Eskom

NEC3 Engineering and Construction

Short Contract (ECSC3)

A contract between **Eskom Holdings SOC Ltd (Reg No. 2002/015527/30)**

and

for **The design, manufacture, factory acceptance testing, delivery, installation, commissioning and site acceptance testing of the inverters, and the decommissioning and removal of the existing inverters at Ankerlig 1 and 2 Power Station.**

Contents: Compiled in accordance with CIDB Standard for Uniformity in Construction Procurement (May 2010 amendments)

Documentation prepared by: [•]

C1 Agreements & Contract Data

C1.1 Form of Offer and Acceptance

Offer

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

Title of the Contract

The tenderer, identified in the signature block below, having examined the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, 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.

The offered total of the Prices exclusive of VAT is	**R[●]**
Value Added Tax @ 15% is	**R[●]**
The offered total of the Prices inclusive of VAT is	**R[●]**
(in words) **[●]**	

This Offer may be accepted by the *Employer* by signing the form of Acceptance overleaf 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: .....

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 1 Agreements and Contract Data, (which includes this Form of Offer and Acceptance)

Part 2 Pricing Data

Part 3 Scope of Work: Works Information

Part 4 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 Tender 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, which must be signed by the duly authorised representative(s) for both parties.

The tenderer shall within one week 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 and signed copy of this document, including the Schedule of Deviations (if any) together with all the terms of the contract as listed above.

Signature(s)		
Name(s)	James L'ETang	
Capacity	Senior Technical Plant Manager	
		(Insert name and address of organisation)
for the Employer	Eskom Holding SOC Ltd Peaking OU PO Box 3487 Tygervalley 7536	
Name & signature of witness		Date

Note: If a tenderer wishes to submit alternative tender offers, further copies of this document may be used for that purpose, duly endorsed, 'Alternative Tender No. _____ '

Schedule of Deviations

Note:

1. To be completed by the Employer prior to award of contract. 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		James L'ETang
Capacity		Senior Manager Technical Plant
On behalf of	*(Insert name and address of organisation)*	*(Insert name and address of organisation)* Eskom Holdings SOC Ltd Peasking OU PO Box 3487 Tygervalley 7536
Name & signature of witness		
Date		

C1.2 Contract Data

Data provided by the *Employer*

Completion of the data in full is essential to create a complete contract.

Clause	Statement	Data
	General	
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 & 14.4	The *Employer*'s representative to whom the *Employer* in terms of clause 14.4 delegates his actions[1] is (Name):	**Neil Davids**
	Address	**Eskom Peaking Generation Office 15 Pasita Street Rosenpark, 7550 Cape Town**
	Tel No.	**021 941 5988**
	E-mail address	**neil.davids@eskom.co.za**
11.2(11)	The *works* are	**Supply, delivery, factory acceptance testing, Installation, site acceptance testing and commissioning the following new Inverters with all installation accessories, including the decommissioning of existing Inverters. The *works* include two inverters for Ankerlig 1 station and two inverters for Ankerlig 2 station.**
11.2(13)	The Works Information is in	**the document called 'Works Information' in Part 3 of this contract.**
11.2(12)	The Site Information is in	**the document called 'Site Information' in Part 4 of this contract.**
11.2(12)	The *site* is	**Ankerlig Gas Power Station**
30.1	The *starting date* is.	**The date that the Contract is signed**
11.2(2)	The *completion date* is.	**TBC**
13.2	The *period for reply* is	**1 (one) week**
40	The *defects date* is	**52 (fifty-two) weeks after Completion**
41.3	The *defect correction period* is	**1 (one) week**

[1] Except those actions which can only be done by the *Employer* as a Party to the contract.

50.1	The *assessment day* is the	**between the 24th and 25th day of each successive month**
50.5	The *delay damages* are	**R6000 per day with a max of 10% of contract value.**
50.6	The retention is	**10%, 5% released on completion, 5 % on defects date**
51.2	The interest rate on late payment is	**[●]%** **[Insert a rate only if a rate less than 0.5% per week of delay has been agreed]**
80.1	The *Contractor* is not liable to the *Employer* for loss of or damage to the *Employer*'s property in excess of	**the amount of the deductibles relevant to the event**
	Does the United Kingdom Housing Grants, Construction and Regeneration Act (1996) apply?	**No**
93.1	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	**[●]**
	Tel No.	**[●]**
	Fax No.	**[●]**
	e-mail	**[●]**
93.2(2)	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**
93.4	The *tribunal* is:	**arbitration.**
	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	**[●] 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.**

The *conditions of contract* are the NEC3 Engineering and Construction Short Contract (April 2013)[2] and the following additional conditions Z1 to Z11 which 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 Change of Broad Based Black Economic Empowerment (B-BBEE) status

Z2.1 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.

Z2.2 The *Contractor* is required to submit an updated verification certificate and necessary supporting documentation confirming the change in his B-BBEE status to the *Employer* within thirty days of the notification or as otherwise instructed by the *Employer*.

Z2.3 Where, as a result, the *Contractor's* B-BBEE status has decreased since the *starting date* the *Employer* may either re-negotiate this contract or alternatively, terminate the *Contractor*'s obligation to Provide the Works.

Z2.4 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 those stated in Clause 91.1 and the amount due on termination includes amounts listed in Clause 92.1 less a deduction of the forecast additional cost to the *Employer* of completing the *works*.

Z3 Confidentiality

Z3.1 The *Contractor* does not disclose or make any information arising from or in connection with this contract available to others except where required by this contract. 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 where required by this contract the *Contractor* ensures that the provisions of this clause are complied with by the recipient.

Z3.2 If the *Contractor* is uncertain about whether any such information is confidential, it is to be regarded as such until notified otherwise by the *Employer*.

[2] If June 2005 Edition applies, delete April 2013 and insert June 2005
[3] State whether attached as a 'PDF' file in terms of Eskom's licence, or to be obtained from Engineering Contract Strategies Tel 011 803 3008, Fax 086 539 1902 or www.ecs.co.za.

Z3.3 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.

Z3.4 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 *Employer*. All rights in and to all such images vests exclusively in the *Employer*.

Z3.5 The *Contractor* ensures that all his subcontractors abide by the undertakings in this clause.

Z4 Waiver and estoppel: Add to clause 12.2:

Z4.1 Any extension, concession, waiver or relaxation of any action stated in this contract by the Parties or their delegates 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.

Z5 Health, safety and the environment

Z5.1 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.

Z5.2 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.

Z6 Provision of a Tax Invoice and interest. Add to clause 50

Z6.1 The *Contractor* provides the *Employer* with a tax invoice in accordance with the *Employer*'s procedures stated in the Works Information, showing the correctly assessed amount due for payment.

Z6.2 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 clause 51.2 is then calculated from the delayed date by when payment is to be made.

Z6.3 The *Contractor* 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.

Z7 Notifying compensation events

Z7.1 Delete from the last sentence in clause 61.1, "unless the event arises from an instruction of the *Employer*."

Z8 *Employer's* limitation of liability; Add to clause 80.1

Z8.1 The *Employer* liability to the *Contractor* for the *Contractor's* indirect or consequential loss is limited to R0.00 (zero Rand).

Z9 Termination: Add to clause 90.2, after the words "or its equivalent":

Z9.1 or had a business rescue order granted against it.

Z10 Addition to Clause 50.5

Z10.1 If the amount due for the *Contractor*'s payment of *delay damages* reaches the limits stated in this Contract Data (if any), the *Employer* may terminate the *Contractor*'s obligation to Provide the Works.

If the *Employer* terminates in terms of this clause, the procedures on termination are those stated in Clause 91.1 and the amount due on termination includes amounts listed in Clause 92.1 less a deduction of the forecast additional cost to the *Employer* of completing the *works*.

Z11 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 Subconsultants 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 Subcontractors 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.

Z11.1 A Committing Party may not take any Prohibited Action during the course of the procurement of this contract or in execution thereof.

Z11.2 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.

Z11.3 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.

Z11.4 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.

Z12 Insurance

Z _12.1 Replace core clause 82 with the following:

Insurance cover 82

82.1 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.

82.2 The *Contractor* provides the insurances stated in the Insurance Table A, from the *starting date* until the earlier of Completion and the date of the termination certificate.

INSURANCE TABLE A

Insurance against	Minimum amount of cover or minimum limit of indemnity	Cover provided until
Loss of or damage to the *works*	The replacement cost where not covered by the *Employer*'s insurance The *Employer*'s policy deductible as at contract date, where covered by the *Employer*'s insurance	The *Employer*'s certificate of Completion has been issued
Loss of or damage to Equipment, Plant and Materials	The replacement cost where not covered by the *Employer*'s insurance The *Employer*'s policy deductible as at contract date, where covered by	The Defects Certificate has been issued

	the *Employer*'s insurance	
The *Contractor*'s liability for loss of or damage to property (except the *works*, Plant and Materials and Equipment) and for bodily injury to or death of a person (not an employee of the *Contractor*) arising from or in connection with the *Contractor*'s Providing the Works	**Loss of or damage to property** *Employer*'s property The replacement cost where not covered by the *Employer*'s insurance The *Employer*'s policy deductible as at contract date where covered by the *Employer*'s insurance Other property The replacement cost **Bodily injury to or death of a person** The amount required by the applicable law	
Liability for death of or bodily injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract	The amount required by the applicable law	

82.3 The *Employer* provides the insurances as stated in the Insurance Table B

INSURANCE TABLE B

Insurance against or name of policy	**Minimum amount of cover or minir 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	Per the insurance policy document

Business Interruption	
Nuclear Material Damage Terrorism	Per the insurance policy document

Z13 Nuclear Liability

Z13.1 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.

Z13.2 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*.

Z13.3 Subject to clause Z13.4 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*.

Z13.4 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.

Z13.5 The protection afforded by the provisions hereof shall be in effect until the KNPS is decommissioned.

Z14 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.

Z14.1 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.

Z14.2 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 Z14.1. Control measures conform to the requirements stipulated in the AAIA-approved asbestos work plan.

Z14.3 The *Employer* manages asbestos and ACM according to the Standard.

Z14.4 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.

Z14.5 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.

Z14.6 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.

Z14.7 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.

Data provided by the *Contractor* (the *Contractor*'s Offer)

The tendering contractor is advised to read both the NEC3 Engineering and Construction Short Contract (April 2013) and the relevant parts of its Guidance Notes (ECSC3-GN)[4] 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 page 31 of the ECSC3 April 2013 Guidance Notes.

Completion of the data in full is essential to create a complete contract.

10.1	The *Contractor* is (Name):	**[●]**
	Address	**[●]**
	Tel No.	**[●]**
	Fax No.	**[●]**
	E-mail address	**[●]**
63.2	The percentage for overheads and profit added to the Defined Cost for people is	**[●]%**
63.2	The percentage for overheads and profit added to other Defined Cost is	**[●]%**
11.2(9)	The Price List is in	**the document called 'Price List' in Part 2 of this contract.**
11.2(10)	The offered total of the Prices is [Enter the total of the Prices from the Price List]:	**R[●]** **excluding VAT** **[in words]** **[●]** **excluding VAT**

[4] Available from Engineering Contract Strategies Tel 011 803 3008, Fax 086 539 1902 or www.ecs.co.za.

C2 Pricing Data

C2.1 Pricing assumptions

Entries in the first four columns in the Price List are made either by the *Employer* or the tendering contractor

If the *Contractor* is to be paid an amount for the item which is not adjusted if the quantity of work in the item changes, the tenderer enters the amount in the Price column only; the Unit, Quantity and Rate columns being left blank.

If the *Contractor* is to be paid an amount for the item of work which is the rate for the work multiplied by the quantity completed, the tenderer enters the rate which is then multiplied by the expected quantity to produce the Price, which is also entered.

All Prices are to be shown excluding VAT unless instructed otherwise by the *Employer* in Tender Data or in an instruction the *Employer* has given before the tenderer enters his Prices.

If there is insufficient space in the Price List which follows, state in which document the Price List is contained.

C2.2 Price List

The Price List is as follows / contained in _____ (delete the text which does not apply and this note)

Item no.	Description	Unit	Quantity	Rate	Price
1	List of recommended spares. Refer to 4.1.8 Spares and Consumables				
	The total of the Prices (excluding VAT):				

C3: Scope of Work

C3.1 Works Information

1. Description of the *works*

1.1 Executive overview

The *works* make provision for the design, manufacture, FAT, delivery, installation, commissioning and SAT of the inverters, and the decommissioning and removal of the inverters at Ankerlig 1&2 Power Station. The works include the termination of existing cabling onto new equipment. The *works* include two inverters for Ankerlig 1 station and two inverters for Ankerlig 2 station.

Ankerlig 1&2 Power Station is located on Neil Hare Road, Atlantis, Cape Town on the west coast of the Western Cape.

1.2 Employer's objectives and purpose of the works

The current system equipment has reached the end of design life, The purpose of the works is to extend the design life of the system by replacing the inverters and to ensure that new equipment is replaced with the latest technology. The *Employers* seeks to receive fully functional inverters as specified in the works, with a minimum design life of 15 years.

1.3 Interpretation and terminology

The following abbreviations are used:

Abbreviation	Meaning given to the abbreviation
AC	Alternating Current
AIA	Approved Inspection Authority
AFC	Approved for construction
CPA	Cost Price Adjustment
DC	DC Direct Current
OEM	Original Equipment Manufacturer
KKS	Kraftwerk Kennzeichen System
LV	Low Voltage < 1000 V AC/DC
OHSA	Occupational Health and Safety Act
PS	Power Station
QC	Quality Control

2. MANAGEMENT AND START UP

2.1 Engineering Quality Assurance Requirements

2.1.1 Quality Plan

The *Contractor* is required to submit a quality control plan for the execution of the works, maintaining the below minimum control points:

Activity Interventions		
H	Hold	*Employer's* representative to verify activity/intervention point is complete. Activity cannot be considered complete and the *Contractor* may not proceed with his schedule until the activity is signed off by *Employer's* representative.
W	Witness	*Employer's* representative to be informed of inspection/activity completion. If *Employer's* representative does not attend the final sign off inspection, the *Contractor* may continue with his schedule at his own risk.
S	Surveillance	The *Contractor* is responsible for ensuring the activity or material requirements are in accordance with the Contract specification. Documented evidence to be submitted to the *Employer*.

Document/Record Requirements		
R	Review	*Employer's* representative to review documentation for acceptability. The *Contractor's* program may not proceed until acceptance of the submitted documentation.
X	Submitted	Documentation or records to be submitted to the *Employer*
O	Not Required	No documentation required.

Activity	**Intervention**	**Documentation**
Approval of installation program	H	R
Material and Equipment certificates	S	R
Final Installation	H	X
Final Commissioning	H	X

2.1.2 Documentation Control

- The *Contractor* implements a comprehensive document control of all documents, their revision status and of the document status in relation to the 'as built' and 'as designed' or commonly known as "approved for construction" plant status. In this regard the *Contractor*

ensures that the documentation supplied by the *Project Manager* as tie-in information, accurately reflects the contract requirements.

- The *Contractor* submits all documentation throughout the design phases of the project in electronic format to the *Project Manager*.
- The *Contractor* submits the final documentation on a formal transmittal form in triplicate to the *Project Manager* All correspondence is sequentially numbered.
- The *Contractor* adheres to *Employer's* technical documents and record management procedure (240-53114186) for all documents submitted.
- The documentation and drawings supplied is in South African English and SI units are used. The *Employer* does not accept scanned electronic copies of documentation or drawings; however, the original documentation with signature is scanned for electronic purposes.
- Documentation is of good quality, prepared by suitably qualified personnel and contain the general arrangement drawings, installation drawings and instructions, operating and maintenance instructions for all equipment.

2.1.3 Health and Safety Risk Management

The *Contractor* shall comply with the South African Occupational Health and Safety Act No. 85 of 1993 and regulations, Eskom Safety, Health, Environment and Quality (SHEQ) Policy 32-727, National Building Regulations as well as SANS 10400 for all works. Furthermore, the *Contractor* shall comply with any additional current statutory requirements of any relevant Government Departments regarding health and safety and environmental health.

The *Project Manager* is entitled to request the *Contractor* to stop work, without penalty to the *Employer*, when the *Contractor's* personnel fail to conform to acceptable health & safety standards or contravene the health and safety sections and regulations. The *Project Manager* must be informed immediately or before the end of a particular shift of any injury or damage to property or equipment. The *Contractor* to provides all the required safety and personal protective Equipment to his staff for the duration of the contract.

Ankerlig SHE Specification, applicable procedures, policies, guidelines and standards which will be used as Eskom's minimum requirements for Health and Safety will be provided.

The *Contractor* shall comply with the requirements for COVID-19 as per Government Directive from Department of Employment and Labour (DEL); Consolidate COVID-19 Direction on Health and Safety Measures in Workplaces issued by Minister in terms of Regulation 4(10) of the National Disaster Regulation.

Only the latest version/ revision of the applicable legislation, acts and regulations shall be deemed to be accepted at Ankerlig Power Station. Not limited to the following below legislation, acts and regulations are complied with:

- Compensation for Occupational Injuries and Diseases Act 130 of 1993
- National Water Act 36 of 1998
- Occupational Health and Safety Act and Regulations (85 of 1993)
- Disaster Management Act 57 of 2002.
- National Environmental Management Act 107 of 1998
- Applicable South African National Standards (SANS)

- National Road Traffic Act 93 of 1996
- Basic Conditions of Employment Act 75 of 1997
- National Veld and Forest Fire Act and Regulations 101 of 1998
- Environmental Conservation Act and Regulations 73 of 1989
- Committee of Land Transport Officials (COLTO)
- SACPCMP Act no. 48 of 2000
- Radiation Protection Act

The *Contractor* shall establish and enforce rules to ensure the health and safety of his own employees and those of its Subcontractors so that high standards of personnel health and safety are achieved and maintained. The *Contractor* shall exercise and enforce all necessary care and measures to preclude exposure of personnel, labour and nearby residents (if any) to potential health hazards and environmental pollutants.

The *Contractor* shall ensure that all persons which are employed and or deployed to work on site undergo police clearance and are certified to have no criminal records. This shall be done prior to them being allowed or given access to start work on site.

The *Contractor* is required to compile a SHE File to comply with the *Employer's* specification, which includes but not limited to the following:

- Safety, Health and Environmental Plan (SHE Plan)
- SHE organization within the Company-Responsibility & Accountability
- OHS Incident management Procedure (32-95)
- Planning of conduct of work activities including planning for changes and emergency work (Operational Plan)
- Management of PPE- Personal Protective Equipment (Procedure with the matrix)
- Emergency planning and fire risk management
- Vehicle and driver behaviour safety (Competency, Traffic Management, etc.)
- Sub-Contractor or supplier selection and management
- Design and specifications (Drawings)
- Key personnel competency, training, appointments
- Communication and awareness Plan
- Behavioural Based Safety Procedure
- *Employer's* Baseline SHE Risk Assessment (BRA).
- *Contractor's* Baseline Risk Assessment in line with the *Employer's* BRA (Identification, assessment and management of Safety, Health and Environmental risks related to the scope of work. The methodology used for the risk assessment must be provided together with the BRA.)
- Valid Letter of Good Standing (COIDA or equivalent)
- SHE policy signed by CEO/ MD- Comply to OHS Act Section 7 or ISO 45001
- Occupational hygiene and health risk assessment

- Medical surveillance
- Method Statements/ Safe Working Procedures
- COVID-19 Risk Assessments and Workplace Plan

In addition, reference is to be made to Health and Safety Specification, for documents and policies which the *Contractor* is to adhere to.

2.1.4 **SHE File**

The *Contractor* is required to compile a SHE File before the commencement of work. The SHE file must be submitted to the *Employer* for review and acceptance, thirty (30) days before any work can commence.

2.1.5 Work Packages

For all site related work the *Contractor* is required to submit a work package before any type of work can commence on the *Employers* plant. The required format of the work package is accordance with template 167A/158-A and a signed copy is provided by the *Contractor* after the *Employer* has reviewed and accepted the work package as final prior to any work.

2.1.6 Programming Constraints

- The *Contractor* submits a bar chart program (in MS Project format) detailing how the works are executed within the stipulated dates, including weekends and public holidays,
- The *Contractor* submits the program within two weeks after contract award,
- The program indicates the start date, completion date and duration of each activity,
- The program is updated and submitted every four weeks during the manufacturing process and daily during site implementation or sooner depending on the urgency of the matter.

2.1.7 Contractor's Management, Supervision and Key People

- 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*.

2.1.8 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 on the equipment specified below. The *Contractor*

will provide training to the *Employers* personnel in two separate sessions on separate days in order to accommodate for COVID-19 restriction. 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 be supplied to the *Employer*.

3. ENGINEERING AND THE *CONTRACTORS* DESIGN

3.1. EXISTING INSTALLATION

The inverters are equipment that forms part of the DC Essential supply systems at the referenced power stations. Each of these systems provide power to the station and all units. The following is the system identification for equipment:

- Ankerlig 1

	Description	**Floc**
Station (OCGT)	Station inverter A	0 0BRU01 GU001
	Station inverter B	0 0BRU02 GU001

- Ankerlig 2

	Description	**Floc**
Station (GAS)	Station inverter A	0 1BRU01 GU001
	Station inverter B	0 1BRU02 GU001

The DC essential supply system supplies the loads via the distribution boards and simultaneously float charge the batteries. Once there is a supply loss or failure of the charger, the batteries will then supply the loads for a certain standby time. The DC-DC converter converts the nominal 220V DC to 24V DC for critical C&I loads. The system is designed with adequate redundancy to maintain high reliability. The 230V AC station inverters provide supply to essential AC station and unit loads and are supplied from the nominal 220V DC bus.

The *Employer* shall provide detailed layout drawings of the works for submission to the *Contractor*. The drawings shall clearly define the works boundaries as well as defining the preferred layout for the works and the equipment interfacing points.

3.2. *EMPLOYERS* DESIGN

3.2.1 Equipment Specifications

The *Employers* has designed the following for work specifications for the equipment:

- Inverters

Ankerlig 1 (Station)				
		measure		tolerance
Input DC	Voltage	V	220	+20/-15%

	Current	A	40	
Input (Bypass) AC	Voltage	V	230	+- 10%, 1 phase
	Current	A	43.4	
	Frequency	Hz	50	+- 3%
Output AC	Voltage	V	230	+- 1%, 1 phase
	Current	A	43.4	
	Frequency	Hz	50	+- 0.1%
	synchronising range	Hz	50	+-3%
	Power	kVA	10	
Dimensions (mm)	H	mm	2200	
	W	mm	600	
	D	mm	800	
Cable Entry			Bottom	
Cooling Mode			natural air cooling	
Overload Behaviour			150% for 60s	
			125% for 10min	
			110% for 20min	
Short Circuit Behaviour			short circuit proof	
Efficiency			>95%	
Temperature			50%	

Ankerlig 2 (Station)				
		measure		tolerance
Input DC	Voltage	V	220	+20/-15%
	Current	A	58.3	
Input AC	Voltage	V	230	+- 10%, 1 phase
	Frequency	Hz	50	+- 3%
Output AC	Voltage	V	230	+- 1%, 1 phase
	Current	A	65.2	
	Frequency	Hz	50	+- 0.1%
	synchronising range	Hz	50	+-3%
	Power	kVA	15	
Dimensions (mm)	H	mm	2200	
	W	mm	800	
	D	mm	800	
Cable Entry			Bottom	
Cooling Mode			natural air cooling	
Overload Behaviour			150% for 60s	
			125% for 10min	
			110% for 20min	
Short Circuit Behaviour			short circuit proof	

Efficiency			>95%	
Temperature			50%	

3.2.2 Existing Installation Supply and Interfaces

The following electrical supply interfaces with the equipment existing equipment and will be reused for new equipment:

- Ankerlig 1

AC Incomers		
	Station Inverters	
	Inverter A (00BRU01 GU002)	Inverter B (00BRU02 GU0020
Voltage	230VAC	230VAC
Frequency	50Hz	50Hz
Current	43.4A	43.4A
Breaker Rating	50-63A	50-63A
Breaker KKS	(-Q01)	(-Q01)
Board Point of Installation	00BHA52.GA001	00BMA07.GA001
Low Voltage Distribution Board KKS	00BHA	00BMA
Cable No:	00BHA1022	00BMA1050

DC Incomers		
	Station	
	Inverter A	Inverter B
Voltage	220V	220V
Current	40A	40A
Breaker Rating	40-50A	40-50A
Breaker KKS	(-Q01)	(-Q01)
Cable No:	00BUD1005	00BUE1005
Board Point of Installation	00BUD02.LA001	00BUE02.LA001
220 DC Distribution Board	00BUD	00BUE

- Ankerlig 2

AC Incomers	
	Station Inverters

	Inverter 1 (01BRU01 GU002)	Inverter 2 (01BRU02 GU002)
Voltage	230VAC	230VAC
Frequency	50Hz	50Hz
Current	65.2A	65.2A
Breaker Rating	63-80A	63-80A
Breaker KKS	(-Q01)	(-Q01)
Board Point of Installation	01BMA52.FA001	01BMB52.GA001
Low Voltage Distribution Board KKS	01BMA	01BMB
Cable No:	01BMA1036	01BMB1043

DC Incomers		
	Station	
	Inverter 1	Inverter 2
Voltage	220V	220V
Current	59A	59A
Breaker Rating	63-80A	63-80A
Breaker KKS	(-Q01)	(-Q01)
Cable No:	01BUD1006	01BUE1006
Board Point of Installation	01BUD02.LA001	01BUE02.LA001
220 DC Distribution Board	01BUD	01BUE

3.3. PARTS OF THE WORKS WHICH THE *CONTRACTOR* IS TO DESIGN

The *Contractor* shall decommission and remove the existing equipment as identified in Section 3.1 existing installation.

The *Contractor* shall manufacture, procure, supply and install all equipment necessary for completion of the works. This includes, but is not limited to:

Ankerlig 1

- 2 x Station inverters as specified in Section 3.2 *Employer's* design.

Ankerlig 2

- 2 x Station inverters as specified in Section 3.2 *Employer's* design.

The *Contractor* shall ensure that equipment issued complies fully with the specifications as indicated in Appendix A of this document as per schedule A. Any deviations from schedule A should be documented in schedule B and listed in the deviation schedule Appendix B and sent for review/ approval to Eskom

3.4. PROCEDURE FOR SUBMISSION AND ACCEPTANCE OF *CONTRACTOR'S* DESIGN

The *Contractor* shall submit all necessary documentation to the *Project Manager* for acceptance prior to any fabrication or procurement taking place. The documentation required for acceptance shall be:

- Data sheets of proposed inverters
- Internal single line diagram diagrams – Inverters
- Decommissioning of existing equipment Procedure
- Installation/Erection Procedure
- Project Schedule
- Quality Control Plan

3.5. OTHER REQUIREMENTS OF THE *CONTRACTOR'S* DESIGN

3.5.1 Design & Constructability Requirements

- The logistics of installation needs to be considered carefully. A 14 day outage is foreseen for the execution of works. This includes the installation of all equipment specified in this document. Due to the spacial limitation on site the sizing of equipment must be strictly adhered to.
- All plant material provided must be new.
- Existing cabling must be re-used and should be clearly marked before disconnecting from the existing equipment.
- The *Contractor* must adhere to Eskom Installation and Commissioning of Power Electronics Equipment Procedure as indicated in Section 3.5.2.1[7], normative, when doing the performing installation works on site.

3.5.2 NORMATIVE/INFORMATIVE REFERENCES

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

3.5.2.1 Normative

1. ISO 9001 Quality Management Systems.
2. 240-53114002 Engineering Change Management Procedure
3. 240-53114248 Thyristor and Switched Mode Charger, AC/DC to DC/AC Converters and Inverter/ Uninterrupted Power Supplies Standard
4. 240-53114186 Project Plant Specific Technical Document and Records Management Procedure.
5. 240-53114248 Thyristor and Switched Mode Charger, AC/DC to DC/AC Converters and Inverter/ Uninterrupted Power Supplies Standard
6. 240-71432150 Plant Labelling Standard
7. 240-170000055 Installation and Commissioning of Power Electronics Equipment
8. 240-86973501 Engineering Drawing Standard
9. NRS002 Graphical Symbols for Electrical Diagrams

3.5.2.2 Informative

10. Occupational Health and Safety Act and Regulations (Act 85 of 1993).
11. 36-681 Eskom Plant Safety Regulations
12. 240-170000055 Installation and Commissioning of Power Electronics Equipment.
13. 192/9701833-A Engineering Investigation Report for DC Essential Supply System at Ankerlig 1 Power Station
14. 192/9701833-F Stakeholder Requirement Definition for Ankerlig 1 DC Essential Supply System Replacement
15. 192/9701833-G Concept Design Report Ankerlig 1 DC Essential Supply System Replacement
16. 192/9701833-K Detail Design Report Ankerlig 1 DC Essential Supply System Replacement
17. 193/404775-A Engineering Investigation Report for DC Essential Supply System at Ankerlig 2 Power Station
18. 193/404775-F Stakeholder Requirement Definition for Ankerlig 2 DC Essential Supply System Replacement
19. 193/404775-G Concept Design Report Ankerlig 2 DC Essential Supply System Replacement
20. 193/404775-K Detail Design Report Ankerlig 2 DC Essential Supply System Replacement

3.5.3 Software and Firmware

5.5.2.1 General

- Software for equipment equipped with serial and network interfaces whereby fault recordings, sequence of events, settings and marshalling can be accessed by a PC and are downloadable in an acceptable format (e.g. csv, xls, and txt), shall be made available as it is deemed to be an integral part of the required inverter system functionality. This software shall be compatible with the current Eskom approved Microsoft Windows (latest available) operating system. Software with DOS as the operating system will not be acceptable. Details of various operating systems supported shall be included in the tender documentation.
- Any future software versions shall be backward compatible.
- The cost of the software, including software manuals, disks and serial cable, shall be limited to a fair cost that shall be included in the tender documentation. A “fair cost” is deemed to be an amount sufficient to cover the material cost and overhead of such items and not the perceived intellectual value of the software. Eskom shall have the right to freely copy the software and reproduce the manuals for exclusive use within Eskom and the successful tenderer shall issue Eskom with a Corporate Software Licence. Preference will be given to on-board web based software which does not require additional software installation.
- The supplier shall provide software support for the full, guaranteed, lifetime of the hardware.
- The supplier shall, on request from Eskom, provide Eskom with the necessary software detail when this is required for the inverter system interfacing with future or existing systems.
- The supplier shall adhere to the software control standard 240-76624509: Control of New Metering Product and Version Changes in Technical, Software, Firmware and Hardware.
- All settings and display features available on the front keypad / display of the inverter system shall be available on the operating software for remote or local applications.
- The alarm / event log page shall be able to be downloaded as a text (*.txt) or excel (*.xls) file to the host PC.
- The software shall be able to save all alarm / charge mode settings as a file (settings sheet) which can be uploaded to the inverter system. All the inverter settings shall also be downloadable into the setting template format.
- The software shall display the status of any modules connected to the inverter system
- During an AC mains failure condition or equipment system failure, the inverter system shall record the discharge curve (battery bank voltage and current, as a minimum) of the battery until the inverter system shut down due to low volts. The recording function shall be optimised to save memory space. This discharge information shall be downloaded when the inverter system is back to normal for review purposes. This file shall also be able to be downloaded to the remote PC, for viewing with the front- end software. This data shall not be stored on or reduce the required memory allocated for normal event logging purposes.

5.5.2.2 Software verification and validation

- To meet the requirements of future contracts based on this specification, if a microprocessor based inverter is being offered, the *Contractor* shall supply evidence on request in the form of reports from a mutually acceptable third party that:
- An adequate formal specification for the software has been produced, based on a requirement document and comprehensive hazard analysis.
- The software has been developed using tested tools, adequately trained staff and using an acceptable quality management system. In particular, all stages of design, development and testing process shall have been adequately planned and documented.
- The software has been formally verified to ensure that it matches its specification.

5.5.2.3 System firmware

- The equipment system firmware version shall be displayed on the rectifier and controller module display and on the operating software.
- Any inverter system based firmware (EPROM or Flash ROM) supplied to Eskom, shall not be changed unless Eskom requests the modification or Eskom gives written approval to the supplier to do the proposed modification. Any modification shall be subject to testing and verification and formal approval, in writing by Eskom, shall be required prior to the supplier placing the altered firmware into operation. The requirements of240-76624509: Control of New Metering Product and Version Changes in Technical, Software, Firmware and Hardware, shall be adhered to.
- The estimated data retention time of EPROM or FLASH ROMs used in the inverter systems shall be the design life of the equipment.
- The equipment firmware shall be upgradeable via remote communication and security checks shall be in place to ensure that such remote upgrade has been successfully completed. In the event of the remote upgrade being unsuccessful, the inverter shall resume normal operation on the older firmware version.

5.5.2.4 The equipment system software operational features

- All settings and display features available on the front keypad / display of the inverter system shall be available on the operating software for remote or local applications.
- The alarm / event log page shall be able to be downloaded as a text (*.txt), excel (*.xls), Comma- separated values (*.csv) file to the host PC.
- The software shall be able to save all alarm / charge mode settings as a file (settings sheet) which can be uploaded to the inverter system. All the inverter settings shall also be downloadable into the setting template format.
- The software shall display the status of any modules connected to the inverter system.
- The software shall display the status of the remote communications connection.
- During an AC mains failure condition or equipment system failure, the inverter system shall record the discharge curve (battery bank voltage and current, as a minimum) of the battery until the inverter system shut down due to low volts. The recording function shall be optimised to save memory space. This discharge information shall be downloaded when the inverter system is back to normal for review purposes. This file shall also be able to be

downloaded to the remote PC, for viewing with the front- end software. This data shall not be stored on or reduce the required memory allocated for normal event logging purposes.

3.5.4 Configuration Management

The *Contractor* shall label the equipment in accordance with the Eskom Plant Labelling Standard as indicated in Section 3.5.2.1 [6], normative. The *Employer* shall provide the *Contractor* with the desired label description and KKS code and the *Contractor* shall print the label as given by the *Employer*.

3.5.5 Civil Requirements

Ankerlig 1 and 2

Station

The allowable point load for the location of the inverters is G=4kN. Since the new equipment will replace the old equipment in the exact same positions, the floor plan will not change. The new equipment shall not exceed the permissible loading as illustrated in the loading schedule as per drawing issued in section 7.1, list of drawings issued by the *Employer*, of this document. The following are the weight specifications for the equipment:

- Inverter – may not exceed 400Kg

3.5.6 Mechanical Requirement

3.5.6.1 General

- The Inverter ASSEMBLY shall comply with the fundamental safety requirements of Clause 5 of SANS 10142-1 and SANS 62040-1, Uninterruptible power systems (UPS) Part 1: General and safety requirements for UPS.
- The Inverter ASSEMBLY shall as a minimum be designed, constructed and tested in accordance with the requirements of Clause 6.6 of SANS 10142-1.
- All components and electric conductors fitted to the ASSEMBLY shall be certified as safe by means of a valid Regulatory Certificate of Compliance (RCC) in accordance with SANS 10142 - 1 Table 4.2 or an SABS Mark of approved performance.

3.5.6.2 Doors and Covers

- For easy access, each cable compartment and each fixed pattern functional unit sub - section shall be provided with individual hinged doors.
- All removable covers shall require the use of a tool for their removal.
- All opening doors shall be pad lockable.
- Doors shall have not less than the following points of hinging:
    - up to 450mm - 2 hinges,
    - up to 800mm - 3 hinges
    - more than 800mm - 4 hinges.
- All doors shall be secured by square key latches as follows:

  - up to 450 mm - 2 latches,
  - up to 800 mm - 3 latches and
  - more than 800 mm - 4 latches
- Any other proven design shall be submitted to Eskom for approval.
- Door latches shall be of robust construction and be manufactured from steel. At least the centre square key latch shall be padlock able.
- Provision shall be made on the cable compartment door hinges to allow the doors to be lifted off.
- Metal hinges shall be of robust construction and shall ensure effective electrical bonding to the enclosure is maintained. Plastic and die cast material is not acceptable.
- The method of fastening the latches and hinges shall be such that it will not wear loose due to vibration or rough handling of the door.
- The door latches and hinges shall be able to withstand an internal severe fault.
- Doors shall have stops to prevent over swing when opening and to avoid interference with adjacent compartments.
- Doors of 800mm or longer shall be provided with webs or other methods to prevent wobbling when the door is operated.

3.5.7 Nameplate/Rating plate/Declared Electrical Performance

Each cubicle shall have a stainless steel or anodized aluminium plate on which the electrical performance of the product is declared. The following information as a minimum is engraved:

- As per IEC requirements
- Manufacturer
- Month/year of manufacture
- Type/model of unit
- Serial number
- INVERTER
  - Inverter input supply voltage and tolerance
  - Nominal input current of inverter
  - Nominal AC output voltage
  - Electrical output supply configuration
  - Nominal AC output current
  - Output frequency
  - Power factor output
  - Rated output active power
  - Rated output apparent power
- BYPASS SUPPLY
  - Bypass input supply voltage and tolerance.

  - Electrical supply configuration
  - Bypass supply nominal input current
  - Input frequency and tolerance
  - Nominal output voltage
  - Nominal input power
- A mimic single line of the equipment is to be provided either via the electronic display or via an engraved label on the front of the panel.

3.5.8 Measurements, Controls, Indications and Alarms

3.5.8.1 Inverter Measurement

A mimic display panel showing the various main components of the Inverter is provided in the front panel of the Inverter unit. This mimic display panel has digital indicators for panel monitoring and digital display is of the auto-ranging 3.5 digit type.

Selection of the required measurements shall be by means of labelled latching as specified in Schedule A. The following selections are provided:

- Inverter output voltage per phase
- Inverter output current per phase
- Inverter output frequency
- Static Bypass input voltage and waveform recording
- Static bypass input current and waveform recording

3.5.8.2 Inverter Controls

The following controls are provided on the mimic display panel:

- Alarm acknowledge.
- Alarm reset.
- Inverter on/off switch.

3.5.8.3 Inverter Indications

The following indications shall be available on the facia of each inverter/static bypass as part of functional single line mimic:

- Output healthy,
  - Inverter on
- Static bypass healthy,
  - Mains supply to static bypass available and within limits.
- Manual bypass on
- Where LEDs are used, green LEDs shall indicate active or operational circuits, and red LEDs shall be used to indicate non-operational circuits.

- All indications shall be clearly labelled.

3.5.8.4 Inverter Alarms

- OUTPUT FAILURE,
    - Inverter –off, failure or stopped;
    - Voltage or frequency out of limits; and
    - Inverter overload
- STATIC BYPASS INPUT FAILURE,
    - Mains failure or out of limits to the static bypass
    - Static bypass unavailable

Any additional alarms shall be specified.

3.6. USE OF *CONTRACTOR'S* DESIGN

- All designs, drawings, specifications, instructions, manuals and other documents created, produced by or on behalf of the *Contractor* for the purposes of providing the works (collectively, the "*Contractor's* Copyright Documents") and copyright therein and all intellectual property rights relating thereto, are, will be, and will remain the property of the contractor.
- The *Contractor* hereby grants to the *Employer*, with effect from the contract date or in the case of documents or other matter not yet in existence, with the effect from the creation thereof (and notwithstanding the completion or abandonment of the works or termination of this agreement) an irrevocable, royalty-free, non–exclusive and perpetual licence to use those of the *Contractor's* documents and other matter supplied to the *Employer* under this contract, for any purpose whatsoever connected with the works, including for the purpose of maintenance, operation, construction, retrofit, refurbishment, upgrade, repair or demolition of the works or any parts thereof.
- The *Employer* uses the *Contractor's* copyright documents and all intellectual property rights relating thereto for the sole purpose of all its needs at Ankerlig 1&2 Power Stations, which includes any *Employer* processes and procedures pertaining to use, maintenance, operation, construction, retrofit, refurbishment, upgrade, repair or demolition of the works.
- The *Employer* may copy and submit, without restriction, all documentation to others employed or contracted by the *Employer* who has duly signed a confidentiality agreement with the *Employer*.
- The *Contractor* may not use any Copyright Documents (and the copyright therein and all intellectual property rights relating thereto), which are owned by the *Employer* and/or others and provided to the *Contractor*, for any other purpose than to provide the works. The *Contractor* may not copy and therefore not retain copies of any such Copyright Documents. At completion of the whole of the works, or earlier termination, the *Contractor* returns to the *Employer* all such documentation provided to him by the *Employer* and/or others.

3.7. DESIGN OF EQUIPMENT

- N/A.

3.8. EQUIPMENT REQUIRED TO BE INCLUDED IN THE WORKS

- *Contractor* to provide all equipment needed for *works*.

3.9. AS-BUILT DRAWINGS, OPERATING MANUALS AND MAINTENANCE SCHEDULES

The following minimum documentation is to be supplied to the *Project Manager* for acceptance prior to commencement of installation.

- Data sheets of proposed inverters
- Internal single line diagram diagrams – Inverters
- Decommissioning of existing equipment Procedure
- Installation/Erection Procedure
- Project Schedule
- Quality Control Plan

3.9.1 Drawings

- All drawings are created electronically and 100% compatible with Micro station V8 software in a DGN file format.
- In conjunction with the electronic DGN copies the *Contractor* also provides a merged set of *.pdf electronic copies upon first issue and each time drawing updates are required. All drawings are signed and the revisions noted as per *Employer's* specifications.
- The electronic files are provided in A3 size and conform to the requirements of The Engineering Drawing Standard 240-86973501 as indicated in Section 3.5.2.1 [8] normative.
- Graphical symbols are used in accordance with the NRS002 Graphical Symbols for electrical diagrams standard.as indicated in Section 3.5.2.1 [9] normative.
- All drawings are submitted to the *Project Manager* for his acceptance.
- The *Contractor* produces the following types of drawings:
    - Cover sheet
    - Index sheet
    - List of symbols
    - List of components with values, tolerances, ratings, type numbers, purchasing specification numbers, manufacturer and circuit reference numbers
    - General layout drawing of the proposed panels
    - Single line diagram
    - Panel internal wiring drawings, including cross referencing and wire numbers
    - Cable block diagrams with termination points
- The *Contractor* is liable for updating drawings till after the final commissioning of the last unit when the *Employer* has signed off and approved the final "As Built" state of the drawings. After commissioning of each unit the *Contractor* supplies two sets of drawing hardcopies within two separate files and in A3 format.

Technical Maintenance and operating Manuals

- All manuals are specific to each of the 2 power stations namely, Ankerlig 1&2 Power Stations. The file descriptions include the following on the front as well as the spine. The *Contractor* incorporates all necessary technical data, design, data literature and drawings into his operating and maintenance manuals.
- An electronic PDF copy and hardcopies of each equipment is to be supplied to the *Project Manager*.
- The technical, maintenance and operating manuals also contains the information and course material of the training manuals
- All design information forming part of the Works Information is included in the manuals.
- All documentation including drawings and operating and maintenance instruction manuals is uniquely identified and cross-referenced with all related documents.
- The manuals are complete with:
    - Power station name and order number
    - Content list
    - List of reference drawings
    - Details of all components
- 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
    - Details and descriptions of all hardware and software
    - Detailed product descriptions and features
    - Datasheets of all components used
    - Operating, maintenance and testing requirements
    - Installation procedures of each equipment
    - Isolation procedures
    - Test certificates
    - Certificates of compliance to international standards
    - Routine test results reports
    - Commissioning test results reports
    - Training information
    - Technical tender submission information
- Any special instructions pertaining to storage of spare parts or to their shelf life are included in the manual.
- All drawings required for component location, dismantling, and re-assembly for maintenance is provided in the manual.
- All special tools required for maintaining and operating the plant and material are identified in a schedule and described in the manual.
- Manuals are produced such that a synopsis is first presented, followed by a first draft, then a pre-print proof and finally by the final manual.

4. PROCUREMENT

4.1 PLANT AND MATERIALS

4.1.2 Quality

- The *Contractor* establishes and implements a system that, as a minimum, meets the requirements of the ISO 9000 series for quality management systems.
- The *Contractor* defines the level of QA/QC or inspection imposed on his sub-contractors and suppliers.
- The programming of inspections, hold and witness points is agreed between the *Employer* and the contractor prior to undertaking any work.
- The *Contractor* ensures that appropriate quality requirements are placed to comply with the services.
- The *Contractor* notifies the *Employer* of any proposed changes to the quality management system that will affect the contract quality requirements, prior to implementing such changes.
- The *Contractor* rectifies, at his own cost and to the satisfaction of the *Employer* all defects, or other faults, which may appear during the defect liability period.
- In case of specialized work based on the *Contractors* own design and their standard manufacturing product in the *works* being defective or any components used found to be defective due to manufacturing defects and thus forcing, any improvement to be implemented to rectify such inherent defects, the cost of such an undertaking would be the responsibility of the *Contractor*.

4.1.3 Guarantee Inspection

- All equipment supplied will carry a warrantee of minimum 36 months starting from the completion commissioning date.
- The *Contractor* will supply a written and electronic warrantee to the *Project Manager* by 15 days after completion of commissioning.

4.1.4 Product Support

- All equipment supplied by the *Contractor* need to have local support available within the Republic of South Africa.
- The *Contractor* should provide product support of the provided solution for the entire life cycle of the equipment.

4.1.5 Defects correction

- The *Employer* will provide the *Contractor* access to correct any post commissioning defects that may arise.

- It will be the responsibility of the *Contractor* to rectify any defects prior to the defects date being reached.

4.1.6 Reliability, security, dependability, maintainability and life expectancy

- The supplier / tenderer shall submit a full track record which shall include the following:
- Equipment hours of installed units per voltage or model / type.
- Customers indicating the number of units employed per model / type.
- Environmental conditions where such equipment is installed.
- All inverters to be used shall have:
    - A proven service record of at least two years and one hundred equipment years.
    - All tendered equipment shall be designed for a minimum working lifetime of 10 years for electronic equipment and 20 years for the balance as indicated in schedule A.
    - Written guarantees to this effect shall be made available as part of the tender.
    - The supplier shall make a statement regarding re-calibration of the equipment to keep it in perfect working order or any other required intervention by the supplier, subsequent to the sale of equipment that will have a financial impact on Eskom.
    - Any internal battery requirements for inverters/ controllers, i.e., battery lifetime, type of battery etc. shall be stated during tender and on a label attached to the front of the equipment.

4.1.7 *Contractor's* procurement of Plant and Materials

- The *Employer* requires warranties from the *Contractor's* suppliers to be in favour of the *Employer*.
- The *Contractor* provides all their supplier's information to the *Employer*.

4.1.8 Spares and Consumables

- The *Contractor* provides a list of recommended spares and include this as part of the contract cost. The *Employer* reserves the right to purchase or not to purchase the spares selected from this list.

4.2 TESTS AND INSPECTIONS BEFORE DELIVERY

The equipment and components making up the *works* shall be of standard construction and shall be supplied with factory acceptance test certificates from the manufacturer.

4.3 MARKING PLANT AND MATERIALS OUTSIDE THE WORKING AREAS

The *Contractor* is requested to mark all identified items of plant and material with the contract and order numbers.

Plant and material is delivered to either the site or the *Contractor's works*.

The following requirements apply to the off-site marking of plant, materials and equipment:

- The *Contractor* gives two (2) weeks' notice to the *Project Manager* and it is shown in the programme.
- The notification to the *Project Manager* is accompanied by a comprehensive inventory of all plant, materials and equipment ready for marking.
- Plant, materials and equipment located at the *Contractor's* subcontractor/s or sub-suppliers are not considered ready for marking.
- Only plant, materials and equipment physically located at the *Contractor's* facility are considered ready for marking.

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

- N/A.

4.5 CATALOGUING REQUIREMENTS BY THE *CONTRACTOR*

- N/A.

5. CONSTRUCTION

This part of the technical specification addresses constraints, facilities, services and rules applicable to the *Contractor* whilst he is doing work on the site during the construction and maintenance phase. It does not specify the work itself as that is included in Section 4, procurement, of the Works Information.

5.1 TEMPORARY WORKS, SITE SERVICES & CONSTRUCTION CONSTRAINTS

5.1.1 Contractor's equipment

- The *Contractor* provides the *Employer* with a complete list of materials, tools, equipment and or machinery before bringing it onto site.
- Records are to be kept of equipment on site including whether it is owned or hired. The *Contractor* is responsible to provide his own scaffolding, lifting equipment, mobile cranes and forklifts where required.
- The *Contractor* provides and maintains all tests and measuring equipment required for all tests to the required accuracy. The accuracy of test equipment is required to be better than ± 0.1 %.
- The type and class of equipment used is subject to the acceptance by the *Employer*.
- The *Contractor's* measuring equipment is accompanied by valid calibration certificates from an approved authority.
- 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.

5.1.2 Equipment provided by the *Employer*

- No equipment will be provided by the *Employer*.

5.1.3 Site services and facilities

Electricity Supply:

- All points of supply are provided in terms of availability and location
- The *Employer* indicates which supply points may be used.
- 220V electrical supply is generally available in the power station complex. 380V supply is also available – the *Contractor* shall ensure they have the correct matching plugs.
- The *Contractor* verifies extension lead requirements.

5.1.4 Facilities provided by the *Contractor*

- The *Contractor* provides, erects and maintains for own use, adequate size office accommodation and stores together with such, lighting and heating as may be required in the area designated by the *Employer*.
- The *Contractor* dismantles and clears off site all such temporary structures and associated foundations and infrastructure.
- The *Contractor* makes provision for accommodation, vehicles, kitchen - and office space (mobile container) and equipment etc.
- The *Contractor* removes all this equipment and waste which was generated during the installation and commissioning within 24 hours after completion.

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

- N/A.

5.1.6 Survey control and setting out of the *works*

- N/A.

5.1.7 Excavations and associated water control

- N/A.

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

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

5.1.9 Sequences of construction or installation

- The sequence of installation is to be in accordance with the *Contractor's* program, which needs to be accepted by the *Project Manager* prior to commencement.

5.1.10 Hook ups to existing *works*

- N/A.

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 all inverters	Within 30 days after Completion
	Maintenance and Operating Manuals	Within 30 days after Completion

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

- N/A.

5.2.4 Commissioning

The testing and commissioning of all equipment will be done in accordance with the commissioning procedures supplied by OEM and Eskom Installation and Commissioning of Power Electronics Equipment Procedure as referenced in Section 3.5.2.1 [7], normative, of this document.

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

Following successful commissioning the *works* will be put into immediate operation.

5.2.6 Take over procedures

The *Employer* takes over the *works* on completion.

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

The *Project Manager* arranges for the *Employer* to allow the *Contractor* access to and use of a part of the *works* which has been taken over if needed to correct a defect. After the *works* have been put into operation, the *Employer* may require the *Contractor* to undertake certain procedures before such access can be granted.

5.2.8 Performance tests after Completion

Commissioning results is captured a commissioning report that will include all commissioning and pre-commissioning tests and results which will be shared with the system operator.

5.2.9 Training and technology transfer

- The *Contractor* provides training on the equipment included as part of the *works* to various categories of the *Employer's* technical staff for the duration of the *works*.
- Training provided by the *Contractor* is directly applicable to the actual plant and material supplied for the *works*.
- Generalised training based on similar plant and material is not acceptable.
- 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
- The *Employer* bears the cost of salaries, accommodation, travelling expenses and other allowances of his personnel during the training, but all other training costs are borne by the contractor.
- The *Contractor* provides 2 additional (repeat) training courses as and when instructed by the *Project Manager*.
- Practical hands-on training for each individual trainee forms an integral part of each of the following courses:
    - Operating Training
    - Maintenance Training
    - Engineering / Commissioning Training
- 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.
- The *Contractor* incorporates all necessary technical data, design data literature and drawings into his training manuals.

- The course material is in English and includes all third party documentation.
- A copy of the training documentation is supplied for each trainee.
- 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

- N/A.

6. PLANT AND MATERIALS STANDARDS AND WORKMANSHIP

6.1 INVESTIGATION, SURVEY AND SITE CLEARANCE

The *Contractor* is responsible to survey the current equipment location, layout and positioning of the panels and need to clearly specify any additional requirements.

6.2 BUILDING WORKS

- N/A.

6.3 CIVIL ENGINEERING AND STRUCTURAL WORKS

- N/A.

6.4 ELECTRICAL & MECHANICAL ENGINEERING WORKS

Reference number	Title / Description	Tick if Publicly available
240-53114248	Thyristor and Switched Mode Charger, AC/DC to DC/AC Converters and Inverter/ Uninterrupted Power Supplies Standard	*
SANS 10142-1:2020 Edition 3	The wiring of premises Part 1 Low Voltage installations	✓
240-170000055	Installation and Commissioning of Power Electronics Equipment Procedure	
240-56227443	Requirements for Control and Power Cables for Power stations Standard	*

6.5 PROCESS CONTROL AND IT WORKS

- N/A

6.6 OTHER SPECIFICATIONS

Reference number	Title	Tick if publicly available
QM-58	Supplier Contract Quality Requirements Specification	*
ISO 9001:2008	Quality Management Systems	✓
OHASA (1993)	Occupational Health and Safety Act of South Africa, Act 85 of 1993	✓
ESKARAAG4	Eskom Operating Regulations for High Voltage Systems, ESKARAAG4	*
	National Environmental Management Act of 1988	✓
32-136	*Contractor* Health and Safety Requirements	*
32-245	Eskom Waste Management Standard	*
36-681	Generation Plant Safety Regulations	*
240-62196227	Eskom Life-saving Rules Directive 23-421	*
240-71432150	Plant Labelling and Equipment Description Standard	*
240-54179170	Classification and designation of technical documentation	*
240-86973501	ESKOM General documentation standard	*
32-644 Rv1	ESKOM Documentation Management Standard	*
167A/49	Drawing and documentation standard for Contractors	*
167A/49	Documentation Process Procedure	*

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.

Ankerlig 1

Drawing number	Revision	Title
0.86/8966		Unit Single Line Diagram
0.86/8967		Station Single Line Diagram
0.86/9011		PCC Power Control General Arrangement
0.86/8998		Admin & Control Building
0.88/1		Ankerlig Power Station Layout Drawing Gas 1 Station Layout
0.88/3451		GAS Turbine building Load Plan
0.88/3449		Plan View Central Control and Office Building Load Input

Ankerlig 2

Drawing number	Revision	Title
0.88/2622		Unit Single Line Diagram
0.88/2623		Station Single Line Diagram
0.88/2441		PCC Power Control General Arrangement
0.88/3434		Admin & Control Building
0.88/1		Ankerlig Power Station Layout Drawing Gas 1 Station Layout
0.88/3451		GAS Turbine building Load Plan
0.88/3449		Plan View Central Control and Office Building Load Input

8. Constraints on how the *Contractor* Provides the Works

General

Access

- The *Employer* will provide access to the site for the *Contractor* to conduct repair works. The site can be accessed via the main access road at DPSS.
- Working space may sometimes be restricted. General access to the power station complex is controlled and it is mandatory that the *Contractor* adheres to all security regulations in force at all times.
- The *Contractor* notes that the Site is a National Key Point and complies with the associated requirements of the National Key Point Act, 102 of 1980.

Functional Requirements

- The *Contactor* must provide sufficient Equipment and tools to carry out the work. The *Contractor* shall have all the necessary ancillary Equipment and hand tools available for the work. The Engineer

shall be entitled to request reserve plant should there be any doubt as to the efficiency or capability of the Equipment provided.

- It is mandatory that the *Contractor* be certified (in terms of the South African Occupational Health and Safety Act of 1993 and Construction Regulations 2014) and has the necessary skills to carry out the *works* as per the Works Information. The structures are safe for use and are structurally sound.

- The *Contractor* shall provide detailed procedures that shall be employed, describing systematically how the Contractor performs the *works*.

- The *Contractor* shall provide an organogram, specific to this particular supply, detailing all the positions and individuals responsible for technical expertise and logistic support. Curriculum Vitaes of these key personnel (e.g. person leading the inspection team, rope access supervisor, corrosion applicators etc.), shall be included with the Safety Plan. Suitably qualified technical backup or support, Quality Assurance and Quality Control personnel are considered key in the execution process. In this regard, details of the personnel number, qualification type, level and experience to be provided as part of the organogram.

Modifications

- The *Contractor* does not modify any plant or materials unless accepted by the *Employer* prior to site execution.

Start of Works

- A site inaugural meeting is held between the *Contractor* and the *Employer*, where details of the *Works* are discussed and clarified prior to site execution. The start of *Works* shall be as per the contract documentation.

Transporting of Employees

- The *Contractor* is in all respects responsible for the housing and transporting of employees, and for the arrangement thereof, and no extension of time due to any delays resulting from this, will be granted.

Others

- The *Contractor* notes that there may be other work taking place during the period when he is providing the *Works*. The *Contractor* liaises with *others* in this regard.

Subcontracting

- All Work done by specialist *Contractor* is the responsibility of the *Principal Contractor*. The *Employer* shall accept *works* as provided by the *Contractor*.

Debris

- The *Contractor* must remove all debris generated from and transports it to a designated spoil site. All spoil material generated by the *Works*, is disposed of by the *Contractor* at the municipal designated dumping site and the *Contractor* must provide proof or certification thereof.

Medical facilities

- No medical facilities are available on site.

Sanitation of the Works

- The *Contractor* is responsible for providing all the required sanitary services necessary and ensuring that the toilets are clean, neat and in a hygienic condition. The *Contractor* makes arrangement for the removal and disposal of sewage for duration of the *Works*. The sanitation of the *Works* is

arranged and maintained by the *Contractor* to the satisfaction of the *Employer*. The *Contractor* is advised to visit the site to familiarize the nature and position of the site.

Security of Works

- The *Contractor* is entirely responsible for the security of all the *Works*, materials, equipment and lighting and other precautions as necessary to ensure security against theft, loss or damage. The *Contractor* is advised to visit site to familiarize with the nature and position of the site.

Tools and Equipment

- The *Contractor* supplies all tools and Equipment for the *Works* including safety harnesses approved by the *Employer* and step ladders with their inspection records.

***Contractor* representation**

- The *Contractor's* Site Supervisor is on site for the entire duration of the *Works*.

Quality Management

The quality requirements are captured in the *Contractor* Quality Management Specification QM 58 (240-105658000), which specify and describe the minimum quality criteria for the selection, evaluation, registration, monitoring and auditing of *Contractor*s. This specification as provided during tender will be seen as part of the *works*. It will work hand in hand with (Form A) Tender & Contract Quality Requirements for QM58 and Quality requirements for ISO 9001 Standard. A Quality Control Plan / Inspection and Test Plan template as well as a Template for a Typical Contract Quality Plan will be provided.

The *Contractor* defines the level of QA/QC or inspection imposed on his Sub-*Contractor*s and *Contractor*s.

The programming of inspections, hold and witness points is agreed between the *Employer* and the *Contractor* prior to undertaking any work.
The *Contractor* arranges, supervise and monitor *works* as per the agreed specification and work procedures approved by the *Employer*. All *works* to be carried out by qualified persons.

Safety And Occupational Health Management

The *Contractor* adheres to the South African Occupational Health and Safety Act No. 85 of 1993, the regulations promulgated thereunder and Eskom Safety, Health, Environment and Quality (SHEQ) Policy 32-727 as well as the National Building Regulations and SANS 10400 for all *works*. Furthermore, the *Contractor* shall comply with any additional current statutory requirements of any relevant Government Departments regarding health and safety and environmental health.

The *Employer's* representative instruct the Contractor to stop work, without penalty to the *Employer*, when the *Contractor's* personnel do not adhere to acceptable health & safety standards or contravene the health and safety sections and regulations. The *Employer's* representative is immediately or before the end of a particular shift, informed of any injury or damage to property or equipment. The *Contractor* provides all the required safety and personal protective equipment to his staff for the duration of the contract.

Ankerlig SHE Specification, procedures, policies, guidelines and standards applicable to the *works*, used as Eskom minimum requirements for health and safety are provided to the *Contractor*.

The *Contractor* shall comply with the requirements for COVID-19 as per Government Directive from Department of Employment and Labour (DEL); Consolidate COVID-19 Direction on Health and Safety Measures in Workplaces issued by Minister in terms of Regulation 4(10) of the National Disaster Regulation.

Only the latest version/ revision of the applicable legislation, acts and regulations shall be deemed to be accepted at the Drakensburg Power Station. Not limited to the following below legislation, acts and regulations are complied with:

- Compensation for Occupational Injuries and Diseases Act 130 of 1993
- National Water Act 36 of 1998
- Occupational Health and Safety Act and Regulations (85 of 1993)
- National Environmental Management Act 107 of 1998
- Applicable South African National Standards (SANS)
- National Road Traffic Act 93 of 1996
- Basic Conditions of Employment Act 75 of 1997
- National Veld and Forest Fire Act and Regulations 101 of 1998
- Environmental Conservation Act and Regulations 73 of 1989
- Committee of Land Transport Officials (COLTO)
- SACPCMP Act no. 48 of 2000
- Disaster Management Act 57 of 2002

The *Contractor* shall establish and enforce rules to ensure the health and safety of his own employees and those of its Subcontractors so that high standards of personnel health and safety are achieved and maintained. The *Contractor* shall exercise and enforce all necessary care and measures to preclude exposure of personnel, labour and nearby residents (if any) to potential health hazards and environmental pollutants.

The *Contractor* shall ensure that all persons which are employed and or deployed to work on site undergo police clearance and are certified to have no criminal records. This shall be done prior to them being allowed or given access to start work on site.

SHE File

The *Contractor* is required to compile a SHE File before the commencement of work. The SHE file must be submitted to the *Employer* for review and acceptance 14 days before any work can commence.

The SHE File to comply with the *Employer's* specification, which includes but not limited to the following:

- Safety, Health and Environmental Plan (SHE Plan)
- SHE organization within the Company-Responsibility & Accountability
- OHS Incident management Procedure (32-95)
- Planning of conduct of work activities including planning for changes and emergency work (Operational Plan)
- Management of PPE- Personal Protective Equipment (Procedure with the matrix)
- Emergency planning and fire risk management
- Vehicle and driver behaviour safety (Competency, Traffic Management, etc.)
- Sub-Contractor or supplier selection and management
- Design and specifications (Drawings)
- Key personnel competency, training, appointment letters
- Communication and awareness Plan
- Management commitment and visible felt leadership
- *Employer's* Baseline SHE Risk Assessment (BRA).
- *Contractor's* Baseline Risk Assessment in line with the *Employer's* BRA (Identification, assessment and management of Safety, Health and Environmental risks related to the scope of work. The methodology used for the risk assessment must be provided together with the BRA.)
- Valid Letter of Good Standing (COIDA or equivalent)
- SHE policy signed by CEO/ MD- Comply to OHS Act Section 7 or ISO 45001
- Occupational hygiene and health risk assessment
- Medical surveillance
- Method statements/ safe work procedure.
- Covid-19 risk assessment and workplace plan.

In addition, reference is to be made to Health and Safety Specification, for documents and policies which the *Contractor* is to adhere to.

Environmental Management

Contractors comply to all National and Local legislation requirements as well as Eskom procedures and policy. Eskom's goal is to ensure zero harm to the environment, and to ensure that any possible impact is mitigated or managed. The Duty of Care and implementation of best practice is critical during operations, and full communication on environmental issues is required at all times.

Contractor develops and submits a method statement / operational plan for the management of waste material for acceptance by environmental practitioner prior to project initiation. All processes are subject to environmental review throughout the contract.

The method statement on waste management will need to include the identification of possible waste streams, temporary storage and disposal options for each waste type, and contingency plans in the case of any environmental incident. A Safety Data Sheet must be supplied for all chemical or hazardous / potentially hazardous material brought onto site.

The *Contractor's* attention is drawn to the fact that the Power Station is situated in a highly sensitive environmental area and that any incident that may result in an environmental impact must be brought to the attention of the *Employer's* representative as soon as it is possible. The site is managed in accordance to an ISO 14401 certified management system, and the *Contractor* is expected to manage all processes in line with environmentally sound principles.

The *Contractor,* in and about the execution of the service, complies with all applicable national, provincial and Municipal environmental legislation and by laws.

Comply with all environmental legislation of South Africa, including but not limited to:
- National Environmental Management Act 107 of 1998
- National Environmental Management Waste Act 59 of 2008
- National Water Act 36 of 1998
- Eskom Waste Standard latest revision
- Waste Management: Norms and standards: Act 59 of 2008 latest revision

Following rules and regulations shall apply on the stations, to promote Eskom's goal of zero harm to the environment:

- Respect and care for the natural environment and for each other
- Minimise or mitigate any impacts that may cause harm or pollution to the environment
- Report immediately an environmental incident requiring action
- No fires are allowed
- No poaching of wildlife or plants is allowed
- Report any illegal activities
- Drive responsibly
- Obey speed limits on site

Security

General access to the station is controlled and it is mandatory that the *Contractor* adheres to all security regulation in force during the period of the contract.

The *Contractor* is required to submit proof of verification record(s) (Security clearance) from SAPS or accredited supplier linked to SAPS AFIS system not older than thirty (30) days before access to site is granted.

Contractor is required to submit the SAPS Clearance Certificates obtained for all his employees along with copies of their Identity Documents to the site Security Manager for verification. Only individuals with clear criminal records will be considered.

8.1 Meetings

- Before any work can commence on site, the *Contractor* and all staff is to attend site induction. The *Contractor* is to allow 2 hours for this.

- The *Contractor* is required to sign on to the workers register each morning and sign out each afternoon. A responsible person (RP) will be appointed by site and will be responsible for the area where the *works* is taking place. The RP will be responsible for ensuring that everyone signs on and off the register, ensure that everyone is aware of the Eskom rules and will confirm that the area is still safe for work. The *Contractor* must notify the RP of the daily work plan prior to execution of works.

- The *Contractor* holds a toolbox talk each morning before commencing with the *Works* to discuss the previous day's work and to ensure that everyone understands what is required of them.

When required, the *Contractor* must have a representative at each daily morning meeting.

Regular meetings of a general nature may be convened and chaired by the *Employer's Representative* as follows:

8.1.1 Project kick-off meeting

Interval	**Location**	**Attendance by:**
Once off meeting	Ankerlig/Virtual	*Employer*, *Contractor* and Others as required

8.1.2 Risk reduction meetings

Interval	**Location**	**Attendance by:**
Adhoc	Ankerlig/Virtual	*Employer*, *Contractor* and Others as required

8.1.3 Implementation meeting for specific progress/QC and feedback

Interval	**Location**	**Attendance by:**
Daily during implementation	Ankerlig	*Employer* and *Contractor*

The implementation meeting is held between the *Contractor* and Supervisor's implementation support team, to report on implementation progress and review any risks, issues and *Employer* actions that need to be resolved in order to ensure smooth implementation of the *works*.
The *Contractor*'s QC representatives provide reports from each meeting to the *Employer's P*roject Engineer.

This report will cover:
- Scheduled QC inspections for the period identified in the meeting.
- Any new QC related issues identified since the last report, its status and action plan for resolution.
- Status and progress on previously reported quality issues.

8.1.4 Meetings of a specialist nature

Interval	**Location**	**Attendance by:**
Adhoc	Any	*Employer's* personnel*, the Contractor* and Others as required
Meetings of a specialist nature may be convened by persons and at times and locations to suit the Parties, the nature and the progress of the *works*.		

8.1.5 **Post-implementation meeting for project feedback and review**

Interval	**Location**	**Attendance by:**
Once-off	Ankerlig/Virtual	*Employer, Contractor* Senior Manager (not the *Contractor*'s *Project Manager*), *Contractor*'s *Project Manager*, *Employer's* personnel, Others as required
The post-implementation meeting is held between the *Employer*, *Contractor* Senior Management, *Supervisor,* and other line groups, to report on implementation issues and reviews. Share lessons learnt in order to ensure smooth implementation on the next implementation phase.		

All meetings are recorded using minutes or a register prepared and circulated by the person who convened the meeting. Records of these meetings shall be submitted to the *Employer* by the person convening the meeting within five days of 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. Confirmation of Contract communications during operational meetings will, however, be considered as formal acknowledgement of receipt of a contract communication

8.2 Use of standard forms

The *Employer's Representative* and the *Contractor* will use the standard NEC ECSC templates listed below:

- Delegation by *Employer;*
- Access;
- Early Warning by *Contractor*
- Early Warning by *Employer';*
- Completion Certificate;
- Notification of Defect by *Employer;*
- Defect Certificate;
- *Contractor's* assessment of amount due;
- Compensation Event notification by *Contractor;*
- Compensation Event Request for Quotation by *Employer;*
- Termination Certificate;
- Notification of dispute
- Acceptance submission by *Contractor;*
- Appointment of *Employer's Representative*
- *Employer's* Instruction;
- *Employer's* summary of amount due.
- Delegation Consent Form

- All contractual communications are through formal compiled letters or forms on the company's letterhead.
- The formal letters and or forms are attached to e-mails and not as a message in the e-mail itself.
- The receiver of the formal letters or forms signs off an acknowledgment of receipt of the communication and returns the acknowledgement of receipt to the sender of the formal communication.

8.3 Invoicing and payment

In terms of core clause 50 the *Contractor* assesses the amount due and applies to the *Employer* for payment. The *Contractor* applies for payment with a tax invoice addressed to the *Employer* as follows:

8.3.1 Assessments

The *Contractor* includes in the Monthly Planning Report the proposed assessment information. Failure to submit such information on the assessment date will result in the *Employer's* representative making his own assessment, based on available information.

The *Contractor* submits, separately, all documentation and certification in support of the proposed assessment information.

The *Contractor* ensures that the requirement in terms of Section 20(4) (C) of the Value Added Tax Act 89 of 1991 as amended by the Revenue Laws Amendment Act 45 of 2003, that the VAT registration number of the recipient of the tax invoice, appears on the said tax invoice in order for the invoice to fully comply with the requirements of a valid invoice for VAT purposes as contained in the said Section 10(4) (C), is adhered to. No payment will be made on tax invoices not fully meeting this requirement.

The *Employer's* VAT Registration Number is **4740101508**

8.3.2 Particulars to be included on the *Contractor's* Tax Invoice:

- Name and address of the *Contractor*
- Date of the invoice,
- An invoice number,
- *Contractor's* VAT registration number;
- The Employer's VAT registration number 4740101508;
- Reference to Contract and/or SAP Task Order number
- The total Price for Work Done to Date which the *Contractor* has completed;
- Other amounts to be paid to the *Contractor*;
- Less amounts to be paid by or retained from the *Contractor*;

The *Contractor* attaches the detail assessment of the amount due to each tax invoice showing the Price for Work Done to Date for each item in the Price List for work which he has completed.

All invoices to be accompanied by the Payment Assessment Certificate as issued by the *Employer's* representative. Invoices to be submitted electronically as PDF documents to: invoiceseskomlocal@eskom.co.za

8.4 Records of Defined Cost

The *Contractor* submits forecasts of time charges for each assessment period and maintain records thereof

Clear records of hours worked or time sheets in respect of all time charges shall be kept by the *Contractor* and shall indicate the resource utilised, location, duration, and times, associated expenses incurred, and a summary of the *works* rendered which shall be cross-referenced to deliverables rendered. The records of hours shall indicate to the *Employer's* representative the time spent. The *Employer's* representative shall review all time sheets

The *Contractor* maintains records of all documentation and make available to the *Employer* any or all such documentation on request.

8.5 Accelerated Shared Growth Initiative – South Africa (ASGI-SA)

Replaced by Supplier Development and Localisation (SDL&I)

Supplier Development and Localisation (SDL&I)

The *Contractor* complies with and fulfils the *Contractor's* obligations in respect of the Supplier Development and Localisation (SDL&I)

8.6 BBBEE and preferencing scheme

The *Contractor* complies with the *Employer's* Black Economic Empowerment Policy

Sub-Contracting

The *Contractor* provides any necessary facilities in order to manage any Sub*contractor* to ensure that the works are carried out in accordance with:

- The Accepted Programme.
- The conditions of contract.
- The Works Information and in particular, the requirements of the Safety Plan, Environmental Management Plan, Quality Management Plan and Operational procedures

8.7 Facilities to be provided by the *Contractor*

8.7.1 Facilities

- The *Contractor* supplies all facilities for the *Works*.
- These include but not limited to:
    - Storeroom/Office Container
    - Sanitary facilities
    - Potable water for personnel taken into account the duration of *Works*, location and surroundings.
    - The *Contractor* is entirely responsible for the security of all the *Works* for 24-hour period.

8.7.2 Plant and Materials

The *Contractor* supplies all Tools, Plant, Material and Equipment for the *Works*.

8.8 Title to material from excavation and demolition

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

8.9 Design by the *Contractor*

The *Contractor* constructs the *Employer's* Design

8.10 Cataloguing requirements by the *Contractor*

- Not applicable

9. Requirements for the programme

The *Contractor* submits a plan in MS Project format,, detailing how the *Works* is executed within the stipulated dates, including weekends and public holidays. The programme must include the following:

- Lead time from Contract start date to Site Establishment
- Proposed time to complete each activity as per the scope of work.
- Resources needed per activity

- Links between activities indicating predecessors and successors.
- Site establishment and de-establishment duration.
- Health, Safety and Environmental considerations including 2 hours for Induction training.
- Float per activity.
- Quality verification and testing activities.
- Key deliverable dates.

The programme will be subject to acceptance by the *Employer* and must be within the offered timeframes during tender stage.

The schedule needs to be updated on a daily basis and be available to the *Employer* when required. The updated schedule must be presented to the *Employer* by each Friday of each week during the execution phase of the *Works*. An Early Warning must be tabled every time the updated schedule indicates lateness of any activities on the critical path.

The *Contractor* sticks to the agreed programme and any changes to it need to be approved by the *Employer*.

Completion is when the *Contractor* has completed the *works* in accordance with the Works Information except for correcting notified Defects which do not prevent the *Employer* from using the *works* and others from doing their work.

10. Services and other things provided by the *Employer*

None, the *Employer* will not provide any services and other things due to the following limitations:

10.1 Electrical Supply

- No electrical connections available at the work area. The *Contractor* provides the electrical supply to perform the *works*.

10.2 Potable Water Supply

- No point of potable water supply available at the work area. Points of supply are only available at the Power Station. The *Employer* takes no responsibility for disruptions in the supply of water, should this option be considered.

10.3 Ablution facilities

- There are no ablution facilities at the work area

10.4 Office and personal Equipment

- No offices and equipment at the work area, *Contractor* makes own arrangements

C4: Site Information

Ankerlig Power Station: is located on Neil Hare road in the Atlantis Industrial area in the Western Cape that is situated approximately 40 kilometres north of Cape Town between the West Coast road (R27) and the West Coast National Road (N7). Access to the Power Station is possible through the well maintained network of National, Provincial and Local tarred roads in the area. The proposed access route to the Power Station is Dassenberg Drive (R307) off the R27 (West Coast Road past Koeberg Power Station). An alternative route would be to utilise the R304 off the National Road N7 to reach Dassenberg Drive (R307). Once on Dassenberg Drive, Charel Uys can be used to reach Neil Hare Road which is adjacent to the Power Station.

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

1. Access limitations

Access to the Ankerlig Power Station is restricted to authorized personnel only. All *Contractor's* staff will be required to produce proof of security clearance before access to site is granted. *Contractor* gives at least 24hrs notice to the *Employer* of his intention to enter security-controlled areas.

All *Contractor*s will be tested daily for the use of alcohol. Any persons found to be above Eskom's legal limit will not be allowed on site.

No passengers allowed at the back of the bakkie.

2. Ground conditions in areas affected by work in this contract

The *Contractor* is to assess the ground condition and work area at the site meeting.

3. Hidden and other services within the *site*

The *Contractor* is to assess the area to confirm the presents of services. Prior to commencement of any *works*, the *Contractor* shall ascertain from the relevant authorities the exact position, depth and level of all existing services in the area and shall make whatever provisions may be required by the authority concerned for the support, maintenance and protection of such services.

4. Details of existing buildings / facilities which *Contractor* is required to work on

The *Contractor* will not be working on any building when there are the presence of pylons in the area, the *Contractor* is to take caution not to undermine or disturb its foundation in any way.

APPENDIX A

A: INVERTER REQUIREMENTS

1) Schedule A: Eskom Requirements

2) Schedule B: Guarantees and technical particulars of equipment offered All Standards quoted will be the Latest revision

NOTES: REGARDING THE COMPLETION OF SCHEDULE A & B:

3) The requirements of this section specified under "Schedule A & B" form part of the Works Information. Schedule B shall be completed by the *Contractor* and submitted with his tender. Filling in Instructions

- Where the *Contractor* does not fully comply with the Engineering requirement, any deviations shall be clearly indicated in Schedule B and listed in the Deviation Schedule, with the cost of the deviation.

- Where there is a need to substantiate or further describe an item in Schedule B, especially in instances of non-compliance with Schedule A, particulars are furnished on a separate sheet clearly marked with the notation of the Schedule A item referred to.

- If a blank space is left in Schedule B next to certain requirements specified in Schedule A, this constitutes a confirmation that the tender does not comply with that specific requirement.

- Where xxxxx is indicated for an item in Schedule A, the Contractor is required to fill in the appropriate information in Schedule B, for the equipment offered.

- Where t.b.c. (to be confirmed) is indicated for an item in Schedule A, the Engineer will fill in the appropriate information in Schedule A, when confirmed.

A **Evidence Reference**

4) Each evidence reference shall be filled in with a reference to the delivery documentation where the word "REQUIRED" is stated. The evidence reference section will refer to the documentation that backs-up the statement made in Schedule B. If no evidence is received or it is not referenced to correctly, it shall be taken as non- compliance with regard to Schedule A

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
1.0	General Requirements					
1.1	Elevation (Atlantis) and (Mosselbaai)	m.a.s.l	226.62 and 110.17			
1.2	Relative humidity	%	10-90 non condensing			
1.3	Lighting		SANS 1652 and SANS 61439 -1 Table G1			
1.4	Outdoor air temperature					
1.4.1	Maximum	°C	60			
1.4.2	Daily average	°C	30			
1.4.3	Minimum	°C	-15			
1.5	Equipment room air temperature					
1.5.1	Maximum	°C	50			
1.5.2	Daily average	°C	35			
1.5.3	Minimum	°C	-5			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
2.0	Electrical input supply					
2.1	Input supply configuration	SANS 10142-1	TN-S			
2.2	Input voltage fluctuations as percentage of nominal voltage	%	220DC +20%/-15% , 230AC +-10%			
2.3	Input frequency fluctuations as percentage of nominal frequency	%	50Hz±5			
2.4	Input voltage deviation from specified voltage maximum to minimum within 1 second.	Yes/No	Yes			
2.5	Input voltage fluctuation between specified minimum to maximum value within one to ten cycles	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
2.6	Input voltage total distortion		Table 1 IEC 61000-2-2			
3.0	Operational requirements					
3.1	Output requirements					
3.1.1	Standard output operating voltage tolerance	%	230V AC ±1%, 1 phase			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.2	Cooling requirements					
3.2.1	Natural	Yes/No	Yes			
3.3	Inrush current					
3.3.1	Inrush current determined as specified in IEC 62040-3	Yes/No	Yes			
3.4	No-load operation					
3.4.1	No-load operation maximum voltage	%	+10			
3.5	Step load capability					
3.5.1	Voltage regulation during 10 to 90% step variation	% after sec 1	2			
3.6	Overload capability					
3.6.1	Overload capability	Duty class	II			
3.7	Short-circuit and current limit capability					
3.7.1	Short circuit capability as stipulated in IEC 62040-3	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.8	Internal protection					
3.8.1	Internal protection	Yes/No	Yes			
3.9	Hardwire/hardware independent protection					
3.9.1	Hardwire/hardware independent protection: Overvoltage protection on load Over temperature monitoring	 Yes/No Yes/No	 Yes Yes			
3.10	Active load sharing					
3.10.1	Active load sharing	%	≤10			
3.11	Efficiency					
3.11.1	a) @ 25% load	%	>87.5			
3.11.2	b) @ 50% load	%	>90			
3.11.3	c) @75% load	%	>92.5			
3.11.4	d) @ 100% load	%	>95			
3.12	Electromagnetic environment and immunity requirements					
3.12.1	Conducted and radiated emissions					

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.12.1.1	Conducted and radiated emissions as specified in IEC 62040-2 for category C3	Yes/No	Yes			
3.12.1.2	Low frequency emissions THDI as per IEC 6100-3-2	%	≤10			
3.13	Immunity					
3.13.1	IEC 62040-2 for category C3	Yes/No	Yes			
3.14	Audible noise					
3.14.1	Audible noise	dB	<65			
3.15	Lightning protection					
3.15.1	Input	kV	6			
3.16	Electrical Requirements					
3.16.1	General					
3.16.1.1	Combined fused switches	IEC 60947-3	IEC 60947-3			
3.16.1.2	Moulded case circuit breakers	IEC 60947-2	IEC 60947-2			
3.16.1.3	Transformers	IEC 60067	IEC 60067			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.16.1.4	Contactors	IEC 60947-4	IEC 60947-4			
3.16.1.5	Transfer switches	IEC 60947-6	IEC 60947-6			
3.16.1.6	Terminal blocks	IEC 60947-7 and Eskom standard 240-70413291	IEC 60947-7 and Eskom standard 240-70413291			
3.16.1.7	Control circuit devices and switching elements	IEC 60947-5	IEC 60947-5			
3.17	Input isolation and overload protection	CFS/MCCB/MCB				
3.17.1	Input isolation and overload protection provided	Yes/No	Yes			
3.17.2	Aux contacts provided	Yes/No	Yes			
3.18	Output isolation and overload protection	CFS/MCCB/MCB				
3.18.1	Output isolation and overload protection provided	Yes/No	Yes			
3.18.2	Aux contacts provided	Yes/No	Yes			
3.19	Input – output isolation	Yes/No				

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.19.1	Input – output isolation galvanically	Yes/No	Yes			
3.20	Earthing					
3.20.1	Exposed non-current carrying parts earthed onto earth bar	Yes/No	Yes			
3.20.2	External earthing point	Yes/No	Yes			
3.20.3	Neutral (grounded circuit conductor) bonded to safety- earthing	Yes/No	Yes			
3.20.4	Earthing compliant with IEEE142:1991	Yes/No	Yes			
3.12	Measurements, controls, indications and alarms					
3.21.1	Inverter measurement					
3.21.1.1	Meter types	Panel Meters/ LCD	LCD			
3.21.1.2	Meter accuracy	%	1			
3.21.1.3	Input voltage measurement	Yes/No	Yes			
3.21.1.4	Output voltage measurement	Yes/No	Yes			
3.21.1.5	Output current measurement	Yes/No	Yes			
3.22	Inverter controls					
3.22.1	Alarm reset	Yes/No	Yes			
3.22.2	On-off switch	Yes/No	Yes			
3.22.3	Lamp test if not LCD	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.23	Inverter indications					
3.23.1	Input healthy	Yes/No	Yes			
3.23.2	Output healthy	Yes/No	Yes			
3.24	Local Alarms	Remote Alarm				
3.24.1	Output failure	Output Failure	Yes			
3.24.2	Mains failure	Input Failure	Yes			
3.25	Communication and control design requirements					
3.25.1	General					
3.25.2	Remote communication link	Yes/No	Yes			
3.25.3	Communication Protocols DNP 3.0 level 2 or 3 and IEC 61850	Yes/No	Yes			
3.25.4	Micro-processor controlled	Yes/No	Yes			
3.25.5	Diagnostic and telemetry capability	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.26	Real time clock and time synchronization					
3.26.1	Real time clock and time synchronization for 30 years	Yes/No	Yes			
3.26.2	Real time clock drift	Seconds/month	<60			
3.26.3	Resettable clock with resetting other parameters	Yes/No	Yes			
3.26.4	Maintain time of clock for 7 days during loss of supply	Yes/No	Yes			
3.26.5	Synchronization of IEDs	Yes/No	Yes			
3.26.6	Synchronization indicated in event log	Yes/No	Yes			
3.27	Communication ports					
3.27.1	Communication ports	2 x Rs-232 1x Rs485 1 x Ethernet or Fibre optic	Yes Yes Yes			
3.28	Monitoring and control					
3.28.1	Interface to local PC	Yes/No	Yes			
3.28.2	Remote interface with Inverter	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.28.3	Software and firmware upgradeable	Yes/No	Yes			
3.28.4	Settings, indications and alarm display via front panel	Yes/No	Yes			
3.28.5	Password controlled	Yes/No	Yes			
3.28.6	Real time control	Yes/No	Yes			
3.28.7	Default values for stand-alone operation	Yes/No	Yes			
3.28.8	Interface with optional unit	Yes/No	Yes			
3.28.9	Unique remote controller identification	Yes/No	Yes			
3.29	Software and firmware					
3.29.1	General					
3.29.1.1	Software to access equipment	Yes/No	Yes			
3.29.1.2	Software updates compatible with supplied systems	Yes/No	Yes			
3.29.1.3	Software license and documentation copyright	Yes/No	Yes			
3.29.1.4	Software support	Yes/No	Yes			
3.29.1.5	Software detail to be supplied	Yes/No	Yes			
3.29.1.6	Adhere to software control standard	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
3.29.1.7	Settings and display features available from front panel display	Yes/No	Yes			
3.29.1.8	Alarm/event lock downloadable	Yes/No	Yes			
3.29.1.9	Software capable to upload and download alarm/ event log or settings	Yes/No	Yes			
3.29.1.10	Software display the status of any modules connected	Yes/No	Yes			
3.29.1.11	Software to display the status of remote communication connections	Yes/No	Yes			
3.30.1	Software verification and validation	Yes/No	Yes			
3.30.2	System firmware					
3.30.2.1	Equipment system firmware displayed on the equipment	Yes/No	Yes			
3.30.2.2	Firmware alterations to be controlled	Yes/No	Yes			
3.30.2.3	Data retention for the expected life of the equipment	Yes/No	Yes			
3.30.2.4	Firmware upgradeable	Yes/No	Yes			
4.0	Mechanical Requirements					
4.1	General					
4.1.1	Compliance to clause 5 of SANS 10142-1 and SANS 62040-1	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.1.2	Designed, constructed and tested in accordance to clause 6.6 of SANS 10142-1	Yes/No	Yes			
4.2	Doors and covers					
4.2.1	Individual hinged doors for each cable compartment and each fix patter functional unit sub-section.	Yes/No	Yes			
4.2.2	All removable covers shall require the use of a tool	Yes/No	Yes			
4.2.3	All opening doors shall be padlockable	Yes/No	Yes			
4.2.4	As a minimum the center square key latch shall be padlockable with hole > 8mm	Yes/No	Yes			
4.2.5	Cable compartment hinges to allow lifting off	Yes/No	Yes			
4.2.6	Durable hinge and latch fastening	Yes/No	Yes			
4.2.7	Doors stops required	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.2.8	Door latches and hinges to withstand internal faults	Yes/No	Yes			
4.2.9	Doors >800mm to be fitted with webs	Yes/No	Yes			
4.3	Main, Distribution, Equalizing and Collection Busbars					
4.3.1	Main and distribution busbars manufactured from electrolytic tough pitch high conductivity copper as per SANS 804	Yes/No	Yes			
4.3.2	Condition of temper for busbar copper designation H2 for half-hard cold working as per SANS 1195	Yes/No	Yes			
4.3.3	Main busbar design maximum permissible surface temperature rise at rated current, Distribution busbar	K K	65 55			
4.3.4	Neutral busbar sizing relative to main busbar rating on input and relative to the associated distribution busbars	% of main busbar % of distribution busbar	≥50 100			
4.3.5	Neutral busbar connected to protective earth via removable bolted link	Yes/No	Yes			
4.3.6	Joints and tees in busbar compliance Bolts high tensile	T-22 8.8 to ISO 898-	T-22 8.8 (ISO 898-1)			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.3.7	Joints: Minimum number of bolts Busbar overlap	# Multiple of thickness or relative to width Conical or spring	≥2 ≥6 or equal Conical			
4.3.8	All busbar supports with minimum rating of the respective fault current rating	Yes/No	Yes			
4.3.9	Span of distribution busbar shall not interfere with cable entry zone.	Yes/No	Yes			
4.3.10	Busbar identification marking: 230 V AC Busbars and DC Busbars 220V	Yes/No Red - positive and Black - Negative	Yes Red - positive and Black - Negative			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.3.11	Collection busbars need to be constructed where SCPD's and mcb's need to be connected in cascaded circuits	Yes/No	Yes			
4.3.12	Sufficient supports for equalizing busbars to withstand fault current	Yes/No	Yes			
4.4	Protective earth conductor and screened earth busbar					
4.4.1	A separate protective earth connected	Yes/No	Yes			
4.4.2	Non-current carrying conductive parts connected to PE	Yes/No	Yes			
4.4.3	Earth conductor size connected to doors	mm^2	6			
4.4.4	PE rating	SANS 10142-1	SANS 10142-1			
4.4.5	Protective circuit parts rated for the highest fault condition	Yes/No	Yes			
4.4.6	PE conductor colour	Green with yellow stripes	Green with yellow stripes			
4.5	Power and control cabling					
4.5.1	Power circuit wiring and connections rated according to the de-rated operating current of the associated protective gear	Yes/No	Yes			
4.5.2	Control wiring connected to source of fault energy rating	1.5 times fuse rating and	1.5 times fuse rating			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
		withstanding I^2t fuse rating	and withstanding I^2t fuse rating			
4.5.3	Connections to equipment mounted on swing doors	Yes/No	No			
4.5.4	Type of conductor cable	Stranded, single or solid	Stranded			
4.5.5	Multistrand cable conductor diameter	mm^2	1.5			
4.5.6	Multistrand cable conductor diameter for current and voltage transformers	mm^2	2.5			
4.5.7	Joints and splices in any circuit, more than one conductor in one lug.	Not allowed	Not allowed			
4.5.8	Terminals assembly and labels shall be accessible		xxxx			
4.5.9	Terminals which are on the live side of fuses and isolating switches shall be completely shrouded	Yes/No	Yes			
4.5.10	Coils in-line with normally open contacts connected to positive	Yes/No	Yes			
4.5.11	Compression joints standard	BS EN 61238	BS EN 61238			
4.5.12	Grommets installed on all holes through which cables are passing	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.5.13	Conductors >100A and passing through metal	Conductor all three phases (both poles of DC conductors) or metal barrier split	xxxx			
4.5.14	AC and DC conductors allowed in same wireway	Yes/No	No			
4.5.15	Power circuit cable sizing standard for the specified volt-drop	SANS 1973-1	SANS 1973-1			
4.5.16	Stripping of insulation standard		xxxx			
4.5.17	Crimping standard		xxxx			
4.5.18	Correct torque standard		xxxx			
4.6	Conductor identification					
4.6.1	Conductor identification	Yes/No	Yes			
4.6.2	Control conductor identification AC circuits DC circuits	Black Grey	Black Grey			
4.6.3	Control bus wiring identification DC AC	Red – positive Black – negative	Red - positive Black - negative			
4.6.4	Conductor of CT and VT circuits	Phase colours	Phase colours			
4.6.5	Control conductor wiring		xxxx			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.7	Enclosure and Assembly					
4.7.1	EMC testing required with door open when MCB and MCCB are fitted behind the door	Yes/No	Yes			
4.7.2	Individual segregation for input, DC port, output, signal and control cabling	Yes/No	Yes			
4.7.3	inverter modules and controller sub rack assemblies	Swing/fix frame assembly	Swing/fix frame assembly options			
4.7.4	Handling and lifting facilities	Removable lifting facility. Forklift handling	Removable lifting facility. Forklift handling			
4.8	Sub-rack assemblies and input/output power distribution modules					
4.8.1	Sub-rack inclusions: Controller sub-assembly in-front	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
	Terminal plate sub-assembly rear Segregated wire loom	Yes/No Yes/No	Yes Yes			
4.8.2	Input/output power modules : Front distribution modules Terminal plate sub assembly rear Segregated wire loom	 Yes/No Yes/No Yes/No	 Yes Yes Yes			
4.8.3	Sub-rack expandable to maximum modules power rating	Yes/No	Yes			
4.8.4	Sub-rack pre wired for expansion	Yes/No	Yes			
4.8.5	Blanking plates installed on unused module positions	Yes/No	Yes			
4.8.6	Ingress protection	IP	IP2X			
4.8.7	Individual MCB module locking facility	Yes/No	Yes			
4.8.8	Terminal plate and top drawer plate thickness	mm	1.6			
4.8.9	Terminal plate width	mm	482.6			
4.8.10	Slotted mounting hole dimensions as per IEC 60297-1 Width Height Horizontal distance between hole center's	IEC 60297-1 mm mm mm	IEC 60197-1 10.3 6.80 465.1			
4.8.11	Overall aesthetically pleasing appearance	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.8.12	Earthing stud fitted on terminal plate	Yes/No	Yes			
4.9	Ingress protection					
4.9.1	IP rating Panel doors closed Panel doors open	IP IP	31 2X			
4.9.2	Additional IP rating requirements	IP	As options IP45 IP55 IP65			
4.10	Cable entry					
4.10.1	Cable entry	Top/Bottom	Bottom			
4.11	Gland plate					
4.11.1	Gland plate height	mm	300mm above point of bottom entry			
4.11.2	Fire retardant and sealing of floor slot	Yes/No	Yes required as part of			
4.11.3	Undrilled gland-plate, corrosion protected as per SANS 1652	Yes/No	Yes			
4.11.4	Adequate gland plate support	Yes/No	Yes			
4.11.5	Non-magnetic gland plates	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.11.6	Bonding of gland plate to PE conductor	Yes/No	Yes			
4.12	Corrosion protection					
4.12.1	Corrosion protection standard	SCSSCAAP9	SCSSCAAP 9			
4.12.2	AC input supply assembly colour	G29	G29			
4.12.3	DC input supply assembly colour	A11	A11			
4.13	Terminations					
4.13.1	Termination standard	240-70413291	240-70413291			
4.13.2	Terminations for all input output and	Yes/No	Yes			
4.13.3	Maximum number of cable cores per termination point	#	2			
4.13.4	Input terminal rating at input minimum voltage	Yes/No	Yes, alternatives can be specified as an option			
4.13.5	DC port terminal size	mm^2	95 Alternatives can be specified as an option			
4.14	Internal wiring					
4.14.1	Wire ways and trunking shall be smooth and free of sharp edges	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
4.14.2	Trunking temperature rating	ºC	90			
4.14.3	All wiring in trunking or wire looms clipped or laced	Yes/No	Yes			
4.15	Conformal coatings					
4.15.1	Conformal coatings required	Yes/No	Yes			
4.16	Accessibility					
4.16.1	Accessibility for cable termination	Yes/No	Yes			
4.16.2	Normal maintenance accessibility following installation	Yes/No	Yes			
4.16.3	Accessibility	Front/rear	Front and rear			
4.17	Minimum clearances					
4.17.1	Pole-to-pole and pole-to-earth clearance standard	SANS 10142-1	SANS 10142-1			
4.17.2	Terminals for input, DC port and output	Segregated/ barriers	Segregated/ barriers			
4.17.3	Minimum creepage distance rating as per SANS 60439-1 clause 7.1.2	Pollution Degree 3, material group 111a with the specified insulation voltage	Pollution Degree 3, material group 111a with the specified insulation voltage			
4.17.4	Clearance and creepage distances	SANS 60439-1	SANS 60439-1			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
		Table 14 and 16	Table 14 and 16			
4.18	Nameplate/rating plate/declared electrical performance					
4.18.1	Nameplate material	Stainless steel/ anodized aluminum	Stainless steel/ anodized aluminum			
4.18.2	Nameplate information	Clause 3.4.18	Clause 3.4.18			
5.0	Settings and Commissioning					
5.1	Settings					
5.1.1	Settings standard	240-56176168	240-56176168			
5.1.2	Settings document for each piece of equipment required based on specific application	Yes/No	Yes to be compiled by OEM based on application			
5.1.3	Microprocessor shall be programmed with these settings as default	Yes/No	Yes			
5.1.4	Revision indicated on document	Yes/No	Yes			
5.1.5	SCPD indicated on settings document	Yes/No	Yes			
5.2	Commissioning					
5.2.1	Commissioning standard	240-56177186	240-56177186			
5.2.2	As commissioning routine, operational and functional tests shall be performed	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
5.3	Upgrading/modifications					
5.3.1	Upgrade/modification report required	Yes/No	Yes			
5.3.2	Hardware upgrade identification	Yes/No	Yes			
5.4	Equipment performance					
5.4.1	Warranty					
5.4.1.1	Warranty period	36 months from date of	36 months from date of			
5.4.2	Reliability, security, dependability, maintainability and life expectancy					
5.4.2.1	Equipment hours of installed units per voltage or model/type	Yes/No	Yes			
5.4.2.2	Customers indicating the number of units employed per model/type	Yes/No	Yes			
5.4.2.3	Environmental conditions where such equipment is installed	Yes/No	Yes			
5.4.2.4	Equipment proven record	>2 years and one hundred equipment years	>2 years and one hundred equipment years			
5.4.2.5	Life expectancy Electronic equipment Other hardware	≥15years ≥20 years				
5.4.2.6	Written guarantee to meet life expectancy	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
5.4.2.7	Supplier product health statement	Yes/No	Yes			
6.0	Type testing					
6.1	Inverter tests	Type Tests Required as per IEC 60146-1-1				
6.1.1	Insulation test	Yes/No	Yes			
6.1.2	Light load functional test.	Yes/No	Yes			
6.1.3	Functional test	Yes/No	Yes			
6.1.4	Rated current test	Yes/No	Yes			
6.1.5	Power loss determination for assemblies and equipment	Yes/No	Yes			
6.1.6	Temperature rise test	Yes/No	Yes			
6.1.7	Power factor measurement	Yes/No	Yes			
6.1.8	Checking of auxiliary devices	Yes/No	Yes			
6.1.9	Measurement of inherent voltage regulation	Yes/No	Yes			
6.1.10	Checking the properties of the control equipment	Yes/No	Yes			
6.1.11	Checking the protective devices	Yes/No	Yes			
6.1.12	Immunity test	Yes/No	Yes			
6.1.13	Overcurrent capability test	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
6.1.14	Radio frequency generated interference and conducted noise	Yes/No	Yes			
6.1.15	Audible noise	Yes/No	Yes			
6.1.16	Measurement of ripple voltage and current	Yes/No	Yes			
6.1.17	Additional tests	Yes/No	Yes			
6.2	Type Tests Required as per SANS 1652	Yes/No	Yes			
6.2.1	Dielectric strength test	Yes/No	Yes			
6.2.2	Insulation resistance test	Yes//No	Yes			
6.2.3	Temperature rise test	Yes/No	Yes			
6.2.4	Power efficiency test	Yes/No	Yes			
6.2.5	Test for protection against lightning surges	Yes/No	Yes			
6.2.6	Short-circuit test on output terminals	Yes/No	Yes			
6.2.7	Ripple voltage limits and ripple current test	Yes/No	Yes			
6.2.8	Audible noise level test	Yes/No	Yes			
6.2.9	Salt fog test	Yes/No	Yes			
6.2.10	Glow-wire test on non-metallic enclosures	Yes/No	Yes			
6.2.11	Lightning surge test	Yes/No	Yes			
6.2.12	Parallel operation test	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
7.0	Marking, labeling and packaging					
7.1	Labelling					
7.1.1	Labeling	0.54/3695 sheet 1 & 2 or 240-62629353	0.54/3695 sheet 1 & 2 or 240-62629353			
7.1.2	Package labelling	Yes/No	Yes			
7.2	Packaging					
7.2.1	Packaging	High specification impact resistant corrugated cardboard with waterproof outer plastic covering	High specification impact resistant corrugated cardboard with waterproof outer plastic covering			
7.2.2	Additional packaging requirements	Crating	Crating as an option			
8.0	Spares					
8.1	General					
8.1.1	Spares list	Yes/No	Yes			
8.1.2	Maintenance spares list	Yes/No	Yes			
8.1.3	Spares pricing	Yes/No	Yes			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
8.1.4	Spares life expectancy within packaging	Years	15			
8.1.5	Spares available for warranty period	Yes/No	Yes			
8.1.6	Delivery	hr ex-works	24			
8.1.7	Spares availability	Years	15			
9.0	Documentation					
9.1	General					
9.1.1	Sets of hard copies	#	3			
9.1.2	Drawings format Drawings size	.dgn A3	.dgn A3			
9.2	Drawings					
9.2.1	General arrangement drawings	Yes/No	Yes			
9.2.2	Single line diagrams	Yes/No	Yes			
9.2.3	Schematic drawings	Yes/No	Yes			
9.2.4	Installation, operating and maintenance instruction manuals					
9.2.4.1	All instruction detailed manuals shall be comprehensively	Number of copies including .pdf software copy				

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
9.2.4.2	The manuals shall cover all equipment forming part of the assembly including: Content list List of reference drawings Detail of all components	Yes/No Yes/No Yes/No	Yes Yes Yes			
9.2.4.3	Manual in loose leaf binder to ISO standard in A4 size	Yes/No	Yes			
9.2.4.4	Manual content	General arrangement drawings, installation drawings and instructions, operating and maintenance instructions for all components, detailed parts list, spare parts ordering instructions etc	General arrangement drawings, installation drawings and instructions, operating and maintenance instructions for all components, detailed parts list, spare parts ordering instructions etc			

Item	Description	Description	Schedule A	Schedule B	Evidence reference	Comments
9.2.4.5	Additional content	Special instructions pertaining to spares storage, drawings for component locations, dismantling and re-assembly.	Special instructions pertaining to spares storage, drawings for component locations, dismantling and re-assembly.			
9.2.4.6	Special tool requirements		xxxx			
9.2.5	Engineering design system					
9.2.5.1	EDS source document of design	Yes/No	Yes			
10.0	Language					
10.1	Language on display ,drawings, documentation and software	US or UK English				

APPENDIX B: DEVIATION SCHEDULE

DEVIATION SCHEDULE

Any deviations from the Works Information and Specifications, or alternatives offered, are listed below with reasons and estimated cost for departure from the specification. If no deviations or alternatives are offered, this

schedule shall be marked (N/A).

Specification or Schedule Number	**Specification or Clause Number**	**Proposed Deviation or Alternative**	**Cost of Deviation or Alternative**