and mitigate the risks with action plans.

Meetings of a specialist nature may be convened as specified elsewhere in this Service Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the *service*. Records of these meetings shall be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the *conditions of contract* to carry out such actions or instructions.

2.2 Documentation control

2.2.1 Document Management

All documents supplied by the *Contractor* shall be subject to Eskom's approval. The language of all documentation shall be in English. The *Contractor* shall include the *Employer*'s drawing number in the drawing title block. This requirement only applies to design drawings developed by the *Contractor* and his Sub*Contractor*s. Drawing numbers will be assigned by the *Employer* as drawings are developed. All equipment to be coded, AKZ codes to be supplied by the *Employer*.

2.2.2 Document Identification

The *Contractor* is required to submit the Vendor Document Submission Schedule (VDSS) as per agreed dates to the delegated Eskom Representative. Eskom will pre-allocate document numbers on the VDSS and send back to the *Contractor* through the delegated Eskom Representative. The VDSS is revisable, and changes must be discussed and agreed upon by all parties. Changes in the VDSS can be additional documentation to be submitted, changes in submission dates or corrections in documentation descriptions, document numbers, etc. The *Contractor*'s VDSS shall indicate the format of documents to be submitted. In Appendix A the *Employer*'s VDSS is attached to indicate minimum documentation required.

2.2.3 Document Submission

All project documents must be submitted to the delegated Eskom Representative with transmittal note according to Project / Plant Specific Technical Documents and Records Management Work Instruction (240-76992014). In order to portray a consistent image, it is important that all documents used within the project follow the same standards of layout, style and formatting as described in the

Work Instruction
The *Contractor* is required to submit documents as electronic and hard copies and both copies must be delivered to the Eskom Representative with a transmittal note.
In addition, the *Contractor* shall be provided with the following standards which must be adhered to:

- Documentation Management Review and Handover Procedure for Gx Coal Projects (240-66920003).

- Project Documentation Deliverable Requirement Specification (240-65459834).
- Technical Documentation Classification and Designation Standard (240-54179170).

Email Subject
The *Contractor* shall submit all documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:

- Electronic copies shall be submitted to Eskom Documentation Centre through generic email address (drmsharedservices@eskom.co.za). The email subject shall as a minimum have the following: (Project Name_Discipline_Subject). Electronic copies that are too large for email will be delivered on CD/DVD, large file transfer protocol and/or hard drives to the Project Documentation Centre. A notification email, with the transmittal note attached, shall be sent to the project generic email address. The Representative will be copied on the email as well.
- Hard copies shall be submitted to the Eskom Representative accompanied by the Transmittal Note.

2.2.4 DRAWINGS FORMAT AND LAYOUT

The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of 240-86973501 Engineering drawing Standard. Drawings issued to Eskom will be a minimum of one hardcopy and an electronic copy. All *Contractor*s are required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in .pdf format. No drawings in TIFF, AUTOCAD or any other electronic format will be accepted. Drawings issued to Eskom may not be "Right Protected" or encrypted.

2.2.5 Operating

- Procedures and manuals for the operation of all modified systems shall be provided/ updated by the *Contractor*.

2.2.6 Maintenance

- Manuals for the maintenance of all modified systems shall be provided/ updated by the *Contractor*.
- A list of recommended spares and their technical specifications are to be provided.
- A list of special tools and drawings are to be provided. Drawings are to be provided as both hard and soft copies.

2.2.7 Engineering

- A system operating description is to be provided.
- Technical manuals detailing the implemented modifications are to be provided.
- All OEM datasheets are to be provided.
- All existing P&ID's, layout, general arrangement, line diagrams, logic diagrams and associated technical documentation affected by the modifications are to be updated to reflect the new/modified systems. Drawings are to be provided as both hard and soft copies (3 hard copies per drawing).
- All new drawings and documentation to be uploaded and registered on the Kriel Power Station Documentation System by the *Employer*.
- The *Contractor* provides all applicable documentation listed in the Vendor Documentation Submission Schedule in Appendix A for acceptance by the *Employer*.
- All functional logic diagrams are submitted by the *Contractor* to the Project Manager for acceptance before activation of logic on the control.

2.2.8 As Built Drawings And Documents

It will be the responsibility of the *Contractor* to revise the drawings and to update all the existing documentation to reflect the "as build" status of the Kriel units and forwards these drawings to the Project Manager 15 working days prior the Completion Date.

2.3 Health and safety risk management

All service providers appointed to render any services within Eskom Kriel Power Station are required to comply with the station's safety requirements.

3.1.1. Employer's Health and Safety Requirements

The *Contractor* acts in accordance with the health and safety requirements stated in the Works Information.

In carrying out its obligations to the *Employer* in terms of this contract; in providing the Works; in using Plant, Materials and Equipment; and while at the Site for any reason, the *Contractor* complies and procures and ensures the compliance by its employees, agents, Sub-Contractors, and mandatories with:

a) the provisions of the Occupational Health and Safety Act 85 of 1993 (as amended) and all regulations in force from time to time in terms of that Act ("the OHSA"); and

b) the Eskom "Safety, Health and Environmental Requirements for Contractors" document attached to the Works Information (as amended from time to time) and such other Eskom Safety Regulations as are applicable to the Works and are provided in writing to the *Contractor* (collectively "the Eskom Regulations"). The Eskom Regulations may be amended from time to time by the *Project Manager* and all amendments will be provided in writing to the *Contractor*. The *Contractor* complies with the provisions of the latest written version of the Eskom Regulations with which it has been provided; and

c) The health and safety plan prepared by the *Contractor* in accordance with the SHEQ Requirements. (The OHSA and the Eskom Regulations are collectively referred to as the "SHEQ Requirements".)

The *Contractor*, always, considers itself to be the "*Employer*" for the purposes of the OHSA and is required to not consider itself under the supervision or management of the Employer regarding compliance with the SHEQ Requirements, the *Contractor* is required to furthermore not consider itself to be a subordinate or under the supervision of the *Employer* in respect of these matters. The *Contractor* is always responsible for the supervision of its employees, agents, Sub-Contractors, and mandatories and takes full responsibility and accountability for ensuring they are competent, aware of the SHEQ Requirements and execute the Works in accordance with the SHEQ Requirements.

The *Contractor* ensures that all statutory appointments and appointments required by any Eskom Regulations are made and that all appointees fully understand their responsibilities and is trained and competent to execute their duties. The *Contractor* supervises the execution of their duties by all such appointees.

The *Employer*, or any person appointed by the *Employer*, may, at any stage during the currency of this contract:

I. Conduct health and safety audits regarding all aspects of compliance with the SHEQ Requirements, at any off-Site place of work, or the Site establishment of the *Contractor*.

II. Refuse any employee, Sub-Contractor, or agent of the *Contractor* access to the premises if such person has been found to commit an unsafe act or any unsafe working practice or is found not to be qualified or authorised in terms of the SHEQ Requirements.

III. Issue the *Contractor* with a stop order should the *Project Manager* become aware of any unsafe working procedure or condition or any non-compliance with any provision of the SHEQ Requirements.

The *Contractor* immediately reports any disabling injury as well as any threat to health or safety of which it becomes aware at the Works or on the Site to the Project Manager and to the Safety Risk Management office.

The *Contractor* appoints a person, qualified in accordance with the SHEQ Requirements, as the liaison with the Eskom Safety Officer for all matters related to health and safety, this person is required to be contactable 24 hours a day.

The *Contractor* confirms that it has been provided with sufficient written information regarding the health and safety arrangements and procedures applicable to the Works to ensure compliance by it and all employees, agents, Sub-Contractors, or mandatories with the SHEQ Requirements while providing the Works in terms of this contract. As such, the *Contractor* confirms that this contract and the relevant Eskom Regulations referred to in this contract constitute written arrangements and procedures between the *Contractor* and the *Employer* regarding health and safety for the purposes of section 37(2) of the OHSA.

The *Contractor* agrees that the *Employer* is relieved of all of its responsibilities and liabilities in terms of Section 37(1) of OHSA in respect of any acts or omissions of the *Contractor*, and the Contractor's employees, agents or Sub-Contractors, to the extent permitted by the OHSA.

The *Contractor* hereby indemnifies the *Employer* and holds the *Employer* harmless in respect of any and all loss, costs, claims, demands, liabilities, damage, penalties or expense that may be made against the Employer and/or suffered or incurred by the *Employer* (as the case may be) as a result of, any failure of the *Contractor*, its employees, agents, Sub-Contractors and/or mandatories to comply with their obligations in terms of this clause 18, and/or the failure of the Employer to procure the compliance by the *Contractor* , its employees, agents, Sub-Contractors and/or mandatories with their responsibilities and/or obligations in terms of or arising from the OHSA.

3.1.2. Contractor's Responsibilities

In addition to the safety requirements identified under responsibility in terms of safety requirements, the *Contractor* ensures that the following responsibilities are complied with:

a) To meet on a regular basis, as agreed, with the *Project Manager* / *Supervisor* who are responsible for:

I. Safety assurance
II. Quality assurance
III. Construction
IV. Commissioning
V. Any other relevant subjects.

b) To commission machinery, if contractually required, in accordance with the commissioning committee's approved commissioning programmes and procedures. The programmes are to identify and account for the interface requirements of other *Contractors* and the Dates contained in the Contract Data.

3.1.3. Specific Risks

The following risks are identified by the *Project Manager* and *Contractor* specifically addresses these risks to ensure that the works is carried out safely:

a) Working at heights
b) Dusty conditions
c) High noise area
d) Work is being carried out overhead by others
e) Work is being carried out below
f) Work in confined spaces
g) Possibility of noxious gasses
h) Possibility of fires or explosions

3.1.4. Safety of Workers

i. The *Contractor* ensures the safety of all persons working on Site. Any hot work including grinding will be applied for in accordance with a permit to work system. No grinding will be allowed on Site unless permission is granted in writing by the *Project Manager*.

ii. All grinding work is properly screened to protect persons from arc flashes or eye injuries. Fire blankets are fitted over the scaffolding planks and platforms. Precautions are taken to prevent any objects grinding splatter from falling.

3.1.5. Fire Protection

i. The *Contractor* shall ensure that adequate firefighting apparatus is provided at all their work Sites or office areas, and that their all their staff or representatives are trained in the use of this apparatus.
ii. The *Contractor* takes precautions to prevent any occurrence of fires or explosions while carrying out any work near flammable gas and liquid systems. Any tampering with the *Employer's* fire equipment is strictly forbidden.
iii. All exit doors, fire escape routes, walkways, stairways, stair landings and access to electrical distribution boards must be kept free of obstruction, and not be used for work or storage at any time. Firefighting equipment remains accessible at all times.
iv. In case of a fire, report the location and extent of the fire to the Electrical Operating Desk at extension 2555.
v. Take the necessary action to safeguard the area to prevent injury and spreading of the fire.

3.1.6. First Aid

i. The *Contractor* provides a First Aid service to his employees and Sub-*Contractors*. In the case where these prove to be inadequate, like in the event of a serious injury, the *Employer*'s Medical Centre and facilities will be available.
ii. Outside the *Employer's* office hours, the *Employer's* First Aid Services are only available for serious injuries and life-threatening situations.
iii. The *Employer* recovers the costs incurred, in the use of the above *Employer*'s facilities, from the *Contractor*.

3.1.7. Hazardous Substances

The *Contractor* shall manage hazardous substances in accordance with the requirements of Occupational Health and Safety Act no 85 of 1993 and NEMWA Act. The *Contractor* shall declare all hazardous chemical substances brought to Site to the *Employer*.

3.1.8. Radiation Protection

The *Contractor* conforms to all the legislative and safety requirements when performing any industrial radiography

3.1.9. Plant Safety Regulations

i. The *Employer,* on request from the *Contractor*, isolates required Plant from all sources of danger as described in the Plant Safety Regulations.
ii. The *Project Manager*, on request, makes available a copy of the latest revision of the Plant Safety Regulations available to the *Contractor*.
iii. The *Contractor* complies with all rules and regulations applicable to Plant safety and completes the Workman's Register prior to working on the Plant.
iv. The *Contractor* declares any grinding and welding to be carried out on the workers register
v. At every permit change the *Contractor* withdraws himself/herself/his staff for that period of permit suspension/revocation and thereafter only proceeds with the works after signing onto the new permit.
vi. The *Contractor* ensures that he/she/all sub-*Contractors*/personnel/staff/his visitors are medically, physically, and psychologically fit to enter the Kriel Power Station, and specifically any confined space.
vii. The *Contractor* is prohibited from entering Radiation Areas.
viii. The responsibility is on the *Contractor* to ensure that the correct confined space requirements and tests have been done or met by the *Employer* prior to entry into any confined space or hazardous Plant areas.
ix. The *Contractor* shall provide proof of competency for technical and safety aspects and must be available as and when required on Site

3.1.10 Occupational Hygiene management

Every contractor must establish an Occupational Hygiene (OH) Management Programme. The programme must outline how worker exposure hazards will be addressed in all workplaces,
The main objective of the OH Management Programme is to help reduce the risk of hazardous exposures, ensure compliance to statutory requirements and improve working conditions. Applicable OH practices need to be applied according to the Occupational Health & Safety Act, 1993 (Act No.85 of 1993) to fulfil this requirement.
Eskom contract custodian / project manager (as advised by the Eskom OHS professional must determine the scope of occupational hygiene applicable to the contract. The scope must include but not limited to:

- Exposure risk assessment - addressing all ergonomics risk, hazardous chemical agents, hazardous biological agents, asbestos, lead, noise, indoor air quality, heat stress, cold stress, ionizing and non-ionizing radiation exposure, illumination and vibration
- Monitoring / sampling programme for Hazardous Chemical Agents, Hazardous Biological Agents, Noise, Ventilation, Heat stress, Cold stress, non-ionising radiation, Indoor air quality, Illumination, Vibration
- Information and training for identified occupational hygiene stressors
- Medical surveillance programme for identified occupational hygiene stress factors.

The Contractor must obtain the service of an Approved Inspection Authority (AIA) in Occupational Health and Hygiene to conduct measurements or sampling for regulated occupational stress factors. The AIA will advise on the required frequency for exposure monitoring.

2.4 Environmental constraints and management

The *Contractor* shall comply with the environmental criteria and constraints stated below:

All service providers appointed to render any services within Eskom Kriel Power Station are required to comply with the station's Environmental Management System requirements.

• NB: Before commencing with any work, the service providers are required to visit the station's environmental section for evaluation. The station's environmental practitioner will evaluate the services to be rendered by the service provider and therefore allocate relevant legal and other requirements documents which the Contractor shall comply with during the works.

Provide Environmental policy and EMP (Environmental Management Plan)

It should always be noted that Kriel Power Station is ISO14001 certified and therefore promotes Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development. All activities taking place within Kriel Power Station must consider section 28 of the National Environmental Management Act (107 of 1998) which makes provision for the duty of care approach. The contractor's team must commit to review and to continually improve environmental management, with the objective of improving overall environmental performance. The Contractor must consult with Kriel Environmental section on a regular basis for on-going assistance and advice.

Kriel Power Station Environmental Licenses

Atmospheric Emission Licence

The station is a holder of a valid and approved Atmospheric Emission License and the contractor shall ensure implementation of the conditions of the license that are applicable to the project.

Water Use License

• The station is a holder of a valid and approved Integrated Water Use License and the contractor shall ensure implementation of the conditions of the license that are applicable to the project.

Waste Management Procedure.

- The Contractor is responsible to keep the work area clean of any rubble.
- All waste introduced and/or produced on the Employer's premises by the Contractor for this contract, is handled in accordance with the Norms and Standards for the Disposal of Waste to Landfill, minimum requirements for the Handling and Disposal of Hazardous Waste in terms of Government Legislation as proclaimed by the National Environmental Management: Waste Act, 2008
- The removal of any hazardous waste is the responsibility of the Contractor.
- The Contractor shall comply with the environmental criteria and constraints as per the Eskom Rules and Regulations.
- The service provider shall comply to, but not limited to, all relevant legal and other requirements including the Kriel Power Station EMS, National Environmental Management Act (Act 107 of 1998) as amended and ISO 14001.

2.5 Quality assurance requirements

To demonstrate the ability to consistently provide products and services that will meet Eskom requirements on quality and any applicable statutory and regulatory requirements, a contractor shall meet the issued supplier **Category 2** quality management requirements as specified in the List of issued Tender Returnables - 240-12248652.

1.3.1 The *Contractor* shall have and submit objective evidence of a developed, implemented and maintained Quality Management System (QMS) that complies with ISO 9001 or any applicable standard of the Quality Management System (the latest applicable revision).

1.3.2 The Quality Management System should drive all the contractor's business management processes to ensure that all of Eskom's requirements are fully met on a consistent basis.

1.3.3 The *Contractor* shall submit a draft Contract Quality Plan (CQP) that is specific to the scope of work as described in the tender documents.

1.3.4 The Contract Quality Plan (CQP) should demonstrate that the organisation is so structured that all the quality assurance requirements in relation to the scope of work will be properly monitored and controlled.

1.3.5 At a minimum, the plan shall address the following requirements as per ISO 10005.

i. Indicate the interfaces with the *contractor's* quality system and applicable documents such as procedures and work instructions,
ii. Establishes communication channels between the *Contractor* and the *Service Manager* in respect of quality and the integration of such with the prescribed contract communication channels,
iii. Indicates how specific subcontractors will be monitored where applicable,
iv. Identifies items or activities for which quality control plans will be prepared,
v. Identifies the specifications, drawings and acceptance criteria for material of which quality control plans are not required,
vi. Identifies the areas or processes requiring special controls,
vii. Identifies the *Contractor's* Management Representative and personnel responsible for the control of quality activities and their relationship to the *Contractor's* management structure,
viii. Identifies the documents which are to be submitted to the *Service Manager*
ix. Indicates the *Contractor's* quality monitoring programme.

1.3.6 The *Contractor is to* periodically update the contract quality plan to reflect changes in any of the above details. The frequency of such updates will be determined by the *Service Manager* but should not be greater than one year.

1.3.7 Where applicable; the supplier shall submit an example or a draft of an Inspection and Test Plan (ITP) or Quality Control Plan (QCP) which should address the quality control elements related to the scope of work and/ or technical specification.

1.3.8 At a minimum the Quality Control Plan (QCP) should indicate the following as appropriate:

i. The identification of the item,
ii. A list of the sequence of operations including inspections and tests,
iii. The identification of the specification, drawings or procedures for each operation,
iv. The acceptance criteria with reference to the appropriate technical specification, in-house, national or international standard and relevant clause number,
v. The inspections and tests the Contractor has nominated for hold and witness points,
vi. Provision for inspections and tests nominated by the *Service Manager*,
vii. Provision for inspection status indication,
viii. Inspection and test records which are generated by the *Contractor*.

1.3.9 The Quality Control Plan (QCP) will be reviewed by the *Service Manager* to allow for insertion of Eskom specific requirements, including hold and witness points, prior to the commencement of work. The *Contractor* cannot commence work until the *Service Manager* accepts the Quality Control Plan.

1.3.10 Monitoring will be carried out periodically or on predetermined intervals by Eskom within the duration of the contract using the agreed upon key performance indicators. For quality this will include,

i. Planned audits, assessments, and inspections,
ii. Monthly monitoring of the compliance of the management system,
iii. And nonconformity monitoring and corrective action response and closure.

The *Contractor* is required to read and fully understand the contents of the Supplier Quality Management Specification (QM-58).

The *Contractor* shall comply with all requirements as set out in QM-58 (Supplier Quality Management Specification)

The *Contractor shall* further ensure that subcontractor's programmes comply with the requirements of the Service Information.

The *contractor shall* notify the *Service Manager* of any changes to the Quality Management System and obtain agreement prior to implementation on existing orders and contracts, or sub orders and subcontracts.

The Supplier Quality Management Specification (QM-58) shall remain applicable in the event of the contract being extended or modified for reasons permitted.

By signature and acceptance of this contract the *supplier* acknowledges and agrees to comply with and adheres to Eskom's policies and procedures (current and/or latest revisions) including the Supplier Quality Management Specification (QM-58).

2.5 Programming constraints

2.7 Contractor's management, supervision and key people

The *Contractor* to provide a key list of personnel who will carry out the work on site with their qualifications attached. A company organogram will be needed by the *Project Manager* to communicate accordingly to

comply with the NEC3 Engineering and Construction Contract communication structures. *Contractor* to refer to Kriel Power Station *Contractor* SHE Requirements RSR0001

The *Contractor* makes arrangements for the use of the available workshop Equipment and Site specific tools.

The *Contractor* does not modify any plant or materials unless accepted by the *Employer* prior to implementation.
The *Contractor* notifies the *Employer* at least two days in advance of a Hold or Witness point on the *Works*.

The *Contractor* informs the *Employer* of any defect found and notify the *Employer* at least two days in advance of a Hold or Witness point on the Works.

The *Contractor* does not operate any Equipment on Site, unless specific authorisation is obtained from the *Employer*.

2.7.1 Plant Safety Regulations Permits

It is the sole responsibility of the *Contractor* to ensure at all times there is an authorised Responsible Person to take out permits for the execution of the *service*. The *Employer* will provide all training necessary for the selected *Contractor's* personnel to be authorised on Eskom Plant Safety Regulation.

2.6 *Contractor*'s management, supervision and key people

N/A

2.7 Invoicing and payment

Within one week of receiving a payment certificate from the *Service 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* payment certificate.

The *Contractor* shall address the tax invoice to:

Eskom Holdings SOC Ltd
Reg. No. 2002/015527/30
Accounts Payable
Email to: Invoiceseskomlocal@eskom.co.za

The *Contractor* keeps records of all invoices submitted and paid up to the end of the project, as well as details of Actual Costs.
All invoices are hand delivered to the Kriel Finance Department (Account payables) and include on each invoice the following information:

Name and address of the *Contractor* and the *Project Manager;*
The contract number and title;
Contractor's VAT registration number;
The *Employer's* VAT registration number 4740101508;
Description of service provided for each item invoiced based on the Price List;
Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT

Contractor is required to follow the correct process to ensure the payment is effected in accordance with contractual payment terms.

Contractor is required to follow the correct process to ensure payment is effected in accordance with contractual payment terms:

2.8.1 Service related invoices

a) Once the *service* have been delivered/completed both parties have to agree that the *service* has been delivered/completed successfully prior to invoicing

b) An assessment payment certificate must be completed between the *Contractor* and *Service Manager* according to the *service* performed. Both parties have to sign the assessment/certificate
c) A copy of assessment/payment certificate must be obtained by the *Contractor* to enable the creation of an invoice and to prevent any discrepancies. A copy of the assessment/payment certificate must be attached to the original invoice
d) *Service Manager* performs a service entry and Goods Receipt on the SAP system. (Assessment/Payment Certificate issued as a source document for Service Entry Goods Receipt)
e) *Service Manager* will the forward the Service entry and Goods Receipt Note number to the *Contractor* within 3 working days after the service has been rendered and the Assessment/Payment certificate signed
f) *Contractor* must forward the original invoices together with a copy of the Assessment/Payment certificate to the Eskom Documentation Centre.

2.8.2 Goods Delivered Invoices

a) Once the Goods are delivered, the *Service Manager* preforms a Goods Receipt on the SAP system. (The delivery note is used as source document for Goods Receipt. The invoice should not be used as a delivery note)
b) *Service Manager* will then forward the Goods Receipt note to the Vendor immediately or within 3 working days after the Goods are delivered.
c) Vendors must then forward the Invoices together with a copy of the Assessment/Payment certificate to the Eskom Documentation Centre

2.8.3 Invoices linked to commodity prices

a) The requirements are the same as for Goods Delivered Invoices.
b) Invoices which are linked to commodity prices will result in CPA (Contract Price Adjustment).
c) Attach a copy of the material invoice that has been previously paid to the CPA invoice, as well as the calculation sheet and all indices attached other than SEIFSA.
d) The relevant Eskom Department will then complete the CPA calculation sheet and forwards it to the Eskom Documentation Centre.

2.8.4 Retention Invoices

a) The requirements are the same as for Goods Delivered and service related Invoices.
b) Where Retention is applicable on the contract, the Eskom SAP system will automatically create the Retention, and the amount deducted from the invoiced amount.
c) Invoices related to retentions release require a defect or completion certificate and a retention release certificate from the *Project Manager* and must be attached to the original invoice. The original invoice for the retention to be released must be accompanied by the approved and signed completion/defect certificate and retention release certificate and forwarded by the *Project Manager* to the Documentation Centre to effect payment.

2.8.5 Foreign exchange Invoices

a) The requirements are the same as for Goods Delivered and *service* related Invoices.
b) The following has to be attached to the Invoice before it will be processed: Commercial invoice. Bill of entry (SAD500), SARS release notification, Customs worksheet, Bill of Lading or Airway Bill and approved Exchange Control Approval (EXCON).

2.8.6 General Information related to Eskom Invoices

a) *Contractor* must ensure that the Service Entry and Goods Receipt Note number appears on the invoice. (It can be printed or hand written on the invoice).
b) Eskom Purchase Order number must appear on invoice.
c) Invoices must be VAT compliant in line with the VAT Act requirements.
d) Invoices submitted must reflect the bank account details. A once off copy of the banking details may be forwarded to the Documentation Centre and it will be attached to each scanned invoice.

e) Invoices must be original or certified as an original in line with the VAT Act. No electronic invoices will be accepted.
f) Eskom's correct name "**Eskom Holdings SOC Limited**" must appear on the invoice.
g) The Eskom VAT registration number: **4740 101 508** must appear on the invoice.
h) No pro-forma invoices will be accepted.
i) *Contractor* cannot be utilized by Eskom for more than 3 times without a contract being established.

Note:
1. Invoices must be delivered to the Eskom Documentation Centre, as this will speed up the payment process and ensure that invoices are not lost and payments delayed. There is no need for *Project Manager* to sign invoices as they perform Goods Receipt in the system. The assessment certificate and Goods Receipt serves as the approval of payment.
2. Eskom Documentation Centre will review invoices according to a checklist and on completion scan the documentation into Accounts Payable processing system (Documentation can only be scanned where the Purchase order no. and Goods Receipt Note no. is reflected on the invoice, and the invoice complies with the VAT Act).
3. Invoices are processed and released for payment by Accounts Payable Section only where the source documentation is 100% correct)

2.8 Insurance provided by the *Employer*

As stated in Contract Data

2.9 Contract change management

Contract change management is managed in accordance with clause 6 of the core clauses in ECC3. In summary, in the event that the *Employer*/*Contractor* notices a change, an event register is issued. If the event/change has cost implications then a quotation is submitted with the event register. The *Project Manager* assesses the quotation and gives an instruction in writing to the *Contractor*.

2.10 Provision of bonds and guarantees

The form in which a bond or guarantee required by the *conditions of contract* (if any) is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.

The *Employer* may withhold payment of amounts due to the *Contractor* until the bond or guarantee required in terms of this contract has been received and accepted by the person notified to the *Contractor* by the *Project Manager* to receive and accept such bond or guarantee. Such withholding of payment due to the *Contractor* does not affect the *Employer*'s right to termination stated in this contract.

2.11 Records of Defined Cost, payments & assessments of compensation events to be kept by the *Contractor*

In order to substantiate the Defined Cost of Compensation Events, the *Employer* may require the *Contractor* to keep records of amounts paid by him for people employed by the *Contractor*, Plant and Materials, work subcontracted by the *Contractor* and Equipment.

The *Contractor*'s Site Manager will complete the site daily log and this will be submitted to the *Project Manager* for his signature before 12 am of the following morning barring weekends. The Friday and weekend logs will be submitted before 12 am Mondays. The log will include but not be limited to the following:

- Date and day.
- Weather.
- Site Conditions.

- Work Done.
- People who are employed by the *Contractor*
- Work sub-contracted by the *Contractor*
- Any incidents during that period.

Any communication and documentation during this service agreement to be filed in the contract file. This file is in the possession of the *Project Manager* at all times.

2.12 Training workshops and technology transfer

Formal training is conducted as part of this contract before completion of the works. The *Contractor* trains the *Employer*'s personnel as per details in section 5.2.9. The *Contractor* is responsible for providing a training register in order to keep as proof of training provided. The signed off training register by all participants is also to be supplied by the *Employer*.

The *Contractor* should create a programme for training on the plant for the *Employer's* nominated employees if required from the *Project Manager*

This training should be relevant for the *Employer's* employees to perform front line fault finding or maintenance

3 Engineering and the *Contractor*'s design

3.1 *Employer*'s design

Kriel Power station is a base load coal fired power station located 15 km outside of Kriel town in Mpumalanga province, South Africa. The power station was first commissioned in 1975 and it comprises of 555 MVA Hydrogen and water-cooled generators in each of its 6 units. 18kV Generator Circuit Breakers uses an air blast type Breaker, which contains its own cooling system for each unit. The Breaker is air blasted using compressed air to an open or closed position and in this way makes a connection between the unit and the grid. The Breaker is opened during outages and at this time the outage philosophy maintenance should be conducted. Once in a closed position the breaker will remain closed until the unit comes off for an Outage unless a trip signal is received.

The compressed air supply is provided by a compressor plant installed for Units 1-3 (North Units) and for Units 4-6 (South Units) respectively. The compressed air plant supplies compressed air at 15MPa on for units 4-6 and at 5Mpa for units 1-3.

At any given time, two compressors should be running to boost the air pressure to above 15MPa for south units or 5Mpa for north units. If the pressure has reached the maximum value on the air receivers, a signal will be sent to stop the compressors and restart them as and when the pressure gets to below the set values.

3.2 Parts of the *works* which the *Contractor* is to design

Compressor Technical Data

Free air delivery	585 l/min
Max. working pressure	250 bar
Electric motor supplied	15 kW
Electric Motor	380 V AC 50Hz
Displacement at first stage	755 l/min
Speed	1450 rpm
Service interval	2000 hrs.

Tubing Specification

- The tubing must be High Pressure tubing with a minimum rating of 30MPa.
- The OD of tubing is 20mm with ID of 14mm.

Safety valves

Replace the safety valves with equivalent Leser safety valves.

Pressure transmitters

Contact gauges or pressure switches to be replaced with four pressure transmitters per plant. The range of these must be from 0-30MPa with local display.

Pressure reducing valves

Replace pressure reducing valves with forced pilot solenoid valves.

PLC Control System and Instrumentation

Replace the existing control system with a PLC control system.

The PLC control system must provide a HMI facility and individual alarms at the Electrical Operating Desk. This system will also provide a real time plant status update to Operating staff in order to facilitate urgent response on critical plant status. This will ensure Generator Circuit Breaker availability. The PLC control system will provide a flexible system where the plant operating philosophy can be altered without any hardware upgrade. A PLC control system will provide redundancy between the two compressor plants if one control system on a plant should fail the remaining PLC system will take control of both the plants.

Supply to the PLC will be a dual ac supply with an ac to dc converter. Existing two AC supplies will be utilised.

Operating and Control Philosophy

- The PLC will interface with pressure transmitters (4-20mA) to control plant and to initiate alarms.
- Compressor plant HMI to be provided in the Control Room.
- Option to select a compressor as leading or lagging compressor.
- Compressor start counting as a function of the PLC.
- Compressor running hours as a function of the PLC.
- Running time exceed to be done via PLC.
- Running hours, must be recorded and trended for the life of the compressor.
- Running time between each start (cut-in) and stop (cut-out) must be recorded and trended.
- Compressor condensate separator blow down time every 10 minutes.
- HP pressure is to be maintained at 25MPa. When HP pressure drops to 22MPa, the control circuit switches the leading compressor on in order to raise HP pressure. If HP pressure drops further to 20MPa, control circuit switches lagging compressor on. This implies that HP pressure will only drop below 20MPa if there is a fault in the system. Therefore, when pressure decays to below 18MPa alarm ‘HP pressure too low’ is initiated.
- HP pressure is to be maintained at 25MPa. When HP pressure reaches 25MPa, the control system switches compressor/s off to prevent any further increase in HP pressure. This implies that HP pressure will rise beyond 25MPa only if there is a fault in the system. Therefore, when the pressure reaches 25.3MPa an alarm ‘HP pressure too high’ must be initiated.
- LP pressure is to be maintained at 15MPa. When the LP pressure drops to 14.7MPa, the control system energizes the solenoid actuated pressure reducing valve which then opens in order to raise HP pressure. This implies that LP pressure will only drop below 14.7MPa if there is a fault in the system. Therefore, when the pressure is below 14MPa, alarm ‘LP pressure too low’ must be initiated.
- LP pressure is to be maintained at 15MPa. When the LP pressure reaches 15.2MPa, the control system de-energizes solenoid actuated Pressure Reducing Valves which then closes in order to prevent any further increase in LP pressure. This implies that HP pressure will rise

beyond 15.2MPa only if there is a fault in the system. Therefore, when pressure increases above 15.7MPa alarm 'LP pressure too high' is initiated.

- When over current relay detects a current to motor 1 exceeding the motor rated current, the electrical supply to motor 1 is interrupted after a time which depends on the IDMT curve of relay. The 'Over-load protection motor 1' alarm must be initiated.
- When over current relay detects a current to motor 1 exceeding the motor rated current, the electrical supply to motor 2 is interrupted after a time which depends on the IDMT curve of relay. The 'Over-load protection motor 2' alarm must be initiated.
- When either or both of the compressors have been running for a time exceeding approximately four hours (e.g. due to a leak in the system) alarm 'Alarm running time' must be initiated.
- All circuit breakers must be supplied with auxiliary switches and initiate alarm 'Auxiliary circuit breaker trip'.
- If there is an interruption in supply voltage to motor 1 there will also be an interruption in control voltage and the 'Control voltage 1 failure' alarm must be initiated.
- If there is an interruption in supply voltage to motor 2 there will also be an interruption in control voltage and the 'Control voltage 2 failure' alarm must be initiated.

All equipment and instrumentation to be IP65 rated.

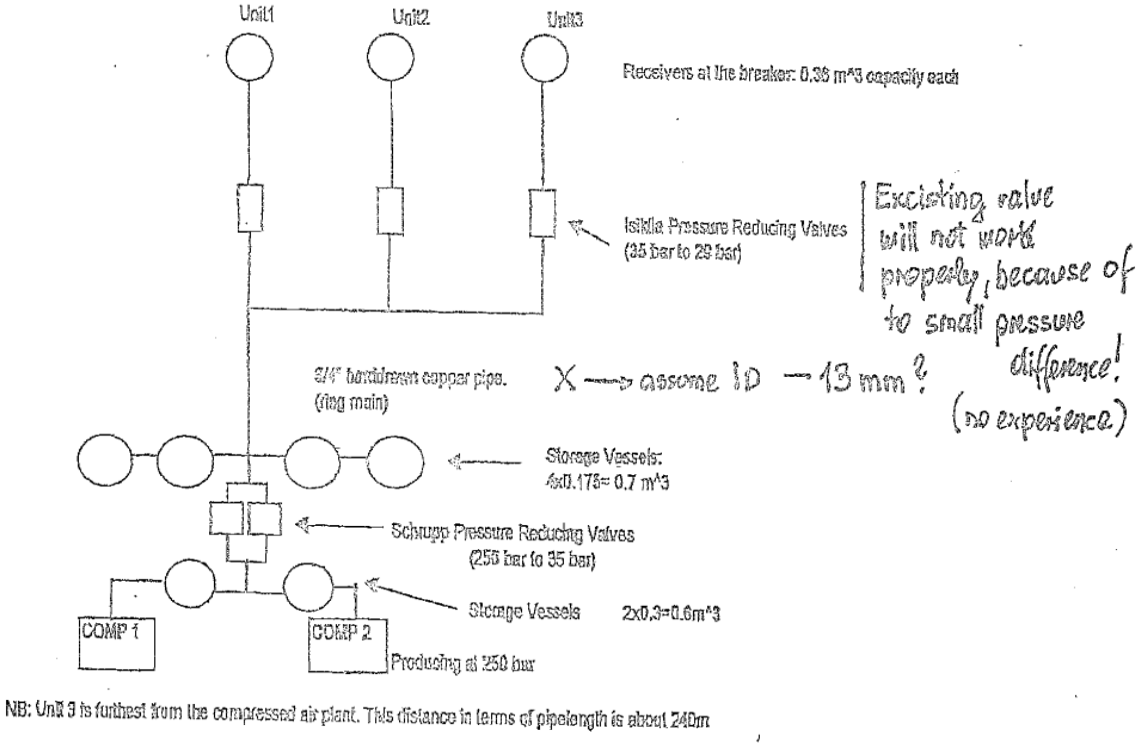
PLC to be installed and hosted in a IP65 rated cabinet.

Compressor Crank Pressure Switch Operating Philosophy

The compressor is fitted with a pressure switch with one normally open and one normally close contact. This pressure switch monitors the sump oil pressure. In order to accommodate this feature the pressure switch must be wired into the control circuit of the compressor. During starting the pressure switch must be bypassed for 15 seconds to allow the compressor to build-up oil pressure when after it should come in to the control circuit. The normally open contact of the pressure switch will be utilised. In order to drain the condensate build-up in the compressor the compressor must be stopped to "loose" the sump oil pressure, which is keeping the condensate drain valves closed. This will be achieved via a limited run time timer in the main control circuit.

Isolation and Receiver Drain Valves

The existing automated receiver condensate off-loading system shall be replaced with manual valves. Swagelok SS-12NBF8 valves with Swagelok SS-20M0-1-8 male fittings.



NB: Unit 3 is furthest from the compressed air plant. This distance in terms of pipelength is about 240m

Compressor Fine Filter

Supply and install a FINE FILTER COMPLETE COMPRESSOR TYPE: SVD 600/250 ITEM NR: 174377 per compressor including spare.

The automated condensate drain system is a filter extension on the compressor, which is connected to the separator system of the compressor. The system is operated via the crank pressure and condensate blow-down is done when the compressor is stopped and the crank pressure opened to atmosphere.

- **SCOPE OF WORK**Changing of solenoid operated blow down valves to manual needle type valves as in Lethabo Power Station.
    1. .Each air receiver shall have its own 6mm needle valve made of stainless steel (OEM Recommendation).

  This would require the condensate to be drained every change of shift if the compressor ran continuously for more than 1hr. This shall be investigated if it happens.
- Pressure testing of the air receivers (Units 1-3 only) to ensure that they can handle pressures of up to 250bar. This must be done one receiver at a time according to Kriel RBI programme which is done 3 or 6 yearly.
- Installation of a fine filter (stock no. 174377, drawings attached on appendix) on the last compressor stage of all compressors to remove condensate before it gets to the air receivers.
- Installation guideline:
    1. Switch off electric current and loosen tube connection to the discharge valve.

2. Screw in new filter with a down pipe to discharge condensate and ensure the O-ring and filter cover are free of defects.
3. Switch in current and run the compressor for 10min to check tightness of fine filter and tube connection.

- Calibrate the vessel's safety valves, replace replenishing valves seals, and check and repair possible air leaks on the connection joints. Follow the system piping and listen to any hissing sound along the pipeline. Repair any leak found.

  NB: If there's any leaks on any of the valves and connection points, this may either increase the filling time or it may cause the compressor to run without stopping which will in turn exacerbate the damage on the safety valves, connections, or the inside of the breaker.

- Adjust pressure setting back to11Mpa on units 1-3 to achieve the relaxation pressure ratio of 3,8:1. This will also ensure that the south units can be supplied with air by the north units. The 11MPa pressure upstream of the GCB cubicle replenishing valve is required to ensure the opening of the replenishing valve and refilling of GCB within 45seconds. This will prevent GCB pressure lock-out and replenishing valve failures.

  NB. Pressure lock happens when the breaker pressures drop to below minimum (less than 2.16Mpa on the LP receiver) The lockout condition prevents the breaker from opening or closing as with inadequate pressure the breaker may damage itself during operating.

- Completely overhaul and restore the electrical control panels to an operational state. (Electrical engineering to provide guidance).
- Install the compressor timer to record running hours of the compressor.

3.2.2 Interface requirements

3.2.2.1 General

1) The *Contractor* allows enough time in order to achieve proper interfacing between all the *Employer's* Engineers and the *Contractor*. The *Contractor* is involved in clarifications and technical queries regarding interfacing and be actively involved during interfacing sessions.
2) The following systems will be affected:
   a) Generator parameters
   b) Excitation transformer AC converter supply
   c) Station and unit AC/DC supplies
   d) Local plant HMI
   e) Floor plans, cable entries and dimensions
   f) AKZ requirements
   g) Control room DCS
   h) Control room operating desk

Control and Monitoring Requirements

1. The control circuit shall be of a digital system to allow versatility thereby minimising hardware configuration when changes are required. It shall have extended ability for self-diagnosis, testing and fault finding.
2. The Supplier shall provide a reliable, easy-to-use data input facility which will facilitate local operation in terms of controlling, testing, displaying as well as resetting of alarms. This shall be in the form of a local control panel with the appropriate operating system.
3. Power and control circuits shall be galvanically isolated from each other.
4. A self-monitoring unit shall be installed to monitor the Plant and Material associated with each channel. Any failure of the active channel must initiate an automatic change over to the other channel with a steady change in nominal stator voltage.
5. A failure in the inactive channel inhibits change over to the failed channel. In the event of an inactive channel failure, no trip signal is issued, rather an alarm is initiated and captured in the built-in fault recorder.

Software and licensing

1. The *Contractor* provides the latest version of all proprietary or open source software and licenses where applicable, including PC operating systems and licenses. The *Employer* cannot accept hardware with the *Contractor*s corporate operating system software.
2. The further firmware, software and licensing updates are provided to the *Employer* for the duration of the support period of the specific equipment. The support period required for the equipment far outlasts any operating systems life expectancy. The *Contractor* therefore puts contingency plans in place when operating systems become obsolete to ensure that their own applications are either migrated to a new platform and that the necessary software drivers are compatible with new hardware as well. The *Employer* is responsible for maintaining the operating system licences throughout the lifetime.
3. All required software, including operating systems and device drivers with their respective licenses and installation files, in order to do maintenance and configuration changes and system recovery, are supplied by the *Contractor*.

Special hardware requirements

1. All computer based systems have a solid state drive installed that is utilised by no more than 50% of the full capacity.
2. All hardware needed to connect with the system needs to be pre-configured and supplied by the *Contractor.*
3. All required software, including operating systems and device drivers with their respective licenses and installation files, in order to do maintenance and configuration changes and system recovery, are supplied by the *Contractor.*

3.3 Procedure for submission and acceptance of *Contractor*'s design

The Detail design is submitted in a hard copy and soft copy format. Drawings to be submitted in Bentley Microstation version 8 format and text documentation to be at least in PDF Microsoft Word 2013 or later is the preferred format for ease of review and commenting. The *Employer* reviews the submitted designs and provides comments back to the *Contractor* within 21 working days. After approval of the Detail design, the *Contractor* proceeds with manufacturing of the system based on the approved designs.

3.3.1 Design phases

The process requires two distinct design phases:

3.3.1.1 Basic design

1. Full system technical and functional descriptions
2. Transfer functions of the system in the time and frequency domain
3. System philosophies finalised
4. Single line diagram of the proposed solution.
5. Block diagram of the system and system plant interface points
6. General layout drawings and cubicle dimensions to allow the *Employer* to evaluate if the installation can be accommodated, both in terms of rigging and space.
7. Approval of the final cubicle layout and designs
8. Floor plans and dimensions and all civil requirements
9. Bill of proposed materials/components including datasheets of all components
10. Type tests of components and/or assembly
11. Test certificates and datasheets of cabling
12. Samples of the termination schedules
13. Cable racking routes and additional racking identified
14. Pre-FAT communications integrity checks/tests
15. Conceptual proposal is submitted by the *Contractor* outlining the product offered, the features and how it will be applied to the Drakensberg plant setup.
16. A reference list is submitted indicating similar applications to plant.

3.3.1.2 Detail design

1. The final drawings (electrical and mechanical) of the complete excitation system including plant interfaces updated on the excitation drawings.
2. Panel internal wiring diagrams with numbers, KKS, component descriptions, etc.
3. Termination schedules and cabling block diagrams
4. Cable racking designs for any additional racking.
5. Software program files and the necessary software to review the program
6. All calculations and specifications of the proposed equipment
7. Design calculations of all power cable requirements.
8. List of all cables to be installed (Cabling Schedule)
9. Design calculation of excitation transformer sizes (electrically and physically)
10. Design calculations of de-excitation equipment
11. Field suppression design
12. AC & DC short circuit calculations
13. Preliminary system and PSS settings for commissioning
14. Factory acceptance testing procedures

3.3.2 Implementation Approval

1. Completed & signed off FAT defects lists
2. Two identical sets of marked up drawings to be used for site installation.
3. Completed & signed of FAT test reports
4. Long lead items delivered to site, especially cabling
5. Site establishment completed. (containers, tools, scaffolding, printers, etc on site)
6. A complete on-site inspection check list to be completed right after delivery (Panels & cabling checks)
7. Authorised site acceptance testing procedures
    a. Panel decommissioning work package
    b. Transformer decommissioning work package
    c. Cabling decommissioning work package
    d. Panel installation work package
    e. Transformer installation work package
    f. Cabling installation & testing work package
    g. Cable racking work package
    h. Civils work package
8. A complete cold commissioning testing procedure (Live loop checks & function tests with machine at standstill)
9. A complete hot commissioning testing procedure (Function tests with machine running). The *Employer* will integrate the program to the overall commissioning program.
10. All relevant QCP steps signed off by the *Contractor* where applicable at the time.

3.4 Other requirements of the *Contractor*'s design

1. All plant and materials shall be new
2. All electrical installations shall be carried out by a qualified electrician.
3. The new electrical cabling is certified by the *Contractor*'s electrician issuing a certificate of compliance (COC) before it is allowed to be connected.
4. All components comply with the Eskom standard 240-64685228 as well as associated international standards, unless otherwise stated.

3.4.1 Configuration management

1. Kriel Power Station subscribes to the AKZ codification system
2. All AKZ numbers or codes shall be submitted to the Project Manager for approval.

3.4.2 Control cubicle requirements

1. The excitation control electronics shall be housed in separate self-contained cubicles.
2. Access to all electronic cards, control and indications shall be from the front of the panel. The exact mechanical layouts and cable slot dimensions shall be confirmed by the *Contractor* during the first site visit.
3. Rigging of equipment of all cubicles to the correct level and location to be done by the *Contractor*. The *Employer*s crane can be used.
4. The cubicles shall be designed to prevent the ingress of dust.
5. The cubicles shall be vermin-proofed.
6. Any additional safety measures to be provided by the *Contractor*.
7. All access doors and covers to live apparatus are adequately marked with warning signs to warn of live parts behind them.
8. All doors equipped with voltage and current carrying plant and materials are earthed to the main frame of the cubicles by means of a braided earth strap.
9. Internal panel lighting is provided with a door-mounted switch enabling the light ot switch on automatically when opening the door.

3.4.3 Wiring and wiring identification requirements

1. All wires to be provided with alphanumeric ferrule codes. All panel wiring to be marked with Graphoplast wiring markers or equivalent (subject to Project Manager acceptance).
2. Wires to be marked on both ends with the same number.
3. A wire adopting its termination point in a terminal rail as its wire number is not acceptable. When one wire has to move from one terminal to another the complete philosophy fails.
4. Ferrules with wire identification numbers read from left to right, and from top to bottom on vertical terminal strips.
5. For control wiring, each wire tail is of sufficient length to reach the allocated apparatus plus an additional length of 500mm to facilitate changes in wiring.
6. The slack is as close as possible to the component in the form of a loop.
7. Wiring is presented in a neat appearance, it is braced and placed in PVC trunking to prevent vibration and the possibility of forces being exerted on termination arrangements, no stick on plastic bracing supports can be used.
8. Wires to plant and material on swing doors are so arranged as to give a twisting motion and not a bending motion to wires. It is required that robust wiring looms at doors are used with clamps on both ends (Clamp on the door and a clamp inside the panel).
9. Where wiring is connected to current transformers, the termination shall be protected adequately.
10. Control and power panel wiring sheaths are coloured as follows:
    a. Black for single phase AC circuits.
    b. Grey for DC circuits.
    c. CT and VT wiring are colour coded as per the phase – red, white, blue and black (neutral).
    d. Power 3 phase AC circuit wiring is colour coded as per the phase – red, white, blue and black (neutral).

11. Panel wire terminations to electronic cards from the back are permissible.
12. All cable cores are terminated on a terminal strip with panel wiring completing the circuit to the relevant interface.
13. Wiring in trunking occupies no more than 75% of the cross sectional area of the trunking.
14. Any wiring connected to AC and DC busbars has an insulation withstand capability of 10 times the rated voltage with a minimum of 2.5 kV over one minute.

3.4.4 Panel/cubicle labelling

1. Eskom standard *240-62629353 – Specification for panel labelling*, applies to panel labels.
2. Due to power station's different requirements there could be site specific requirements, the *Contractor* is to identify all labelling needs for the works and submit it to the Project Manager for approval.
3. All sharp corners on labels are to be removed. Where a backing plate is used, four ¾ mm diameter holes are to be drilled into the label, each ¾ mm from the outer edges, top left and right, bottom left and right.
4. Conductive labels or backing plates are not allowed on the inside of any electrical cubicles.
5. All warning labels on panels, doors or other structures are pre-approved before printing and application by the *Contractor*.

3.4.5 Fuse links and carriers

1. Fuses are of the BS 88 or equivalent industrial high breaking capacity type.
2. Fuse links and fuse bases for bolted connections are used for power fuse applications.
3. Fuse links and fuse bases with blade contacts are not acceptable for this application.
4. All other fuses for DC and AC supply and VT fuses and fuse holders are of the English Electric type NFS or equivalent.
5. No screw type fuse holders are permitted.

3.4.6 MCBs

MCBs used for stator voltage isolation are graded with VT fuses upstream. Proof of such grading is supplied to the *Project Manager* for acceptance. "Z-curve" MCB has proved to grade with fuses in most cases

3.4.7 Signalling lamps

1. Indicating lamps are of the LED type and are easily replaceable from the front of the panel without the use of special tools.
2. The voltage of the lamps is as per the circuit served.
3. The mounting of the lamp and resistor facilitates adequate ventilation.
4. Visual indication of alarms might also be served via scrollable LCD display or other type of visual display.

3.4.8 Auxiliary relays

1. Auxiliary relays comply with Specification 32-333.
2. Special notice should be taken if such auxiliary relays are to perform tripping functions. All relays should be of the demagnetising type.
3. All plug in type relays have bases where the termination of wires up to 1.5mm2 can be connected and up to a maximum of two wires per termination point.
4. Plug in relay bases do not cause wires entering the outermost terminals to interfere with an adjacent relay base.
5. All plug in type relays have metal, rust resistant retaining clips to prevent the relays from dislodging either accidentally or due to vibrations. Spacing between relay/relay bases are adequate to allow for individual relay removal without disturbing adjacent devices.
6. It is customary to use auxiliary relays with a mechanical forcing plunger. Such plungers are removed before final commissioning and the holes plugged with a suitable plug to prevent dust ingress into the relay contact area.

7. All auxiliary relay type tests or OEM certificates/specifications are submitted to the project manager for approval prior to ordering the components. Specifications include the contact's DC breaking capability.

3.4.9 Output contacts

1. All output relays are to be fitted with self-resetting contacts.
2. Each tripping relay shall have at least two output contacts.
3. Contacts are rated in accordance with specification 32-333 (20MΩ at 500Vdc).
4. Output contacts of any relay, auxiliary or binary output card is able to carry the maximum load of the circuit it is used for without any damage.
5. In cases where large coils need to be energised with a high closing current but a much lower holding current, an "economising" resistor is typically inserted by the very same device through its own auxiliary contact. When such auxiliary contact fails to open to insert the resistor in series with the coil, a suitable MCB protects the initiating relays output contacts from being damaged. The preferred solution is rather to use an appropriate mini contactor as interposing device that can carry the closing current of the large coil continuously or a combination of the two.

3.4.10 Earthing requirements

1. The excitation apparatus is adequately earthed.
2. All non-current carrying conductive parts including the entire panel frame, all removable covers, relays, meters, gland plates, etc., are effectively connected to the earthing conductor by means of their mounting arrangement on the panel or by a separate earthing conductor.
3. This is done in such a way that the touch potential at any point on the panel due to a full phase to phase or phase to earth fault is limited to earth potential.
4. The earthing conductor is connected to the station earth mat at the designated earthing point of the panel.
5. The earthing conductor is pre-drilled to allow for connection to the station earth mat.
6. Should additional earthing conductors be required to meet the above requirements and specifications, the *Contractor* provides and installs such material
7. All cable screens and spare cores are earthed one side only.

3.4.11 Shrouding

1. All exposed terminals and cable terminations including test block terminations are shrouded using a transparent non-flammable material to prevent accidental contact.
2. Acrylic sheeting is unacceptable as a shrouding material. Non-flammable, transparent, poly-carbonate or poly-propylene is the preferred material.
3. All cover designs are submitted to and approved by the Project Manager.

3.4.12 Terminals

1. Neither insulation displacement type connectors nor spring type connecter without screws are allowed.
2. Provision is made for printed circuit boards to be modified if this is a preferred type connector by the *Contractor*.
3. The use of "fast-on" or push on connectors are not allowed on power circuits, voltage transformer circuits, current transformer circuits or earth connections.
4. The terminals are spring retained on the assembly rail complying with DIN EN 50045 and when mounted and wired in service, is closely fitted to avoid the accumulation of foreign matter between adjacent terminals.
5. End barriers or shields are provided for open sided patterns.
6. It is possible to replace any terminal in an assembly without dismantling adjacent units; it is permissible, however, to loosen any clamping device.
7. Screw retention of any component from the rear of the mounting rail is not acceptable.
8. All terminal blocks are readily accessible.
9. The terminals are of the rail mounted screw clamp spring-loaded insertion type where terminations or lugs are compressed between two plates by means of terminal screws.

10. Terminals are spring loaded such that the actions of the springs are independent of the action of the terminal screws.
11. Terminal screws are captive within the mouldings and their heads do not project above the mouldings when fully released.
12. Each terminal accepts up to two hooked blade type lugs.
13. Terminal entries are shrouded such that no current carrying metal is exposed when hooked blade lugs are fitted.
14. Springs withstand corrosion that might affect performance during their working life.
15. Springs do not carry any current.
16. Cross connection required for connecting two or more adjacent terminals are via wire loops. OEM supplied bridge pieces screwed down by the cage clamp is submitted to the Project Manager prior to use. Bridging from the top of the terminal to connect adjacent terminals invariably requires terminal insulation to be mechanically modified and bridging materials are not plated after punching and bending and allows for high resistance connections to develop over time. Should this be a preferred connection method it is submitted for approval prior to use on this project.
17. When used in current transformer circuits, the terminals are capable of accepting hooked blade lugs on 6mm² wires.
18. The terminals are sized to provide for pre-insulated lugs to fit after being crimped with the ‘flat’ crimp lying parallel with the rail.
19. The insulation impulse level and isolation requirements between individual terminals are guaranteed.
20. For stud type terminals two terminal studs are provided for each “way”, and are of sufficient length to accommodate two ring tongue terminations in addition to a full nut and a locking device.
21. Loose links, where provided, are secured by a nut and washers, and are of tin plated copper or brass. Barriers are provided between terminal “ways”.
22. These barriers project at least 3mm above the studs.
23. All types of commonly used terminals as shown on the drawing 18.48/5695 sheet 4. However the type of terminal in which the screw bears directly onto the termination or the conductor, i.e. “pinches the conductor”, is not acceptable.
24. All control system interface terminals are spring loaded link type terminals.
25. Terminals are numbered sequentially from left to right.

3.4.13 Lugs

1. No bare wire connection to any terminal is allowed.
2. All lugs are of the compression type.
3. Control lugs and their application with different types of terminals are as detailed on the drawing 18.48/5695 sheet 4.
4. Crimping on power lugs is in accordance with BS 4579 Part 1.
5. Crimping tools are calibrated according to their manufacturer’s specifications. The crimped area is at least equal to 1.5 times the conductor square area.
6. Documented proof of conformance to IEC 61238-1 (2003-05) specification requirements for tensile force heat cycling, resistance and temperature measurement may be requested by the Project Manager.
7. Control wiring using bootlace ferrules are crimped with a crimping tool compressing the ferrule from four sides. Single sided indent type crimping is not allowed.
8. Push on/fast on lugs are not the preferred lug. Any use of push on lugs in the entire system are declared in the tender document for approval of the Project Manager. After judgment on merit and if allowed, only nickel plated steel lugs are allowed and no tin plated brass or copper lugs are allowed due to their inferior longevity and contact resistance.
9. All lugs crimped onto wires of 6mm2 and above are of the hex crimped type. Indent (dimple) type crimping is not permitted.

3.4.14 Noise emission and electromagnetic compatibility

1. The Compressor Control System shall not exceed the electrical noise interference limits as stated in 32-333.
2. The Compressor Control System is not damaged and does not mal-operate when operated under conditions described in 32-333.

3.4.17 Cabling scope

The *Contractor* provides goods and services to meet the following requirements:

1. Testing of all power cables,
2. Replacement of damaged cables,
3. Cable joining and termination,
4. Cable numbering,
5. Decommission of existing Compressor Control System
6. Core drill if required by *Employer.*
7. Fire sealing of all cable entry points and floor slots.
8. Connection of earth conductors for switchgear assembly to existing earth.

3.4.18 Cabling requirements

1. The Contractor supplies and installs all cables required for the AVR upgrade project.
2. Cabling to other systems must be specified, supplied and installed by the Cabling Contractor.
3. The Contractor may re-use the existing cabling.
4. Cables that are not long enough may not be joined. They should either be replaced or connected via a junction box; the Contractor provides and installs such material.
5. All electrical installations of 220V and above are carried out by a qualified electrician.
6. The new electrical cabling is done in accordance with the following standards:
   i. 240-56227443: Requirements for Control and Power cables for power station standard
   ii. SANS 10142-1- Wiring Premises
7. The following templates issued by the Employer, must be used during the design and works section of the project. These are (but are not limited to):
   i. Template 240-56176097: Electrical Cable Schedule
   ii. Template 240-56227927: Electrical Load List Template
   iii. Template 240-77301384: Electrical LV Load Schedule Template
8. Cable schedules are supplied by the *Contractor* indicating the following minimum data:
   a) Cable number
   b) Cable type
   c) Cable length
   d) Plant/interface description
   e) Plant destination AKZ
   f) Core ferule numbers
   g) Route identification
9. After delivery of cabling to site, the cable drums must be inspected and the insulation tested by the *Contractor*. The results must be supplied to the *Employer* and it must be indicated whether the drum has passed or failed.

3.4.19 Cable installation

1. Cables may enter panels from the bottom only.
2. During installation of the cables, extreme care is to be exercised to avoid kinking or bending which may damage the cable insulation or sheath.
3. Cables which are accidentally damaged during installation are to be repaired or replaced to the satisfaction of the Employer. In no case is a cable, on which the outer sheath has been punctured, installed.
4. The Cabling Contractor is responsible for storage of all cable and is to suitably protect it from weather and damage during storage and handling.
5. The Cabling Contractor installs the cables onto the existing cable racks where applicable or where new racks are installed after approval of the project manager.
6. Power and control cable are not be routed on the same rack.
7. No tee offs nor jointing of wiring is to be done, other than at the terminals.
8. When optic fibre cables are used they will be installed in metal conduits.

3.4.20 Cable identification

1. All cables are identified by a cable number at termination points.
2. The Cabling Contractor applies to the Project Manager for cable numbers in Excel format indicating the following:

i. Type of cable e.g. Armoured PVC
ii. Number of conductors e.g. 2
iii. Voltage e.g. 230V
iv. Description of Purpose e.g. Eastern Substation 380V Main Distribution Board Supply B.
v. Origin and destination

3.4.21 Cabinet and Junction Box Identification

1. All cabinets panels and junction boxes are identified by a permanent number fixed to the cabinet/box.
2. All junction boxes and distribution
3. The Contractor applies to the Project Manager for cabinet/junction box numbers in Excel format indicating the following:
   a. Location: eg Unit 1 Zero meter level
   b. Number of cables e.g. 4
   c. Voltage e.g. 380V
   d. Description of Purpose

3.4.22 Product support

1. The OEM clearly states, in writing, the warrantee period on their product and the components covered.
2. It is also be clearly stated in writing what the limitations in product support are beyond the specified warrantee period and what options there are to be considered as well as the cost involved regarding support beyond the warrantee period.
3. Beyond the warrantee period the *Contractor* still have the ability to do repairs on faulty components. If this is not possible then the *Contractor* provides an exchange policy to the *Employer* where faulty electronic modules can be exchanged and a discount provided by the *Employer* for the new component.
4. During and beyond the warrantee period the faulty modules are to be investigated by the *Contractor* and a failure report provided to the *Employer* stating the reason for failure.
5. The *Contractor* offers a 12 month guarantee on the supplied equipment from the date of commissioning. The *Contractor* offers a standard 12 month warranty on quality and workmanship.
6. The *Contractor* plans for a visual inspection at a time suitable to the *Employer*, approximately one year after completion.
7. The *Contractor* inspects each unit on or before the defects date and provides the *Employer* with an inspection report.
8. The *Contractor* liaises with the *Employer* three months prior to the defects date to confirm machine availability.
9. The *Contractor* corrects all defects identified before the defects correction period

3.5 Use of *Contractor*'s design

The *Employer* may use the *Contractor*'s design for any purpose in relation to the compressor control systems at Kriel Power Station.

3.6 Design of Equipment

None.

3.7 Equipment required to be included in the *works*

The *Contractor* shall provide all equipment needed for the works.

3.8 As-built drawings, operating manuals and maintenance schedules

3.8.1 General

1. The original as built approved version of all documents and drawings shall be handed to the *Employer*. The *Contractor* shall provide documentation in electronic media using Microsoft Office or "searchable" PDF format. The *Employer* allocates numbers to the documentation and drawings which the *Contractor* indicates on the documentation and drawings. The *Contractor* shall use pre-approved templates provided by the *Employer* for all documentation and drawings required.
2. The *Contractor* shall submit all technical documentation and drawings for acceptance to the *Employer* prior to manufacture. The *Contractor* submits two sets of hardcopy files plus an electronic copy of information on CD of all documentation indicated in the paragraphs to follow

3.8.2 Drawings

1. All drawings are created electronically and 100% compatible with Microstation software in a DGN file format.
2. In conjunction with the electronic DGN copies, the *Contractor* shall provide a merged set of PDF copies upon first issue and each time drawing updates are required. All drawings shall be signed and revisions noted as per the *Employer*'s specifications.
3. The basic design is also to be submitted in this format to evaluate both the design and the electronic format.
4. The electronic file shall conform to the Eskom standard 240-86973501.
5. The detail design drawings have the pre-approved title blocks and borders as provided by the *Employer*.
6. Graphical symbols are used in accordance with the NRS002 standard.
7. All drawings shall be submitted to the Project Manager for acceptance.
8. The *Contractor* shall produce as built drawings within 4 weeks of each site acceptance test and submit them to the Project Manager for his acceptance.
9. The *Contractor* shall be produced in the following types of drawings:
    a. Cover sheet
    b. Index sheet
    c. List of symbols
    d. List of components with values, tolerances, ratings, type numbers, purchasing specification numbers, manufacturer and circuit reference numbers
    e. General layout drawing of the proposed panels and floor plan
    f. Singe line diagram
    g. Block diagram of the system
    h. Panel internal wiring drawings, including cross referencing and wire numbers
    i. Cable block diagrams with termination points
    j. Transfer functions of the system in the time and frequency domain.
10. The *Contractor* is liable for updating drawings until final commissioning when the *Employer* has signed off and approved the final "As Built" state of the drawings. After commissioning the Contactor shall supply two sets of drawing hardcopies in two separate files and in A3 format.

3.8.3 Technical, maintenance and operating manuals

1. All manuals shall be specific to Kriel Power Station.
2. Documentation includes transfer functions of each part of the regulation system.
3. The technical, maintenance and operating manuals also contain the information and course material of the training manuals.
4. All design information forming part of the Works Information is to be included in the manuals.
5. All documentation including drawings and operating and maintenance instruction manuals are uniquely identified and cross-referenced with all related documents.
6. The manuals are complete with:
    a. Power Station name and order number
    b. Content list
    c. List of reference drawings, and
    d. Details of all components
7. Manuals are of good quality prepared by suitably experienced personnel. The *Contractor* ensures that the manuals/files are complete with the following information represented as a minimum:
    a. Details and descriptions of all hardware and software
    b. Detailed product descriptions and features
    c. System control philosophy
    d. Datasheets of all components used

e. Recommended spares lists
f. Operating, maintenance and testing requirements
g. Full system maintenance program
h. Installation procedures of each component
i. Isolation procedures
j. Alarm descriptions and responses
k. Certificates of compliance to international standards
l. Routine test results reports
m. Commissioning test results reports
n. Training information
o. Technical tender submission information

8. Any special instructions pertaining to storage of spare parts or to their shelf life are included in the manual.
9. All drawings required for component location, dismantling, and re-assembly for maintenance is provided in the manual.
10. All special tools required for maintaining and operating the plant and material are identified in a schedule and described in the manual.
11. Manuals are produced such that a Synopsis is first presented, followed by a First Draft, then a pre-print proof and finally be the Final Manual.

3.8.4 Settings and device configurations

1. The *Contractor* shall provide the settings data for each and every configurable device supplied.
2. All settings, configurations, alarm and tripping matrixes are configured as per recommendation by the *Contractor* and are reviewed by the *Employer* for final acceptance.
3. The *Contractor* is responsible for the calculation of all settings and the calculations are provided to the *Employer* for acceptance. The applied settings within the excitation system are provided to the *Employer* by means of active Windows or configuration files containing the settings which can easily be copied to a work document.

4 Procurement

4.1.1 Minimum requirements of people employed on the Site

4.1.2 BBBEE and preferencing scheme

The company shall maintain or improve upon their current B-BBEE Contribution level for the duration of the contract. The supplier will be required to submit a new B-BBEE certificate within 3 months, should ownership of the company change during the life of the contract

4.2 Plant and Materials

4.2.1 Quality

All inspections and testing to be performed in accordance with the Quality Control Procedure developed by the *Contractor*. The specified Materials and Equipment are to be new, unused, and free from defects and imperfections. Reconditioned Materials and/or Equipment are not regarded as new under any circumstances. The *Contractor* will not use Materials or Equipment which are generally recognised as being unsuitable or Otherwise to be avoided for the purpose for which they are intended.
Only components of high reliability will be utilised, with a proven operating history, to enable the Plant to achieve required reliability and availability. Equipment design, engineering and manufacture will be done in accordance with the best modern practice applicable to high-grade products of the type to be furnished, so as to ensure the efficiency and reliability of the Works and the strength and suitability of the various parts for the Works.
Materials and equipment withstands ambient conditions and the variations of temperature arising under working conditions without distortion, deterioration or undue strains in any part. All parts and components are made accurately, and where practicable, to acceptable standards so as to facilitate replacement and repairs. Repair of defective material and/or equipment will be done only with the *Employer*'s approval and any such repair, if approved, will be carried out to the satisfaction of the *Employer*.
The *Contractor* ensures that co-ordinated and formally documented management system is in place for the assurance of quality. The *Employer* is to specify intervention (hold and witness) points during the manufacturing, installation and on site testing stages of the project. The *Contractor* issues preliminary notification of such intervention points by ten working days in advance to the *Employer*, and confirms such hold and witness points at least five working days prior to the activity.

4.3.2 Plant & Materials provided "free issue" by the *Employer*

None

4.3.3 *Contractor*'s procurement of Plant and Materials

None

4.3.4 Spares and consumables

The *Contractor* supplies the *Employer* with a detailed list of all spares required in order to maintain the new Excitation Control System. The list of spares is supplied three months before the delivery of the items for the installation. The *Contractor* further supplies all basic maintenance spares, in accordance with the *Contractor*'s maintenance schedules, such as filters and fuses to the *Employer* before installation. The *Contractor* shall keep all critical spares at hand, as needed during commissioning, to prevent extended delays caused by failure of any of the components; these spares will remain the property of the *Contractor*. Furthermore, the *Contractor* shall provide a detailed spares management plan with projection on spares obsolescence and end of life management for electronic modules, power electronic devices and other assembly modules.

The complete recommended spares list includes the following details:

a) Description

b) Part number
c) Special storage requirements
d) Replacement part or routing maintenance part
e) Quantity
f) Cost
g) Lead time
h) Supplier full contact details and address.

4.2.2 Plant & Materials provided "free issue" by the *Employer*

State arrangements for collection by *Contractor* or delivery by others on behalf of the *Employer*, off loading, inspection, storage, care custody and control, return of unused Plant and Materials, etc. State whether any samples are to be provided by the *Employer* and if so how, where and when. Always include a statement to the effect that 'all other Plant and Materials are to be provided by the *Contractor*'.

4.2.3 *Contractor*'s procurement of Plant and Materials

Specify any constraints on how the *Contractor* is to order, codify, expedite, freight, import, transport to Site and any other requirements for delivery and storage before installation. The *Employer* may require warranties from suppliers to be in favour of the *Employer* and not just to the *Contractor* during the life of the contract. Also include requirements for vendor data which the *Employer* may need after Completion of the whole of the *works*. THIS IS A VERY IMPORTANT SECTION IN PROCESS PLANT AND UTILITY PROCUREMENT CONTRACTS.

4.2.4 Spares and consumables

Some contracts may need to include provision for the supply of a minimum category of spares, fuel, oil or other feed stock and consumables which the *Employer* may need at or just after take over and that it is best the *Contractor* provide these initially as part of his Providing the Works.

4.3 Tests and inspections before delivery

Core Clauses 40 and 41 both make reference to the Works Information regarding tests and inspections. Specify any requirements here for any tests and inspections that are to be done by the Supervisor or Others before delivery to the Working Areas, particularly if such tests and inspections are to be carried out by agents of the Employer overseas.

4.4.1 Factory acceptance test (FAT)

1. The *Contractor* will perform pre-checks and tests before the *Employer* is notified to be involved with FAT.
2. Before FAT will commence, a complete Factory Acceptance Test Procedure will be submitted by the *Contractor* to the *Employer*. The *Employer* will review the procedure and make updates where necessary.
3. The *Contractor* supplies two copies of all test certificates and data sheets prior to the commencement of the factory testing.
4. The *Contractor* gives the *Employer* at least 10 working days' notice of the date on which the control system is ready for inspection and testing when these tests are to be done in South Africa and two months' notice if it is to be done outside the border of South Africa.
5. The *Employer* is provided with access to the *Contractor*'s premises for the purpose of establishing compliance with the contractual requirements by means of inspections, surveillance's, audits and witnessing the performance of any tests.
6. Communications testing will be conducted during the basic design phase. This will also be regarded as a pre-FAT test.
7. This inspection entails a full system check (functional and wiring checks) to ensure compliance with this specification, contract drawings and other applicable standards.
8. Allowance is made in the delivery time to cater for this requirement.

9. The system functionality is to be demonstrated by the *Contractor* to the Project Manager/Supervisor during Factory Acceptance Tests at the *Contractor*'s facility for one control system. Only if non critical defects are picked-up that cannot be rectified before the first unit's commissioning, will additional FAT continue on subsequent units on the same basis.
10. A complete Factory Acceptance Testing procedure is included in the design package.
11. The following tests (checks) are conducted by the *Contractor* as a minimum requirement and witnessed by the Project Manager/Project Supervisor, lead Engineer and site representative:
    a. Dielectric test of current transformers, auxiliary wiring and control circuitry;
    b. Dielectric tests of power circuit, bus bars and cables.
    c. Current transformer test to prove the ratio, polarity, resistance and magnetising curves;
    d. Check the nameplates, connections, torque all bolts and nuts on power cabling that will not require loosing and refastening on site;
    e. Functional tests on circuitry, and the indication circuitry (checks include fuse ratings, labelling, ferrule numbers, crimping and tightness of all connections including lugs);
    f. Calibration checks of all voltmeters and ammeters to prove their operation and accuracy class;
    g. Power Supply checks
    h. Control Function Tests (Limiters, step responses, firing angles, control, etc)
    i. Alarms and indication checks
    j. Power electronics checks and tests
    k. Breaker/contactor tripping and closing under off-nominal voltages.
12. The Factory Acceptance Testing of the ECS is completed at the manufacturer's works and accepted by the Project Manager, before dispatching the complete unit to site.
13. A defects list needs to be kept as a live working document to capture any deviation from the works information. These could be simple wiring errors or more serious functional requirements that are not met.
14. The *Contractor* is given a reasonable time to rectify wiring without delaying the completion of the FAT. When more serious defects are encountered, the *Contractor* needs to inform the Project Manager immediately about it, with an estimated time to resolution and testing of the function/requirement.

4.4 Marking Plant and Materials outside the Working Areas

NA

4.5 *Contractor*'s Equipment (including temporary works).

NA

4.6 Cataloguing requirements by the *Contractor*

NA

5 Construction

1.1 Temporary works, Site services & construction constraints

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

1. Before work starts on Site, a Site inaugural meeting is held between the Contractor and the Employer, where details of the Works are discussed and clarified;
2. The Contractor's Site Supervisor is on Site for the entire duration of the Works.
3. General access to the power station is controlled and Site induction has to be completed before work will be allowed to start.
4. It is mandatory that the Contractor adheres to all security regulations in force during the period of the contract.
5. Before entry to the Site will be allowed, everyone will undergo an alcohol breathalyser test which needs to be passed. This is one of the five Life-saving Rules to which the Contractor is required to adhere to at all times.

5.1.2 Restrictions to access on Site, roads, walkways and barricades

1) The Contractor satisfies himself and comply with the Site conditions presented during induction.
2) The Contractor is required to comply with all Site restrictions pertaining to the Site's roads, walkways and barricades.

5.1.3 People restrictions on Site; hours of work, conduct and records

1. Normal working hours:
   a) Monday to Thursday: 07h00 – 16h15
   b) Fridays: 07h00 – 12h00

2. Outage working hours are as follows:
   a) Monday to Sundays: 07h00 – 18h30

5.1.4 Health and safety facilities on Site

The health and safety facilities on Site will be discussed in detail during the Site induction

5.1.5 Environmental controls, fauna & flora, dealing with objects of historical interest

N/A

5.1.6 Title to materials from demolition and excavation

The *Contractor* has no title to plant and/or materials resulting from him carrying out the *Works*.

5.1.7 Cooperating with and obtaining acceptance of Others

All activities are performed according to the Accepted Programme.

5.1.8 Publicity and progress photographs

No notice boards, advertising rights, media relations, and photography and progress photographs will be allowed without appropriate authorisation.

5.1.9 *Contractor*'s Equipment

1. The Contractor provides the Employer with a complete list of materials, tools, Equipment and or machinery before bringing it onto Site.
2. The Contractor provides and maintains all test and measuring Equipment required for all tests to the required accuracy. The accuracy of test Equipment is required to be better than ± 0.1 %.
3. The type and class of Equipment used is subject to the Acceptance by the Employer.

4. The Contractor's measuring Equipment is accompanied by valid calibration certificates from an approved authority.
5. The Project Manager may at any stage during the Contract require such Equipment to be checked by an approved laboratory or the South African Bureau of Standards.

5.1.10 Equipment provided by the *Employer*

None

5.1.11 Site services and facilities

5.1.11.1 Refuse Disposal

The Employer provides special colour coded bins as per the table below for refuse disposal. These bins are emptied by the Employer free of charge. The Contractor ensures that all workers under his control strictly adhere to the correct use of refuse bins as stated in the Plant.

Blue Bins	Scraps Metal Only
White Bins	Domestic Refuse
Yellow Bins	Asbestos Material
Brown Bins	Building Rubble
Red Bins	Oil or Chemical containing refuse.

5.1.11.2 Supply of Electricity

- Employer will make available to the Contractor 220/230-volt electrical supply free of charge from the closest existing point of supply.
- The Contractor is to make provision for the necessary extensions and plug points.
- All Electrical boards must be inspected and tested before connecting to a power supply and then a CoC must be issued by the Contractor
- The Contractor will adhere to the Electrical Installation Regulations of 1992

5.1.11.3 Medical Facilities

- The Contractor provides a First Aid service to his employees and subcontractor. In the case where these prove to be inadequate, like in the event of a serious injury, the Employer's Medical Centre and facilities are available.
- Outside the Employer's office hours, the Employer's First Aid Services are only available for serious injuries and life threatening situations.
- The Employer is entitled, however, to recover the costs incurred, in the use of the above Employer's facilities, from the Contractor.

5.1.11.4 Toilet Facilities

The Employer provides the Contractor access to toilet facilities.
Temporary chemical toilets are provided by the Contractor where deemed necessary.

5.1.12 Facilities provided by the *Contractor*

- The *Contractor* shall provide, for his own use adequate size offices.
- A cleaning service must also be provided.
- Domestic rubbish will be removed free of charge.
- The *Contractor* shall dismantle and clear off site all such infrastructure at the discretion of the *Service Manager* on completion of the contract.
- No such dismantling and clearance work shall be carried out without prior approval by the *Service Manager.*
- Any electrical equipment or appliances used by the *Contractor* shall conform to the applicable South African Safety standards and Kriel standard PSR 010, and shall be maintained in safe and proper working condition.

- The *Employer* shall have the right to stop the *Contractor*'s use of any electrical equipment or appliance, which in the *Employer's* opinion does not conform to the foregoing.

5.1.12.1Site Location

- The boundary of the site is within the Power Station boundary fences.
- The *Contractor* is to mark the boundaries of his site clearly.
- The *Contractor* is to ensure that all his material and equipment is always within the boundaries of his site.
- A site for the *Contractor* will be provided if needed. (The exact position will be determined on site).
- The *Contractor* will ensure further treatment of the yard area to keep all neat and tidy at all times.
- The *Contractor* shall also include for such items as security, watch and access arrangements to his yard area.
- The *Contractor* shall not occupy any site area other than that located to him
- On completion of the service on Site, all areas allocated to the *Contractor* shall be re-instated to their former condition to the satisfaction of *Employer*

5.1.12.2 *Contractor*'s site requirements

- The *Contractor* supplies, installs, properly maintains and removes all temporary construction facilities and utilities necessary for the complete performance of the *service*
- Including the following:
- The *Contractor's* yard should adhere to sound housekeeping, failing with this the *Employer* may use another *Contractor* to clean up the *Contractor's* yard. These costs will be carried by the *Contractor*.
- Any damage to installed lighting is repaired at the *Contractor*'s expense.
- The reticulation of electricity, water and any other services required by the *Contractor* from a supplied central distribution point.
- Hazardous Substances to be contained as per Eskom requirements.
- Transportation on and off site
- Telephone connections may be available and the *Contractor* applies via the *Purchaser's Representative* for a connection. Connection fees and calls are for the *Contractor's* account.
- Compressed air and gases
- Maintenance of lay-down and storage areas
- Electric panels and distribution wiring for erection and within *Contractor*'s yard
- Security of *Contractor*'s yard
- Temporary lighting to ensure safe working conditions.

5.1.12.3 Accommodation

The provision of accommodation for *Contractor*'s personnel is the responsibility of the *Contractor*.
The *Contractor* or any of his employees or subcontractors is not allowed to use the *Employer's* dining facilities. The shop next to the main office building may be utilized by the *Contractors*.

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

N/A

5.1.14 Survey control and setting out of the *works*

N/A

5.1.15 Excavations and associated water control

N/A

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

1) The Contractor minimises interference of any nature with regards to existing services, cable and pipe trench covers.
2) In the event that the Contractor damages one of the above, the penalty would be for the Contractor.

5.1.17 Control of noise, dust, water and waste

The *Contractor* ensures that all activities comply with the safety requirements.

5.1.18 Sequences of construction or installation

All activities are performed according to the Accepted Programme.

5.1.19 Giving notice of work to be covered up

All notices and warnings will follow the ECC3 requirements.

5.1.20 Hook ups to existing works

The floor & surrounding space is limited and the Contractor will assess the area properly in order to execute the works successfully and timeously

5.2 Completion, testing, commissioning and correction of Defects

5.2.1 Work to be done by the Completion Date

On or before the Completion Date the *Contractor* shall have done everything required to Provide the Works except for the work listed below which may be done after the Completion Date but in any case before the dates stated. The *Project Manager* cannot certify Completion until all the work except that listed below has been done and is also free of Defects which would have, in his opinion, prevented the *Employer* from using the *works* and Others from doing their work.

	Item of work	**To be completed by**
	As built drawings of	Within days after Completion
	Performance testing of the *works* in use as specified in paragraph of this Works Information.	See performance testing requirements.

5.2.2 Use of the *works* before Completion has been certified

N/A

5.2.3 Materials facilities and samples for tests and inspections

All components will be in line with approved list of components as supplied by the *Employer*. Samples of components may be requested by the *Employer* for pre-approval where deemed necessary.

5.2.4 Commissioning

The activities forming part of live testing, live commissioning or power up of any component is not embarked on until the Project Manager's acceptance (safety clearance certificate) has been obtained for construction and erection work performed in this stage.

5.2.4.1 Commissioning documentation

Commissioning does not start until the following documents, which are required for the commissioning of the plant, is accepted by the Project Manager:

1. All relevant drawings as-built.
2. All relevant site acceptance test reports completed and signed.

3. All QCP's signed at the relevant steps.
4. Draft Technical Maintenance and Operating manuals supplied.
5. All installation related defects are cleared.
6. All safety clearance certificates signed.

5.2.4.2 Site acceptance tests

1. Site acceptance tests are carried out by the *Contractor* and witnessed by the Supervisor and/or *Employer*.
2. The test procedures are prepared by the *Contractor* and accepted by the Project Manager.
3. The purpose of the Site acceptance test is to ensure that all the Plant and Materials are correctly installed, checked and that no malfunction or damage occurred during the transportation and / or erection.
4. The *Contractor* provides all the test equipment for testing the individual functional units/components.
5. When the site acceptance tests are completed, the control system is safety cleared (safety clearance certificate) and the *Contractor* issues a COC for acceptance by the Project Manager.
6. The *Contractor* is the signatory to this certificate.

5.2.4.3 Cold / pre commissioning tests

1. Site cold commissioning tests are carried out by the *Contractor* and witnessed by the *Employer*.
2. The test procedures are prepared by the *Contractor* and accepted by the Project Manager.
3. The purpose of the cold commissioning is to ensure that all the Plant and Materials are correctly installed, prove live loops and test basic functions with the machine at standstill.
4. The *Contractor* provides all the test equipment for testing the individual functional units.

5.2.4.4 Hot commissioning

1. Hot commissioning starts after cold commissioning is complete.
2. The plant is commissioned by running the system fully manual and testing each piece of Plant and Material for full functionality in each mode of operation.
3. Due to possible constraints from the *Employer*, the *Contractor* allows for his commissioning engineer to be available continuously during each hot commissioning activity.
4. The commissioning engineer is officially certified by the *Contractor* as being qualified and experienced to commission the excitation system and be able to make the necessary software updates as may be required onsite during hot commissioning.

5.2.5 Start-up procedures required to put the *works* into operation

The *Contractor* is on site when the first live operation of the plant commences. All switching to get the plant ready is done by the *Employer* to obtain the status for start-up as per agreed commissioning program.

5.2.6 Take over procedures

Take-over is when all testing, inspections and commissioning as specified in sections 5.2.1, 5.2.4, 5.2.5 are completed successfully.

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

Access will be granted to the Contractor for defects correction as per core clause 43.4 in ECC3

5.2.8 Performance tests after Completion

Commissioning results are sent to the system operator for evaluation and results can be requested to be readjusted to meet system requirements.

5.2.9 Training and technology transfer

5.2.9.1 General

1. The *Contractor* provides training on the Plant and Material and systems included as part of the *works* to the various categories of the *Employer's* technical staff for the duration of the *works*.
2. Training provided by the *Contractor* is directly applicable to the actual Plant and Material supplied for the works.
3. Engineering training is provided prior to the Factory Acceptance Testing of the ECS.
4. All pre-FAT training is conducted at the *Contractor*'s local test facility and all operating and maintenance training is conducted at Kriel Power Station.
5. The local facilities for training provided by the *Employer* are a suitably sized air-conditioned room, to accommodate 12 trainees as well as trainee and trainer desks, an overhead projector and flipchart or white board.
6. The number of participants that are to be trained is as indicated by the Project Manager.
7. The *Contractor* provides 3 additional (repeat) training courses as and when instructed by the *Project Manager*.
8. Practical hands-on training for each individual trainee forms an integral part of each of the following courses:
    a. Operating Training
    b. Maintenance Training
    c. Engineering / Commissioning Training
9. The Engineering / Commissioning training are of such a standard that experienced staff are able to commission and re-engineer some parts of the system after such training has been obtained.

5.2.1.1 Operating

The training includes the following aspects:

1. Familiarise with documentation including drawing configuration logic.
2. Operator interface familiarisation e.g. operational functions, alarms etc.

5.2.1.2 Maintenance

The training includes the following aspects:

1. Familiarisation with documentation (maintenance plan, procedures etc.)
2. Operator interface familiarisation e.g. operational functions, alarms etc.
3. Hardware familiarisation
4. Hardware maintenance
5. Maintenance of control and instrumentation

5.2.1.3 Engineering

The training includes the following aspects:

1. Familiarisation with documentation (maintenance plan, procedures etc.)
2. Operator interface familiarisation e.g. operational functions, alarms etc.
3. Hardware familiarisation
4. Hardware maintenance
5. Maintenance of control and instrumentation
6. Interfacing to the future control system

7. Bus system fault finding and engineering
8. Full commissioning understanding

5.2.1.4 Training documentation

1. The *Contractor* incorporates all necessary technical data, design data literature and drawings into his training manuals.
2. The course material is in English and includes all third party documentation.
3. A copy of the training documentation is supplied for each trainee.
4. The supply of drafts, pre-print proofs and printed copies of training documentation is planned by the *Contractor* in such a way that the required training is complete before FAT of the unit commences.
5. Training manuals are continuously updated by the *Contractor* up to the date of issue of the Defects Certificate for the whole of the *works*.

5.2.10 Operational maintenance after Completion

None

6 Plant and Materials standards and workmanship

6.1 Building works

NA

6.2 Civil engineering and structural works

NA

6.3 Electrical & mechanical engineering works

Doc Identifier	Description
ISO 9001	Quality Management Systems
32-727	Eskom Safety, Health, Environment and Quality (SHEQ) Policy
240-105658000	Supplier Quality Management: Specification
36-726	List of Approved Electronic Devices to be used on Eskom Power Stations
240-56227443	Requirements for Control and Power Cables for Power Stations Standard
240-53114026	Project Engineering Change Management
240-53114186	Document and Record Management Procedure
240-66920003	Project Handover Documentation Management Procedure
240-71432150	Plant Labelling Standard
ECM0004	Labelling Specification
240-86973501	Engineering Drawing Standard

6.4 Process control and IT works

As per clause 3.2 (Parts of the works which the Contractor is to design)

6.5 Other [as required]

7 List of drawings

7.1 Drawings issued by the *Employer*

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

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

Drawing number	Revision	Title

7.2 Appendix A – Vendor Document Submittal Schedule

DOCUMENTION REQUIREMENTS AND SUBMISSIONS -

Document Description		- Reference	- Format of presentation	TOTAL PROJECT PHASE WHEN DOCUMENTATION IS REQUIRED: ENQUIRY	TENDER RETURNABLES	CONTRACT AWARD + months (ENGINEERING)	MANUFACTURING ACCEPTANCE	BEFORE INSTALLATION	BEFORE COMMISSIONING	PROJECT COMPLETION
Electrical Documents Submission										
General	Index and Register of Documents - Preliminary	N/A	Soft / Hard Copy		x					
	Index and Register of Documents - Final	N/A	Soft / Hard Copy							x
	System Design	N/A	Soft / Hard		x					

	Preliminary		Copy							
	Philosophies	N/A	Soft / Hard Copy		**x**					
	System Design Final	N/A	Soft / Hard Copy			**x**				
Scope of work	Cabling Scope	Works Info	Soft / Hard Copy		**x**					
	Earthing & Lightning Protection Scope	Works Info	Soft / Hard Copy		**x**					
	Compressor Control System Scope of work	Works Info	Soft / Hard Copy		**x**					
Switchgear Interfaces	Electrical Interfaces, Schematics & Drawings - Preliminary	N/A	Soft / Hard Copy		**x**					
	Electrical Interfaces, Schematics & Drawings - Detail Design	N/A	Soft / Hard Copy			**x**				
	Electrical Interfaces, Schematics & Drawings - Revisions	N/A	Soft / Hard Copy					**x**		
	Electrical Interfaces Commissioning Procedure	N/A	Soft / Hard Copy						**x**	
	Electrical Interfaces, Schematics & Drawings - Final	N/A	Soft & Hard Copy							**x**
Cabling	Cable Design - Preliminary	240-56227443 / Works Info	Soft / Hard Copy		**x**					
	Completed cable tables in accordance with 240-56227443 - Preliminary	240-56227443 / Works Info	Soft / Hard Copy		**x**					
	Cable Schedule - Preliminary	240-56227443 / Works Info	Soft / Hard Copy		**x**					
	Cable Routing - Preliminary	240-56227443 / Works Info	Soft / Hard Copy		**x**					
	Cable Detail Design Pack	240-56227443 / Works Info	Soft / Hard Copy			**x**				
	Cable Routing and Termination Drawings (For Review)	240-56227443 / Works Info	Soft / Hard Copy					**x**		
	Cable Tests and Procedures (For Review)	240-56227443 / Works Info	Soft / Hard Copy					**x**		
	Cable Commissioning Procedures (For Review)	240-56227443 / Works Info	Soft / Hard Copy						**x**	
	Cable Routing and Termination Drawings - FINAL AS BUILT	240-56227443 / Works Info	Soft & Hard Copy							**x**
	Cable Tests Reports as per 240-56227443	240-56227443 / Works Info	Soft & Hard Copy							**x**

	Cable Handover Pack (including all terminations, schedules, Test Reports and procedures - signed)	240-56227443 / Works Info	Soft & Hard Copy							**x**
	Completed cable tables in accordance with 240-56227443	240-56227443 / Works Info	Soft & Hard Copy							**x**
	Cable schedules	240-56227443 / Works Info	Soft & Hard Copy		**x**	**x**				
	Cable servitude drawings	240-56227443 / Works Info	Soft & Hard Copy		**x**					
	Cable rack design drawings	240-56227443 / Works Info	Soft & Hard Copy			**x**				
	Completion Certificate	240-56227443 / Works Info	Soft & Hard Copy							**x**
Earthing & Lightning Protection	Earthing Layouts / Drawings - Preliminary	240-56356396	Soft / Hard Copy		**x**					
	Earthing Layouts / Drawings - Detail Design	240-56356396 / Works Info	Soft / Hard Copy			**x**				
	Earthing Tests and Procedures (For Review)	240-56356396 / Works Info	Soft / Hard Copy					**x**		
	Earthing Layouts / Drawings - FINAL AS BUILT	240-56356396 / Works Info	Soft & Hard Copy						**x**	
	Earthing Test Reports as per 240-56356396	240-56356396 / Works Info	Soft & Hard Copy							**x**
	Earthing Handover Pack (including all test reports & procedures signed)	240-56356396 / Works Info	Soft & Hard Copy							**x**
	As built drawings	240-56356396 / Works Info	Soft & Hard Copy						**x**	
	Completion Certificate	240-56356396 / Works Info	Soft & Hard Copy							**x**
Compressor Control System										
	Type test reports and certificates	Works Information	Soft / Hard Copy		**x**					
	Switchgear load schedules - Preliminary	Works Information	Soft / Hard Copy		**x**					
	Compressor Control System protection philosophy, list of alarms and trips	Works Information	Soft / Hard Copy			**x**				

	Detailed equipment list (material list) for each circuit	Works Information	Soft / Hard Copy			**x**				
	Compressor general arrangement drawings	Works Information	Soft / Hard Copy		**x**					
	ECS schematic drawings	Works Information	Soft / Hard Copy			**x**				
	Full sets of drawings	Works Information	Soft / Hard Copy			**x**				
	Detailed design review documentation	Works Information	Soft / Hard Copy			**x**				
	Design-verification certificates of all functional units	Works Information	Soft / Hard Copy			**x**				
	Technical details of all the components	Works Information	Soft / Hard Copy			**x**				
	Routine test reports	Works Information	Soft / Hard Copy							**x**
	Routine test certificates	Works Information	Soft / Hard Copy							**x**
	Handover file index	Works Information	Soft / Hard Copy							**x**
	Engineering handover file index	Works Information	Soft / Hard Copy							
	As built package for design (which contains the cover sheet, general arrangement, bus-wiring arrangement, summary sheet and applicable schematic drawings)	Works Information	Soft / Hard Copy					**x**		
	As built package for functional unit (which contains the schematic drawings, material list, punch list (signed-off), mechanical and electrical inspection checklist, functional and operational tests)	Works Information	Soft / Hard Copy					**x**		
	Training course outline (topics/curriculum)	Works Information	Soft / Hard Copy					**x**		
	Summary or preliminary version of training manuals	Works Information	Soft / Hard Copy					**x**		
	Engineering training manual	Works Information	Soft / Hard Copy					**x**		
	Operating training manual	Works Information	Soft / Hard Copy					**x**		
	Maintenance training manual	Works Information	Soft / Hard Copy					**x**		
	Operating, installation and maintenance manuals	Works Information	Soft / Hard Copy					**x**		
	(with work instructions)	Works Information	Soft / Hard Copy					**x**		

	Equipment guarantee certificates	Works Information	Soft / Hard Copy							x
	Calibration Certificates for test equipment used	Works Information	Soft / Hard Copy							x
	Maintenance plan for ECS life of 30 years	Works Information	Soft / Hard Copy					x		
	Recommended list of spares	Works Information	Soft / Hard Copy					x		
	Quality Control Plan (QCP) or Inspection and Test Plan (ITP)	Works Information	Soft / Hard Copy				x			
	Factory Acceptance Testing (FAT) Plans and Procedures	Works Information	Soft / Hard Copy				x			
	FAT Report	Works Information	Soft / Hard Copy					x		
	FAT File	Works Information	Soft / Hard Copy					x		
	(e.g. Routine test certificates, verification check list, test equipment calibration certificates, instrument transformer calibration certificates, manufacturing drawings, functional checks report)	Works Information	Soft / Hard Copy					x		
	Factory Clearance Certificate	Works Information	Soft / Hard Copy					x		
	Site Acceptance Testing (SAT) Plans and Procedures	Works Information	Soft / Hard Copy					x		
	SAT Report	Works Information	Soft / Hard Copy							x
	SAT File	Works Information	Soft / Hard Copy							x
	(e.g. Routine test certificates, verification check list, test equipment calibration certificates, construction drawings, functional checks report)	Works Information	Soft / Hard Copy							x
	Completion certificate	Works Information	Soft / Hard Copy							x

C3.2 *CONTRACTOR*'S WORKS INFORMATION

Will be completed as per the final agreement

PART 4: SITE INFORMATION

Document reference	Title	No of pages
	This cover page	1
C4	Site Information	2
	Total number of pages	3

PART 4: SITE INFORMATION

C4.1: Information about the *site* at time of tender which may affect the work in this contract

General

The Kriel Power Station is situated approximately half way between Bethal and Ogies on the R545, being just over 30 km from each town and 10 km north-west of Kriel town.

Climate

Kriel Power Station is situated in a summer rainfall area with an average annual precipitation of about 750-mm falling almost entirely during the months of October to April. The average rainfall per month generally exceeds 40 mm during this period, although drought periods do occur which can last for 20 days or longer. Drought periods occur most frequently during the months of October/November and March/April. January is statistically the highest rainfall month with an average monthly rainfall of about 130-mm. June has the lowest rainfall with an average monthly rainfall of about 7 mm.

Approximately 85% of the annual rainfall occurs in the summer months and heavy falls of 125 to 150 mm occasionally occur in a single day. The annual average number of thunderstorms is about 75. These storms are often violent with severe lightning and strong (but short-lived) gusty winds and are sometimes accompanied by hail. This region has among the highest hail frequencies in South Africa; about 4 to 7 occurrences (depending mainly on altitude) may be expected annually.

January is normally the hottest month with an average daily maximum temperature of 27°C with a mean daily temperature in winter being about 16°C. Winter average daily temperatures vary from 18, 5°C maximum to -1°C minimum. The extreme temperatures recorded range from 34, 7°C to minus 12, 4°C for the period 1920 - 1984. (Source: Weather Bureau, Pretoria)

Winds are generally light to moderate except during thunderstorms. Generally the prevailing wind directions are from the North West during the day and from the east at night. During daytime, the prevailing winds are from the north-western direction. During night-time, the prevailing winds are from the north-eastern direction. The highest recorded average wind speed is 17, 6 km/hour. The average wind velocity over the year is 14, 5 km/hour.

(Source: MSN weather & Weather 24, average records 2008 - 2009.)

Weather Data

THE ASSUMED 1 IN 10 YEAR RAINFALL FIGURES ARE:

Month	Cumulative rain (mm)	No of days with rainfall > 10mm
January	200	6
February	150	6
March	120	5
April	110	4
May	40	3
June	20	2
July	30	2
August	30	2
September	60	3
October	140	6
November	160	7
December	170	6

Relative Humidity

Records for Bethal (2008 - 2009)
The average relative humidity on an annual base are as follows:
08:00 = 80%
14:00 = 52%
20:00 = 73%

Prevailing Winds

Records for Bethal (2008 - 2009)
Winds are mostly north-westerly except for February and March when they are easterly to south-easterly. The highest wind speeds are recorded from the south-east: on average 14km/h.

Other Climatic Factors

Records for Bethal (2008 - 2009)
Thunder occurs mostly from November to January with average of 35.7 days annually.

a) Hail occurs mostly in December with average of 2.8 days annually.
b) Fog occurs mostly in the winter months with an average of 19 days annually.
c) Snow rarely occurs
d) Cloud coverage is highest in the summer months with annual average as follows:
   - 08:00 = 2.8/8
   - 14:00 = 3.8/8
   - 20:00 = 3.1/8

Evaporation for the area is in rage of 75mm to 190mm per month. The highest evaporation occurs in December, and the lowest in June.

Topography

The surface topography of the Kriel area is typical of the Mpumalanga Highveld consisting in the main of a gently undulating plateau. The flood plains of the local streams are at an average elevation of ± 1540 meters above mean sea level and drainage generally is a northerly direction.

Air Quality

The existing and potential sources of air pollution in Kriel area are the following:

- Kriel Power Station stack emissions
- Kriel Power Station dry dust (fly ash) handling plant
- Dust blow from the Eskom coal stock yard
- Dust blow from the roads in the area
- Seasonal dust blow caused by ploughing of farmlands, and dust blow off denuded fields
- Dust blow from dried out exposed surfaces of the wet ash dam.

However, Eskom utilises the majority of the top surface of the ash dam as an evaporation pan for polluted water, which means that the exposed surface is constantly wet. The sides of the ash dam have largely been rehabilitated, with the result that dust blow from the ash dam.

Access limitations

The contractor safety system file will be required as mitigation against safety hazards which must comply with requirements of Kriel Power Station. Arrangements must be made with Employer so that access can be gained without any restriction/ constraints to work onsite that may not be immediately apparent from an inspection of the site. Contractor will be required to do induction before access to site can be granted.