



NEC3 Engineering & Construction Contract

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

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

for Installation of HVAC CEP VSD Room Modification

Contents:	No of pages
Part C1 Agreements & Contract Data	[•]
Part C2 Pricing Data	[•]
Part C3 Scope of Work	[•]

CONTRACT No. [Insert at award stage]

Part C1: Agreements & Contract Data

Contents:	No of pages
C1.1 Form of Offer and Acceptance	[•]
C1.2a Contract Data provided by the <i>Employer</i>	[•]
C1.2b Contract Data provided by the <i>Contractor</i>	[•]

1 Form of Offer & Acceptance

Offer

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

Installation of HVAC CEP VSD Room Modification

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

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

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

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

Signature(s)

Name(s)

Capacity

**For the
tenderer:**

(Insert name and address of organisation)

Name &
signature of
witness

Date

Tenderer's CIDB registration number (if applicable)

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

Acceptance

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

The terms of the contract, are contained in:

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

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

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

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

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

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

Signature(s)

Name(s)

Capacity

**for the
Employer**

Eskom Holdings SOC Limited
Kusile Power Station
R545 Kendal/Balmoral Rd
Haartebeesfontein Farm
Witbank

Name &
signature of
witness

Date

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

C1.2 ECC3 Contract Data

Part one - Data provided by the *Employer*

[Instructions to the contract compiler: (delete these two notes in the final draft of a contract)]

1. Please read the relevant clauses in the conditions of contract before you enter data. The number of the clause which requires the data is shown in the left hand column for each statement however other clauses may also use the same data.
1. Some ECC3 options are always selected by Eskom Holdings SOC Ltd. The remaining ECC3 options are identified by shading in the left hand column. In the event that the option is not required select and delete the whole row. Where the following symbol is used "■" - data is required to be inserted relevant to the specific option selected.]

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

Clause	Statement	Data
1	General	
	The <i>conditions of contract</i> are the core clauses and the clauses for main Option	
	■	A: Priced contract with activity schedule
	dispute resolution Option	W1: Dispute resolution procedure
	and secondary Options	
		X2 Changes in the law
		X5: Sectional Completion
		X7: Delay damages
		X15: Limitation of <i>Contractor's</i> liability for design to reasonable skill and care
		X16: Retention
		X18: Limitation of liability
		Z: <i>Additional conditions of contract</i>
	of the NEC3 Engineering and Construction Contract, April 2013 (ECC3)	
10.1	The <i>Employer</i> is (Name):	Eskom Holdings SOC Ltd (reg no: 2002/015527/30), a state owned company incorporated in terms of the company laws of the Republic of South Africa
	Address	Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg
10.1	The <i>Project Manager</i> is: (Name)	Zanele Kubheka

	Address	Kusile Power Station / R545 Kendal / Balmoral Rd Haartebeesfontein Farm / Emalahleni																							
	e-mail	kubhekza@eskom.co.za																							
10.1	The <i>Supervisor</i> is: (Name)	Nhlanhla Rikhotso																							
	Address	Kusile Power Station / R545 Kendal / Balmoral Rd Haartebeesfontein Farm / Emalahleni																							
	e-mail	rikhotnn@eskom.co.za																							
11.2(13)	The <i>works</i> are	Design, Supply and Installation HVAC CEP VSD Room Modification																							
11.2(14)	The following matters will be included in the Risk Register	1. Dust Inhalation 2. Slip, Trip & Fall 3. Falling Objects 4. Electric Shock 5. Permit to Work 6. Working at heights 7. Quality 8. Time																							
11.2(15)	The <i>boundaries of the site</i> are	Kusile Power Station Units 1 – 6																							
11.2(16)	The Site Information is in	Part 4: Site Information																							
11.2(19)	The Works Information is in	Part 3: Scope of Work and all documents and drawings to which it makes reference.																							
12.2	The <i>law of the contract</i> is the law of	the Republic of South Africa																							
13.1	The <i>language of this contract</i> is	English																							
13.3	The <i>period for reply</i> is	Five (5) working days																							
2	The Contractor's main responsibilities																								
3	Time																								
11.2(3)	The <i>completion date</i> for the whole of the <i>works</i> is	After commissioning of each section, all permits to site has been cleared and proper handover is done to the end user																							
11.2(9)	The <i>key dates</i> and the <i>conditions</i> to be met are:	<table><tr><th colspan="4"><i>Condition</i> to be met</th><th><i>key date</i></th></tr><tr><td>1</td><td>Submit Programme for approval</td><td></td><td></td><td>2 Weeks after Kick off meeting</td></tr><tr><td>2</td><td>Submit QCP's</td><td></td><td></td><td>2 weeks after Kick off meeting</td></tr><tr><td>3</td><td>Submit safety file for approval</td><td></td><td></td><td>2 Weeks after kick off meeting</td></tr></table>				<i>Condition</i> to be met				<i>key date</i>	1	Submit Programme for approval			2 Weeks after Kick off meeting	2	Submit QCP's			2 weeks after Kick off meeting	3	Submit safety file for approval			2 Weeks after kick off meeting
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3	Submit safety file for approval			2 Weeks after kick off meeting																					

		4	All tools to be used to be readily available and inspected	As soon as safety file is approved
30.1	The <i>access dates</i> are:	Part of the Site		Date
		1	Kusile Unit 1	2 Days after Site Establishment and Permit to work approval
		2	Kusile Unit 2	2 Days after Site Unit 1 Completion and Permit to work approval
		3	Kusile Unit 3	2 Days after Site Unit 2 Completion and Permit to work approval
		4	Kusile Unit 4	2 Days after Site Unit 3 Completion and Permit to work approval
		5	Kusile Unit 5	2 Days after Site Unit 4 Completion and Permit to work approval
		6	Kusile Unit 6	2 Days after Site Unit 5 Completion and Permit to work approval
31.1	The <i>Contractor</i> is to submit a first programme for acceptance within	2 Weeks after kick off meeting		
31.2	The <i>starting date</i> is	First working day following the Contract signature date		
32.2	The <i>Contractor</i> submits revised programmes at intervals no longer than	5 days		
35.1	The <i>Employer</i> is not willing to take over the <i>works</i> before the Completion Date.	After commissioning of each section unit, all permits to site has been cleared and proper handover is done to the end user		
4	Testing and Defects			
42.2	The <i>defects date</i> is	52 weeks after Completion of the whole of the works		

43.2 The *defect correction period* is **2 weeks after Contractor is being notified about the defect.**

5 Payment

50.1 The *assessment interval* is **25th day of each successive month.**

51.1 The *currency of this contract* is the **South African Rand.**

51.2 The period within which payments are made is **4 weeks.**

51.4 The *interest rate* is **the publicly quoted prime rate of interest (calculated on a 365 day year) charged from time to time by the Standard Bank of South Africa Limited (as certified, in the event of any dispute, by any manager of such bank, whose appointment it shall not be necessary to prove) for amounts due in Rands and**

(ii) the LIBOR rate applicable at the time for amounts due in other currencies. LIBOR is the 6 month London Interbank Offered Rate quoted under the caption "Money Rates" in The Wall Street Journal for the applicable currency or if no rate is quoted for the currency in question then the rate for United States Dollars, and if no such rate appears in The Wall Street Journal then the rate as quoted by the Reuters Monitor Money Rates Service (or such service as may replace the Reuters Monitor Money Rates Service) on the due date for the payment in question, adjusted *mutatis mutandis* every 6 months thereafter and as certified, in the event of any dispute, by any manager employed in the foreign exchange department of The Standard Bank of South Africa Limited, whose appointment it shall not be necessary to prove.

6 Compensation events **Refer to NEC3 ECC terms and conditions of core clause 6**

60.1(13) The place where weather is to be recorded is: **Kusile Power Station**

The *weather measurements* to be recorded for each calendar month are, **the cumulative rainfall (mm)**

the number of days with rainfall more than 10 mm

the number of days with minimum air temperature less than 0 degrees Celsius

the number of days with snow lying at 09:00 hours South African Time

and these measurements:

The *weather measurements* are supplied by **The Project Manager of the System Engineer on request**

The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:

Kusile Power Station

and which are available from:

the South African Weather Bureau and included in Annexure A to this Contract Data provided by the Employer

7	Title		
8	Risks and insurance		
80.1	These are additional <i>Employer's</i> risks	Late design approval, late equipment supply, and commencement of the works.	
9	Termination		
10	Data for main Option clause		
A	Priced contract with activity schedule		
20.4	The <i>Contractor</i> prepares forecasts of Defined Cost for the <i>works</i> at intervals no longer than Four (4) Weeks.		
53.1	The <i>Contractor's share percentages</i> and the <i>share ranges</i> are	<i>share range</i> less than [●] % from [●]% to [●]% from [●] to [●]% greater than [●]%	<i>Contractor's share percentage</i> [●]% [●]% [●]% [●]%
11	Data for Option W1		
W1.1	The <i>Adjudicator</i> is	the person selected from the ICE-SA Division (or its successor body) of the South African Institution of Civil Engineering Panel of Adjudicators by the Party intending to refer a dispute to him. (see www.ice-sa.org.za). If the Parties do not agree on an Adjudicator the Adjudicator will be appointed by the Arbitration Foundation of Southern Africa (AFSA).	
	Address	[●]	
	Tel No.	[●]	
	Fax No.	[●]	
	e-mail	[●]	
W1.2(3)	The <i>Adjudicator nominating body</i> is:	the Chairman of ICE-SA a joint Division of the South African Institution of Civil Engineering and the London Institution of Civil Engineers. (See www.ice-sa.org.za) or its successor body.	
W1.4(2)	The <i>tribunal</i> is:	arbitration.	

W1.4(5)	The <i>arbitration procedure</i> is The place where arbitration is to be held is 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 latest edition of Rules for the Conduct of Arbitrations published by The Association of Arbitrators (Southern Africa) or its successor body. [•] South Africa the Chairman for the time being or his nominee of the Association of Arbitrators (Southern Africa) or its successor body.																					
12	Data for secondary Option clauses																						
X2	Changes in the law																						
X5	Sectional Completion																						
X5.1	The <i>completion date</i> for each <i>section</i> of the <i>works</i> is:	<table><thead><tr><th>Section</th><th>Description</th><th>Completion date</th></tr></thead><tbody><tr><td>1</td><td>Project Execution & Commissioning & Hand Over Unit 1</td><td>3 Months after designs approval</td></tr><tr><td>2</td><td>Project Execution & Commissioning & Hand Over Unit 2.</td><td>3 Months after Unit 1 completion.</td></tr><tr><td>3</td><td>Project Execution & Commissioning & Hand Over Unit 3.</td><td>3 Months after Unit 2 completion.</td></tr><tr><td>4</td><td>Project Execution & Commissioning & Hand Over Unit 4</td><td>3 Months after Unit 3 completion.</td></tr><tr><td>5</td><td>Project Execution & Commissioning & Hand Over Unit 5.</td><td>3 Months after Unit 4 completion.</td></tr><tr><td>6</td><td>Project Execution & Commissioning & Hand Over Unit 6.</td><td>3 Months after Unit 5 completion.</td></tr></tbody></table>	Section	Description	Completion date	1	Project Execution & Commissioning & Hand Over Unit 1	3 Months after designs approval	2	Project Execution & Commissioning & Hand Over Unit 2.	3 Months after Unit 1 completion.	3	Project Execution & Commissioning & Hand Over Unit 3.	3 Months after Unit 2 completion.	4	Project Execution & Commissioning & Hand Over Unit 4	3 Months after Unit 3 completion.	5	Project Execution & Commissioning & Hand Over Unit 5.	3 Months after Unit 4 completion.	6	Project Execution & Commissioning & Hand Over Unit 6.	3 Months after Unit 5 completion.
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X7	Delay damages																						
X7.1	Delay damages for late Completion of the <i>sections</i> of the <i>works</i> are:	<table><thead><tr><th>section</th><th>Description</th><th>Amount per day</th></tr></thead><tbody><tr><td>1</td><td>Unit 1</td><td>1% of Total Prices per day.</td></tr><tr><td>2</td><td>Unit 2</td><td>1% of Total Prices per day.</td></tr></tbody></table>	section	Description	Amount per day	1	Unit 1	1% of Total Prices per day.	2	Unit 2	1% of Total Prices per day.												
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		3	Unit 3	1% of Total Prices per day.
		4	Unit 4	1% of Total Prices per day.
		5	Unit 5	1% of Total Prices per day.
		6	Unit 6	1% of Total Prices per day.
	Remainder of the <i>works</i>			
	The total delay damages payable by the <i>Contractor</i> does not exceed:		10% of the contract price	
X15	Limitation of the <i>Contractor's</i> liability for his design to reasonable skill & care			
X16	Retention			
X16.1	The <i>retention free amount</i> is	R0.00		
	The <i>retention percentage</i> is	5%		
X18	Limitation of liability			
8.1	The <i>Contractor's</i> liability to the <i>Employer</i> for indirect or consequential loss is limited to:	R0.0 (zero Rand)		
X18.2	For any one event, the <i>Contractor's</i> liability to the <i>Employer</i> for loss of or damage to the <i>Employer's</i> property is limited to:	the amount of the deductibles relevant to the event		
X18.3	The <i>Contractor's</i> liability for Defects due to his design which are not listed on the Defects Certificate is limited to	The greater of - the total of the Prices at the Contract Date and - the amounts excluded and unrecoverable from the <i>Employer's</i> assets policy for correcting the Defect (other than the resulting physical damage which is not excluded) plus the applicable deductible as at contract date.		
X18.4	The <i>Contractor's</i> total liability to the <i>Employer</i> for all matters arising under or in connection with this contract, other than excluded matters, is limited to:	the total of the Prices other than for the additional excluded matters. The <i>Contractor's</i> total liability for the additional excluded matters is not limited. The additional excluded matters are amounts		

		for which the <i>Contractor</i> is liable under this contract for • Defects due to his design which arise before the Defects Certificate is issued, • Defects due to manufacture and fabrication outside the Site, • loss of or damage to property (other than the <i>works</i>, Plant and Materials), • death of or injury to a person and • infringement of an intellectual property right.
X18.5	The <i>end of liability date</i> is	(i) Two (2) years after the <i>defects date</i> for latent Defects and (ii) the date on which the liability in question prescribes in accordance with the Prescription Act No. 68 of 1969 (as amended or in terms of any replacement legislation) for any other matter. A latent Defect is a Defect which would not have been discovered on reasonable inspection by the <i>Employer</i> or the <i>Supervisor</i> before the <i>defects date</i>, without requiring any inspection not ordinarily carried out by the <i>Employer</i> or the <i>Supervisor</i> during that period. If the <i>Employer</i> or the <i>Supervisor</i> do undertake any inspection over and above the reasonable inspection, this does not place a greater responsibility on the <i>Employer</i> or the <i>Supervisor</i> to have discovered the Defect.
Z	The <i>Additional conditions of contract</i> are	Z1 to Z15 always apply.
Z1	Cession delegation and assignment	
Z1.1	The <i>Contractor</i> does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the <i>Employer</i> .	
Z1.2	Notwithstanding the above, the <i>Employer</i> may on written notice to the <i>Contractor</i> cede and delegate its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the Electricity Supply Industry.	
Z2	Joint ventures	
Z2.1	If the <i>Contractor</i> constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations then these persons or organisations are deemed to be jointly and severally liable to the <i>Employer</i> for the performance of this contract.	
Z2.2	Unless already notified to the <i>Employer</i> , the persons or organisations notify the <i>Project Manager</i> within two weeks of the Contract Date of the key person who has the authority to bind the <i>Contractor</i> on their behalf.	
Z2.3	The <i>Contractor</i> does not alter the composition of the joint venture, consortium or other	

unincorporated grouping of two or more persons without the consent of the *Employer* having been given to the *Contractor* in writing.

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

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

Z4 Confidentiality

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

Z5 Waiver and estoppel: Add to core clause 12.3:

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

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

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

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

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

Z8 Notifying compensation events

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

Z9 Employer's limitation of liability

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

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

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

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

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

Z12 Ethics

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

Affected Party means, as the context requires, any party, irrespective of whether it is the *Contractor* or a third party, such party's employees, agents, or Subcontractors or Subcontractor's employees, or any one or more of all of these parties' relatives or friends,

Coercive Action means to harm or threaten to harm, directly or indirectly, an Affected Party or the property of an Affected Party, or to otherwise influence or attempt to influence an Affected Party to act unlawfully or illegally,

Collusive Action means where two or more parties co-operate to achieve an unlawful or illegal purpose, including to influence an Affected Party to act unlawfully or illegally,

Committing Party means, as the context requires, the *Contractor*, or any member thereof in the case of a joint venture, or its employees, agents, or Subcontractor or the Subcontractor's employees,

Corrupt Action means the offering, giving, taking, or soliciting, directly or indirectly, of a good or service to unlawfully or illegally influence the actions of an Affected Party,

Fraudulent Action means any unlawfully or illegally intentional act or omission that misleads, or attempts to mislead, an Affected Party, in order to obtain a financial or other benefit or to avoid an obligation or incurring an obligation,

Obstructive Action means a Committing Party unlawfully or illegally destroying, falsifying, altering or concealing information or making false statements to materially impede an investigation into allegations of Prohibited Action, and

Prohibited Action means any one or more of a Coercive Action, Collusive Action Corrupt Action, Fraudulent Action or Obstructive Action.

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

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

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

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

Z13 Insurance

Z 13.1 Replace core clause 84 with the following:

Insurance cover

84

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

INSURANCE TABLE A

Insurance against	Minimum amount of cover or minimum limit of indemnity
Loss of or damage to the works, Plant and Materials	Contractor shall be liable to any damaged caused to Employer's property, equipment, material, and plant. Contractor shall be accountable for 25% of the damages caused per incident. 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
Loss of or damage to Equipment	The replacement cost
Liability for loss of or damage to property (except the works, Plant and Materials and Equipment) and liability for bodily injury to or death of a person (not	<u>Loss of or damage to property</u> <u>Employer's property</u> The replacement cost where not covered by the Employer's insurance The Employer's policy deductible, as at Contract Date, where covered by the Employer's insurance <u>Other property</u> The replacement cost
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

Z 13.2

Replace core clause 87 with the following:

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

INSURANCE TABLE B

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

Z14 Nuclear Liability

- Z14.1 The *Employer* is the operator of the Koeberg Nuclear Power Station (KNPS), a nuclear installation, as designated by the National Nuclear Regulator of the Republic of South Africa, and is the holder of a nuclear licence in respect of the KNPS.
- Z14.2 The *Employer* is solely responsible for and indemnifies the *Contractor* or any other person against any and all liabilities which the *Contractor* or any person may incur arising out of or resulting from nuclear damage, as defined in Act 44 of 1999, save to the extent that any liabilities are incurred due to the unlawful intent of the *Contractor* or any other person or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.
- Z14.3 Subject to clause Z14.4 below, the *Employer* waives all rights of recourse, arising from the aforesaid, save to the extent that any claims arise or liability is incurred due or attributable to the unlawful intent of the *Contractor* or any other person, or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.
- Z14.4 The *Employer* does not waive its rights provided for in section 30 (7) of Act 44 of 1999, or any replacement section dealing with the same subject matter.
- Z14.5 The protection afforded by the provisions hereof shall be in effect until the KNPS is decommissioned.

Z15 Asbestos

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

AAIA	means approved asbestos inspection authority.
ACM	means asbestos containing materials.
AL	means action level, i.e. a level of 50% of the OEL, i.e. 0.1 regulated asbestos fibres per ml of air measured over a 4 hour period. The value at which proactive actions is required in order to control asbestos exposure to prevent exceeding the OEL.
Ambient Air	means breathable air in area of work with specific reference to breathing zone, which is defined to be a virtual area within a radius of approximately 30cm from the nose inlet.
Compliance Monitoring	means compliance sampling used to assess whether or not the personal exposure of workers to regulated asbestos fibres is in compliance with the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.
OEL	means occupational exposure limit.
Parallel Measurements	means measurements performed in parallel, yet separately, to existing measurements to verify validity of results.
Safe Levels	means airborne asbestos exposure levels conforming to the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.
Standard	means the <i>Employer's</i> Asbestos Standard 32-303: Requirements for Safe Processing, Handling, Storing, Disposal and Phase-out of Asbestos and Asbestos Containing Material, Equipment and Articles.
SANAS	means the South African National Accreditation System.
TWA	means the average exposure, within a given workplace, to airborne asbestos fibres, normalised to the baseline of a 4 hour continuous period, also applicable to short term exposures, i.e. 10-minute TWA.
Z15.1	The <i>Employer</i> ensures that the Ambient Air in the area where the <i>Contractor</i> will Provide the Services conforms to the acceptable prescribed South African standard for asbestos, as per the regulations published in GNR 155 of 10 February 2002, under the Occupational Health and Safety Act, 1993 (Act 85 of 1993) ("Asbestos Regulations"). The OEL for asbestos is 0.2 regulated asbestos fibres per millilitre of air as a 4-hour TWA, averaged over any continuous period of four hours, and the short term exposure limit of 0.6 regulated asbestos fibres per millilitre of air as a 10-minute TWA, averaged over any 10 minutes, measured in accordance with HSG248 and monitored according to HSG173 and OESSM.
Z15.2	Upon written request by the <i>Contractor</i> , the <i>Employer</i> 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 <i>Contractor</i> may perform Parallel Measurements and related control measures at the <i>Contractor's</i> expense. For the purposes of compliance the results generated from Parallel Measurements are evaluated only against South African statutory limits as detailed in clause Z15.1. Control measures conform to the requirements stipulated in the AAIA-approved asbestos work plan.
Z15.3	The <i>Employer</i> manages asbestos and ACM according to the Standard.
Z15.4	In the event that any asbestos is identified while Providing the Services, a risk assessment is conducted and if so required, with reference to possible exposure to an airborne concentration of above the AL for asbestos, immediate control measures are implemented and relevant air

monitoring conducted in order to declare the area safe.

- Z15.5 The *Contractor's* personnel are entitled to stop working and leave the contaminated area forthwith until such time that the area of concern is declared safe by either Compliance Monitoring or an AAIA approved control measure intervention, for example, per the emergency asbestos work plan, if applicable.
- Z15.6 The *Contractor* continues to Provide the Services, without additional control measures presented, on presentation of Safe Levels. The contractually agreed dates to Provide the Services, including the Completion Date, are adjusted accordingly. The contractually agreed dates are extended by the notification periods required by regulations 3 and 21 of the Asbestos Regulations, 2001.
- Z15.7 Any removal and disposal of asbestos, asbestos containing materials and waste, is done by a registered asbestos contractor, instructed by the *Employer* at the *Employer's* expense, and conducted in line with South African legislation.
- 

C1.2 Contract Data

Part two - Data provided by the *Contractor*

[Instructions to the contract compiler: (delete this notes before issue to tenderers with an enquiry)

Whenever a cell is shaded in the left hand column it denotes this data is optional. If not required select and delete the whole row, otherwise insert the required Data.]

Notes to a tendering contractor:

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

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

Clause	Statement	Data
10.1	The <i>Contractor</i> is (Name): Address Tel No. Fax No.	
11.2(8)	The <i>direct fee percentage</i> is The <i>subcontracted fee percentage</i> is	% %
11.2(18)	The <i>working areas</i> are the Site and	
24.1	The <i>Contractor's</i> key persons are: 1 Name: Job: Responsibilities: Qualifications: Experience: 2 Name: Job: Responsibilities: Qualifications: Experience:	

² Available from Engineering Contract Strategies Tel 011 803 3008, Fax 011 803 3009 or see www.ecs.co.za

		CV's (and further key persons data including CVs) are appended to Tender Schedule entitled _____.		
11.2(3)	The <i>completion date</i> for the whole of the works is			
11.2(14)	The following matters will be included in the Risk Register			
11.2(19)	The Works Information for the <i>Contractor's</i> design is in:			
31.1	The programme identified in the Contract Data is			
A	Priced contract with activity schedule			
11.2(20)	The <i>activity schedule</i> is in	(in figures) (in words), excluding VAT		
11.2(30)	The tendered total of the Prices is			
	Data for Schedules of Cost Components	<i>Note "SCC" means Schedule of Cost Components starting on page 60, and "SSCC" means Shorter Schedule of Cost Components starting on page 63 of ECC3 (April 2013).</i>		
A	Priced contract with activity schedule	Data for the Shorter Schedule of Cost Components		
41 in SSCC	The percentage for people overheads is:	%		
21 in SSCC	The published list of Equipment is the last edition of the list published by The percentage for adjustment for Equipment in the published list is	Minus %		
22 in SSCC	The rates of other Equipment are:	Equipment	Size or capacity	Rate
61 in SSCC	The hourly rates for Defined Cost of design outside the Working Areas are Note: Hourly rates are estimated 'cost to company of the employee' and not selling rates. Please insert another schedule if foreign resources may also be used	Category of employee		Hourly rate

62 in SSCC	The percentage for design overheads is	%
63 in SSCC	The categories of design employees whose travelling expenses to and from the Working Areas are included in Defined Cost are:	

C1.2 Contract Data

Part two - Data provided by the Contractor

[Instructions to the contract compiler: (delete this notes before issue to tenderers with an enquiry)

Whenever a cell is shaded in the left hand column it denotes this data is optional. If not required select and delete the whole row, otherwise insert the required Data.]

Notes to a tendering contractor:

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

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

Clause	Statement	Data
10.1	The <i>Contractor</i> is (Name): Address Tel No. Fax No.	
11.2(8)	The <i>direct fee percentage</i> is The <i>subcontracted fee percentage</i> is	% %
11.2(18)	The <i>working areas</i> are the Site and	
24.1	The <i>Contractor's</i> key persons are: 1 Name: Job: Responsibilities: Qualifications:	

³ Available from Engineering Contract Strategies Tel 011 803 3008, Fax 011 803 3009 or see www.ecs.co.za

C2 ECC3/A COVER

61 SSCC	in	The hourly rates for Defined Cost of design outside the Working Areas are Note: Hourly rates are estimated 'cost to company of the employee' and not selling rates. Please insert another schedule if foreign resources may also be used	Category of employee	Hourly rate
62 SSCC	in	The percentage for design overheads is	%	
63 SSCC	in	The categories of design employees whose travelling expenses to and from the Working Areas are included in Defined Cost are:		

PART 2: PRICING DATA
ECC3 Option A

Document reference	Title	No of pages
C2.1	Pricing assumptions: Option A	
C2.2	The <i>activity schedule</i>	

C2.1 Pricing assumptions: Option A

How work is priced and assessed for payment

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

Identified and defined terms	11	
	11.2	(20) The Activity Schedule is the <i>activity schedule</i> unless later changed in accordance with this contract.

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

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

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

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

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

Function of the Activity Schedule

Clause 54.1 in Option A states: "Information in the Activity Schedule is not Works Information or Site Information". This confirms that specifications and descriptions of the work or any constraints on how it is to be done are not included in the Activity Schedule but in the Works Information. This is further confirmed by Clause 20.1 which states, "The *Contractor* Provides the Works in accordance with the Works Information". Hence the *Contractor* does **not** Provide the Works in accordance with the Activity Schedule. The Activity Schedule is only a pricing document.

Link to the programme

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

Preparing the *activity schedule*

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

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

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

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

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

An activity schedule could have the following format:

C2.2 the *activity schedule*

Item No.	Description	Unit	Quantity	Rate	Amount
	SECTION 1				
	<u>PRELIMINARIES AND GENERAL</u>				
	-				
1	Establishment of Facilities on the Site	Once Off	1		
	De-establishment of Facilities on the Site	Once Off	1		
2	Safety File	Once Off	1		
3	PPE	Once Off	21		
4	Entry Medicals	Once per year	26		
5	Exit Medicals	Once per year	26		
6	Site Office Container (2 No for 12 months)	Per Month	12		
7	Site Storage Container (2 No for 12 months)	Per Month	12		
8	Travelling - LDV Van (1No for 12 months)	Per KM	45 360		
9	Transport - Kombi (1No for 12 months): 21 seater	Per Month	12		
10	Police / Security Clearance certification	Once per year	26		
	<u>DESIGN AND SITE CREW</u>				
	<u>DESIGN COSTS</u>				
	-				
11	Mechanical Engineer/Technologist (1-5 Years Experience) (1No) - HVAC Design	Hours	480,00		
12	Electrical Engineer/Technologist (1-5 Years Experience) (1No) - Electrical Design	Hours	480,00		
13	Civil/Structural Engineer/Technologist (1-5 Years Experience) (1No) - Civil Design	Hours	240,00		
14	Instrumentation (1-5 Years Experience) (1No) - Instrumentation Design	Hours	240,00		
15	Draughtsman (1No)	Hours	640,00		
	<u>SITE CREW COSTS</u>				
	-				
16	Site Manager (1-5 Years Experience) (1No)	Hours	1 952		
17	Safety Officer (1-5 Years Experience) (1No)	Hours	1 301		
18	Quality Controller (1-5 Years Experience) (1No)	Hours	1 301		
19	Planner (1-5 Years Experience) (1No)	Hours	416		
20	Supervisor - Mechanical (1-5 Years Experience) (1No)	Hours	1 139		

21	Supervisor - Electrical (1-5 Years Experience) (1No)	Hours	1 139		
22	Supervisor - Civil (1-5 Years Experience) (1No)	Hours	813		
23	Supervisor - Instrumentation (1-5 Years Experience) (1No)	Hours	651		
24	HVAC Technician (1-5 Years Experience) (1No)	Hours	1 139		
25	Instrumentation Technician (1-5 Years Experience) (1No)	Hours	1 139		
26	Electrician (1-5 Years Experience) (2No)	Hours	1 139		
27	Bricklayer (2No)	Hours	1 139		
28	Rigger (1No)	Hours	1 139		
29	Semi-Skilled (2No)	Hours	1 139		
30	General Worker (4No)	Hours	1 139		
31	KKS (Kraftwerk-Kenzeichnungs Systems) Coding Specialist: 3 or more years of experience (1No)	Hours	240		
TOTAL PRELIMINARIES AND GENERAL - CARRY FORWARD TO FINAL SUMMARY					
	SECTION 2				
	BUILDERS WORK				
	<u>DEMOLITIONS</u>				
	<u>Breaking up and removing</u>				
1	80mm Thick interlocking pavers with mortar joints on sand bedding and cart away to designated dumping area	m ²	225,20		
TOTAL DEMOLISH - CARRY FORWARD TO BUILDERS WORK SUMMARY					
	<u>ALTERATIONS</u>				
	<u>REMOVAL OF EXISTING WORK</u>				
	<u>Taking out and removing doors, windows, etc, including thresholds, sills, etc and including making good cement plaster on all sides and into reveals and brickwork on all sides and into reveals with steel trowelled finish (building up openings elsewhere)</u>				
1	Industrial louvre, size 3222 x 2750mm high overall from one brick wall	No	6		
	<u>Taking out/off and removing sundry metalwork</u>				

2	100m Push bar panic component (Code: PHA1/S) for single door with one point locking, Max. Door Width: 1230mm, the cross bar can be cut down to fit door	No	6		
3	Take out and remove steel grating, size 400 x 400mm	No	12		
	<u>Taking out and removing sanitary fittings, tanks, geysers, etc, including disconnecting from pipes, traps, etc and making good floor and wall finishes (making good tiling and paintwork elsewhere)</u>				
4	Decommissioning of the existing exhaust fan units, remove and store at allocated space and make good where required	No	12		
	BUILDING UP OPENINGS				
	<u>Face bricks are to be Terracotta Satin, 140mm wide pointed with recessed horizontal and recessed vertical joints.</u>				
5	One brick walls	m ²	53,13		
	<u>Galvanised hoop iron cramps, ties, etc</u>				
	-				
6	30 x 1,6mm Wall tie 400mm long with one end shot pinned to concrete and with ties bent out and built into brickwork	No	152		
7	4.6 x 350mm Steel tie with one end on steel column and other end built into brickwork	No	129		
	OPENINGS THROUGH EXISTING WALLS ETC				
	<u>Breaking out for and forming plain openings through brick walls, including making good facebrick on four sides and into reveals</u>				
8	Opening 1 550 x 650mm high through one brick wall	No	6		
	<u>Altering openings</u>				
9	Altering opening in one brick wall where ducting, size 1300 x 1150mm would be removed to form opening for new ducting, size 1 000 x 800mm high overall by building up brickwork on both sides, top and bottom, making good face brickwork on all sides.	No	12		
	<u>MECHANICAL CLEANING</u>				

	<u>Wash down with pressurised watering down and with approved chemical cleaning using approved mild, non-abrasive chemical material</u>				
10	Roller shutter door, opening size 3200 x 3500mm with a width of 230mm (to receive weather-stripping)	m	80,40		
TOTAL ELTERATIONS - CARRY FORWARD TO BUILDERS WORK SUMMARY					
	<u>EARTHWORKS</u>				
	EXCAVATIONS ETC				
	<u>Excavation in earth not exceeding 2m deep</u>				
1	Reduced levels under floors	m ³	101,34		
	<u>Extra over excavations in earth for excavation in</u>				
2	Soft rock	m ³	10,13		
3	Hard rock	m ³	5,07		
	<u>Extra over all excavations for carting away</u>				
4	Surplus material from excavations and/or stock piles on site, to a dumping site to be located by the employer	m ³	101,34		
	<u>FILLING ETC</u>				
	<u>Filling of gravel-soil material (G5) supplied by the contractor, compacted to 95% Mod AASHTO density</u>				
5	Under floors etc	m ³	101,34		
	<u>Compaction of ground surfaces</u>				
6	Compaction of natural or excavated ground surface under floors etc, including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 95% Mod AASHTO density	m ²	225,20		
	TESTS				
	<u>Prescribed tests to determine degree of compaction or other properties of ground or filling</u>				

7	Modified AASHTO Density test	No	11		
	WEED KILLERS, INSECTICIDES, ETC				
	<u>Soil insecticide in accordance with SANS 5859</u>				
8	Under floors etc, including forming and poisoning shallow furrows against foundation walls etc, filling in furrows and ramming	m ²	225,20		
TOTAL EARTHWORKS - CARRY FORWARD TO BUILDERS WORK SUMMARY					
	CONCRETE, FORMWORK AND REINFORCEMENT				
	<u>UNREINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES</u>				
	<u>10MPa/19mm concrete</u>				
1	50mm surface blinding under the slab	m ³	11,26		
	<u>REINFORCED CONCRETE CAST ON/IN FORMWORK</u>				
	-				
	<u>35MPa/19mm concrete</u>				
2	Slab	m ³	33,78		
3	Concrete plinth	m ³	1,69		
	<u>TEST CUBES</u>				
4	Making and testing 150 x 150 x 150mm concrete strength test cube (Provisional)	No	24,00		
	<u>CONCRETE SUNDRIES</u>				
	<u>Finishing top surfaces of concrete smooth with a steel trowel</u>	R0,00	0,00		
5	Slab and concrete plinth	m ²	0,00		
	<u>REINFORCEMENT (PROVISIONAL)</u>				
	<u>High tensile steel reinforcement to structural concrete work</u>				

6	12mm Diameter dowel bar 260mm long with one end embedded 110mm deep in side of concrete, greased and wrapped in silicon sealer. Ref: SANS 282:2004, Edition 5.1 - Shape code 51	No	42		
	<u>Fabric reinforcement</u>				
7	Type 311 fabric reinforcement, Size 2400mm x 600mm sheet in concrete plinth	No	1		
	<u>Smooth formwork to sides</u>				
8	Edges, risers, ends and reveals not exceeding 300mm high	m	193,13		
	<u>Boxing in smooth formwork to form</u>				
9	30 x 30mm Chamfers along top edges	m	51,90		
TOTAL CONCRETE, FORMWORK AND REINFORCEMENT - CARRY FORWARD TO BUILDERS WORK SUMMARY					
	<u>WATERPROOFING</u>				
	<u>WATERSTOPS, SEALING STRIPS, JOINT SEALANTS, ETC</u>				
	<u>8mm sealing compound including backing cord, bond breaker, primer, etc</u>				
1	Supply and install 8mm x 20mm soft rubber type foam strip for rattle and sound dampening as well as dust sealing. Self adhesive with peel off backing. Resistant to water, oil, petrol and most chemicals to roller shutter door size 3200 x 3500mm	m	80,40		
TOTAL WATERPROOFING - CARRY FORWARD TO BUILDERS WORK SUMMARY					
	<u>IRONMONGERY</u>				
	<u>HANDLES</u>				
	<u>Manufactured by "Dormakaba" or similar approved</u>				
1	100m Push bar panic component (Code: PHA1/S) for single door with one point locking, Max. Door Width: 1230mm, the cross bar can be cut down to fit door	No	6		
2	Anodised Aluminium tags	No	30	R	-
TOTAL IRONMONGERY - CARRY FORWARD TO BUILDERS WORK SUMMARY					

	<u>STRUCTURAL STEEL WORK</u>				
	<u>STEEL COLUMNS AND BEAMS</u>				
	<u>Galvanised welded Columns and Beams in single lengths with flat section base, top, bearer and connection plates bolted to concrete or brickwork:</u>				
1	PFC 180 x 70 in Beams. 4847mm length with material code of S355JR @ 21.1 kg/m. Mark no (T1)	Tons	1,23		
2	PFC 180 x 70 in Beams. 1970mm length with material code of S355JR @ 21.1kg/m. Mark No. (T2)	Tons	0,25		
3	PFC 100 x 50 in Beams. 1970mm length with material code of S355JR @ 10.7Kg/m. Mark No. (T3)	Tons	0,12		
4	70 x 70 x 6mm in Beams.1970mm length with material code of S355JR @ 6.38Kg/m. Mark No. (Br1)	Tons	0,23		
5	120 x 120 x 8mm angle iron in Columns, 2797mm length with material code of S355JR @ 14.7 kg/m. Ref (L1, L2, L3 & L4)	Tons	0,99		
6	120 x 120 x 8mm. 180mm length with material code of S355JR @ 14.7Kg/m. Mark No.(CL1)	Tons	0,06		
	<u>BOLTS, FASTENERS, ETC</u>				
7	120 x 120 x 8mm angle cleat fixed to PFC 180 x 70 beam with M12 x 40LG bolts	No	66		
8	250 x 250 x 12mm thick plate once holed four times for bolts and welded on columns	No	24		
9	M12 HD expansion bolt including nut and washer cast in exact position in top of concrete	No	96		
TOTAL STRUCTURAL STEEL WORK - CARRY FORWARD TO BUILDERS WORK SUMMARY					
	<u>METALWORK</u>				
	<u>GALVANISED STEEL FLOORS</u>				
	<u>Floor duct covers</u>				

1	600x410x4mm thick galvanised steel cover, with cubing of 460mm long, 20mm diameter rod of 720mm long including two L-Shaped angle size, 120x80x55mm	No	12		
TOTAL METAL WORK - CARRY FORWARD TO BUILDERS WORK SUMMARY					
	EXTERNAL WORKS				
	<u>EXCAVATIONS ETC</u>				
	<u>Excavation in earth not exceeding 2m deep:</u>				
1	Excavate for holes n/e 2m deep	m ³	18,52		
2	Risk of collapse not exceeding 1.5 m deep.	m ²	105,84		
	<u>Extra over all excavations for carting away</u>				
3	Surplus material from excavations and/or stock piles on site, to a dumping site to be located by the employer	m ³	18,52		
	<u>UNREINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES</u>				
	<u>25MPa/19mm concrete</u>				
	<u>All description for concrete in footings shall be deemed to include 4 x 8 Gauge Strand GMS Holding Down Wire Anchors secured to 4 x 100mm long M12 GMS eye bolt c/w 45mm diameter flat washer and nut cast into footings with the aid of 4 x M10 (hook and eye) turn buckle, all to the engineers approval.</u>				
4	Bases	m ³	18,52		
	<u>TEST CUBES</u>				
5	Making and testing 150 x 150 x 150mm concrete strength test cube (Provisional)	No	9		
	<u>STRUCTURAL STEEL WORK</u>				
	<u>BOLTS, FASTENERS, ETC</u>				
6	150 x 150 x 12mm thick plate once holed four times for bolts and welded on 76x76mm square tube post	No	12		

7	150 x 150 x 12mm thick plate once holed four times for bolts and welded on 100x76mm rectangular tubular post	No	6		
8	M12 HD expansion bolt including nut and washer cast in exact position in top of concrete	No	72		
	<u>FENCING</u>				
	<u>"ClearVu" galvanised and polymetic 6000 coated security fencing</u>				
9	Clearvu fence 76 x 50mm (High security) aperture at 2425mm high, option mesh panels with reinforcing rib "V" - section and galvanised with polymetic 6000 coating all as per manufacturers specification.	m	193,77		
10	2.4m Height 76 x 76mm Square Tube Post Polyester Powder Coated including plastic pole caps,12 polyester powder coated spider clamps per post,12 tek screws per post and tek adaptor or similar approved.	No	67,00		
11	ClamberPrufe or similar approved Swing Gate 1.8m x 2.4m Wide Polyester Powder Coated including 100 x 100 x 2400mm high hinge post	No	6,00		
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2	BILL No. 2: ALTERATIONS				
3	BILL No. 3 EARTHWORKS				
4	BILL No. 4 CONCRETE, FORMWORK AND REINFORCEMENT				
5	BILL No. 5 WATERPROOFING				
6	BILL No. 6 IRONMONGERY				
7	BILL No. 7 STRUCTURAL STEELWORK				
8	BILL No. 8 METALWORK				
9	BILL No. 9 EXTERNAL WORKS				

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C3.1: EMPLOYER'S WORKS INFORMATION

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1 Description of the works

1.1 Executive overview

The project scope of work focuses on the modification/upgrade of the existing infrastructure and the relevant engineering activities for the services required. The CEP VSD room modification project is limited to Unit 1 to 6 Condensate Extraction Pump (CEP) Variable Speed Drives (VSD) rooms.

The HVAC scope of *Works*, as detailed in this specification document, activity schedule and accompanying drawings; comprise of the engineering, the provision of all labour including materials and *Contractor's* equipment, manufacturing, supply, delivery, off-loading, hoisting, erection, testing, balancing and commissioning to serve, guarantee and maintenance after final completion of the air conditioning and ventilation installation.

The engineering, quality control, inspections, plant and material selection, preparation of installation drawings, testing, balancing, commissioning and preparation of operating and maintenance manuals, are to be managed and executed by the *Contractor* in a systematic manner as follows:

- a) Detailed Design.
- b) Plant and material selection.
- c) Installation drawings.
- d) Plant installation.
- e) Testing, balancing and commissioning Documentation.
- f) Quality control.
- g) Operating Instruction and Maintenance Manuals; and
- h) Inspection Record Cards/Checklists and final hand-over

The Works include the following:

- a) Each CEP VSD room is to be serviced by dedicated custom-built Direct Expansion (DX) industrial units and ducted air distribution system to control room temperatures to 25°C ($\pm$ 5°C).
- b) Associated Electrical *Works* for new HVAC system.
- c) Associated controls and accessories for new HVAC system.
- d) Associated Building, Civil and Structural *Works* for HVAC system.
- e) Decommissioning and removal of all old equipment to allocated space at Kusile Power Station and make good where required for complete HVAC *Works*.
- f) Re-testing, re-balancing and re-commissioning of the complete HVAC *Works*.
- g) Provision of painting and corrosion protection for complete HVAC *Works*
- h) Updating of the existing operation & maintenance manuals and provision of new where required
- i) Update the plant codification & labelling and provide new where required for the complete *Works*
- j) The Contractor makes provision for spares and maintenance support as per the requirements set out in this document.
- k) Quality assurance.
- l) The Contractor is to execute maintenance and maintenance management under the supervision of Employer for a period of 12 (twelve) months from the date of Taking over of the *Works*. The minimum intervals for the Contractor to be onsite for inspection and maintenance after taking-over of *Works* are to be 3, 6, 9 and 12 months respectively.

The construction of the *Works* will be undertaken while Kusile Power Station remains live during the complete duration of the execution of works. Hence, the installation of new *Works* is to be carried out in a systematic manner to ensure no loss of services in essential areas can be accommodated at any stage.

1.2 Employer's Design

Detailed design drawings of the site area are listed in APPENDIX A and shall be issued to the *Contractor* for the completion of the *Works*.

1.2 EMPLOYER'S OBJECTIVES AND PURPOSE OF THE WORKS

The HVAC system is to be upgraded and refurbished to satisfy (need in terms of the functions the system must perform) the following:

- The HVAC system is to be equipped with air-conditioning systems that will be able to control the ambient conditions according to 25°C ($\pm$ 5°C).
- The relative humidity is to be controlled at 75% max, with no condensation
- All rooms are to be maintained under a positive pressure, so as to minimise dust ingress (minimum positive pressure of 5Pa with all doors closed).

The purpose of the Works includes the following:

- To ensure that Power Station infrastructure function correctly and safely to comply with original design and statutory requirements/standards.
- Provide adequate cooling, ventilation to ensure long term integrity of all process control electronic equipment is maintained during its operation and maximizes plant efficiency.
- To provide & maintain good indoor air quality and dust control.
- To provide a safe environment for occupants and keep escape routes safe.
- To maintain internal temperatures to the limits as specified by mechanical ventilation and air conditioning.
- To prevent the build-up of fumes, odours and other gases during the operation and maintenance life of the building.
- To interface closely with the Fire Protection/Detection Systems to ensure integrity of fire compartments and fire zones.

1.3 ENGINEERING AND CONTRACTOR'S DESIGN

The complete HVAC system is to be designed in accordance with the requirements of Eskom Heating Ventilation and Air Conditioning (HVAC) Design Guideline (240-70164623) and Heating Ventilation and Air Conditioning System Design Work Instruction (240-143112846).

1.4 EMPLOYER'S FUNCTIONAL SPECIFICATION REQUIREMENTS

The design of the following related HVAC Works is to be provided as follows:

Description of work	Responsible Discipline				
	HVAC Works (Excluding Electrical, controls and Building related Works)	HVAC standalone equipment controls	Fire Detection Interface	HVAC Power Supply and distribution	Related Building Works
1. Functional Specification	Employer's HVAC discipline	Employer's HVAC discipline	Employer's C&I discipline	Employer's Electrical discipline	Employer's Civil/Structural discipline
2. Detailed Design	Contractor's HVAC discipline	Contractor's HVAC discipline	Contractor's Electronic/Fire discipline	Contractor's Electrical discipline	Contractor's Civil/Structural/Builder's discipline
3. Plant and material selection; installation and as built drawings;	Contractor's HVAC discipline	Contractor's HVAC discipline	Contractor's Electronic/Fire discipline	Contractor's Electrical discipline	Contractor's Civil/Builder's discipline

Description of work	Responsible Discipline				
	HVAC Works (Excluding Electrical, controls and Building related Works)	HVAC standalone equipment controls	Fire Detection Interface	HVAC Power Supply and distribution	Related Building Works
Testing, balancing and commissioning Documentation; Operating Instruction and Maintenance Manuals; and Inspection Record Cards/Checklists					

The details of the *Employer's* designs are provided under plant and material standards and workmanship section below.

The *Employer* provides the following interfaces:

- Existing HVAC system plant locations and new plant locations
- Existing HVAC electrical panels. New electrical termination points for new HVAC electrical panels.
- Existing and new ducting routes
- Existing fire detection panels

1.5 DESCRIPTION OF EXISTING HVAC SYSTEM

1.5.1 Existing Electrical Equipment Installed

The CEP VSD installed on each room is an ABB variable speed drive unit that is rated at 2500 kVA, with a typical efficiency of 97%. The anticipated heat loads to be generated by a 2500 kVA VSD is estimated to be 75 kW.

1.5.2 Existing Ventilation System

Each CEP VSD room is equipped with 4-off 25% rated ducted exhaust fans which are activated by a thermostat device to start the fans at 36°C & above and switch them off at 28°C & below. Filtered fresh air drawn into each room via wall mounted louvres that are equipped with primary filters.

The ventilation system is designed to maintain the indoor temperature within the specified areas below 40°C, however the system has not been able to control the room temperatures to the desired temperatures and has resulted to high temperatures when ambient exceed 35°C.

1.6 PARTS OF THE WORKS WHICH THE CONTRACTOR IS TO DESIGN

The CEP VSD room modification project is limited to Unit 1 to 6 Condensate Extraction Pump (CEP) Variable Speed Drives (VSD) rooms. The impacted systems/areas include the following, however not limited to:

- Heating, Ventilation and Air Conditioning system (HVAC) upgrade/modification.
- Electrical system modification.
- Building/Civil and Structural infrastructure modification.

d) C&I system modification.

The plant and material are to be designed and selected with due regard to the installation site conditions, particularly with respect to altitude, ambient temperatures, and atmospheric conditions. The plant and material are to be selected to operate within the limits recommended by the manufacturers and where equipment will be required to operate at conditions deviating from the manufacturer's standard selection tables; re-rating is to be done strictly in accordance with the manufacturer's selection procedures.

The contractor's design is to comprise detailed design package (detailing the selection of the equipment) which will be reviewed and approved in accordance with Employer's design review procedure 240-53113685. The *Contractor's* designer is to issue Professional Engineering Certificate (PEC) in terms of the Construction Regulations, Occupational Health and Safety Act, 1993 for the complete HVAC *Works*, stating that the installation has been carried out in accordance with applicable standards.

The design data specified in this specification and those dimensions shown on the tender drawings are intended for tendering purposes only. The *Contractor* is required to take the actual measurements onsite before proceeding with design & manufacture of the complete *Works* as dimension accuracy remains the responsibility of the *Contractor*.

The *Contractor* is to design, produce required drawings and select plant & material which satisfies:

- a) The overall plant performance and efficiency specification.
- b) The specified reliability; and keep maintenance costs to a minimum.
- c) Local and statutory authorities and construction requirements.
- d) Space constraints; and
- e) Local content

Contractor produces self-explanatory operating and maintenance manuals suitable for staff training. The Operating and maintenance manuals are to include the following however not limited to:

- a) Description of the complete HVAC system
- b) Operating, control and maintenance philosophies
- c) As Built drawings & Commissioning Results

The *Contractor* is to execute the following:

- a) Detailed design
- b) Plant and material acceptance testing
- c) Testing and commissioning
- d) Training of operators
- e) Training of maintenance personal
- f) Training of engineering personal
- g) Troubleshooting
- h) Implementation of an overall quality assurance plan

The *Contractor* is responsible for the detailed design of the *Works* below and that such designs are submitted to the *Employer* for approval prior to procurement and manufacture of any plant and material.

The complete HVAC design is to be flexible to future growth and allow modular growth. 10% future growth has been built into the heat loads and selection of the equipment.

The complete HVAC system is to be designed and configured to allow ease of access for service and maintenance. Sufficient access space has to be allowed for, between the HVAC equipment for operation and maintenance purposes.

1.6.1 Investigation, Survey and Site Clearance

The design data specified in this specification and those dimensions shown on the tender drawings are intended for tendering purposes only. The *Contractor* is required to take the actual measurements onsite

before proceeding with design & manufacture of the *Works* as dimension accuracy remains the responsibility of the *Contractor*.

1.6.2 Outdoor Design Conditions

The outdoor design conditions for HVAC are based on the Weather Bureau data. The mean maximum temperature (DB) for summer and mean minimum temperature for winter is taken as a design condition. The Weather Bureau does not list temperature and associated relative humidity (RH) as one set of data. The Kusile Power Station in the Mpumalanga climate conditions are as follows:

- a) Summer: Ambient Temperature = 33°C DB 20°C WB.
- b) Winter: Ambient Temperature = 0°C DB -2°C WB.
- c) Site elevation: 1545 m above sea level.

1.6.3 Indoor Design Conditions

The HVAC system is to maintain indoor conditions as detailed by the table below 24hours, 7 days a week, and 365 days per year.

Table 1: Indoor conditions

Description	Indoor Temperatures	Relative Humidity	Pressurisation Requirements
1. Variable Speed Drives (VSDs)/Variable Frequency Drives (VFDs)	25°C ± 5°C	75% max, no condensation	Positive pressure (minimum positive pressure of 5Pa with all doors closed)

1.6.4 HVAC System Design Requirements

The *Contractor's* HVAC discipline is responsible for the detailed design; plant and material selection; installation and as built drawings; testing, and commissioning documentation; operating instruction and maintenance manuals of the complete HVAC Works.

The *Contractor* is to submit the detail design for the HVAC scope for acceptance. Employer's HVAC department to review the designs submitted by the *Contractor* and sign it off for acceptance.

The complete HVAC performance figures obtained during testing and commissioning must be within a range of ±5% of the specified figures given during *Contractor* design, plant and material selection phase.

The *Contractor* is to issue HVAC Certificates of Compliance (COCs).

The system is to consist of DX industrial air conditioning units that are to service the various areas. The system configuration is envisaged to be as follows:

Table 2: Direct Expansion (DX) Industrial Units Configuration

HVAC System component	Running Units Only	Running + Standby Units
1. Air Cooled Condensers		✓
2. AHU's equipped with pressurisation		✓
3. Ducted distribution system	✓	
4. Controls		✓
5. Power supply (Essential and Normal Supply)		✓

1.6.4.1 Proposed HVAC System description is as follows:

- a) **Air Cooled Condensers:** Heat rejection (condensing) will be accomplished by dedicated air-cooled condensers that shall service the AHUs through refrigerant pipework.
Design: Air Cooled Condenser configuration is designed as running + standby system. The system however has a single point of failure in terms of refrigerant pipework.
- b) **Air handling units with pressurisation:** The room is to be served by a ducted AHUs to provide the required cooling in each substation.
Design: AHU units are designed as running + standby system.
- c) **Ducted distribution system:** All substations are to be served by externally insulated supply air ductwork complete with air terminals and fire dampers where required.
Design: The complete ductwork is designed as running service.
- d) **Power supplies:** The complete HVAC system is to be provided with 1 x power distribution board/switchgear panel fed by 1 x set of power cables (single feed). The power distribution board/switchgear panel is to be serviced by essential and normal power supplies with source selected upstream at the mains power supply.
Design: Power distribution board and power supplies are designed running + standby system.
- e) **Controls:** Purpose made central control or monitoring system will be installed in the building. Each air-cooled condenser and AHU can also be manually overridden if a controller fails. Independent controls provide a better reliability, and by default do not have a single point of failure.
Design: Controls are designed as running + standby system.

The 2-off exhaust fans located on the northern side of the room are to be replaced with 2-off custom built DX industrial air conditioning units (duty & standby) on each CEP VSD Room. The other 2-off exhaust fans are to be retained and be utilised for smoke extraction purposes. The fresh air intake louvres are to be removed and bricked-up, section of the opening to be used for ducted return purposes back to the new air conditioning units.

Each custom-built DX industrial air conditioning unit is to be equipped with post evaporator primary washable and secondary bag filters; as well as pre condenser section primary washable filters.

The main HVAC equipment details for each CEP VSD Room have been selected as follows:

Table 3: Ducted Type Direct Expansion (DX) Built-up Units

Area	Unit Nominal Cooling Capacity each (kW)	Number Required (duty & standby)	Power Source (50Hz)	Estimated Weight of equipment (kg)
1. Unit 1 CEP VSD Room	105	2	380V/3ph/60kW (each)	1500
2. Unit 2 CEP VSD Room	105	2	380V/3ph/60kW (each)	1500
3. Unit 3 CEP VSD Room	105	2	380V/3ph/60kW (each)	1500
4. Unit 4 CEP VSD Room	105	2	380V/3ph/60kW (each)	1500
5. Unit 5 CEP VSD Room	105	2	380V/3ph/60kW (each)	1500
6. Unit 6 CEP VSD Room	105	2	380V/3ph/60kW (each)	1500

1.6.4.2 DX System Cooling Plant

Each CEP VSD room is to be equipped with running and standby DX ducted type Air Handling Units (AHUs) together with matching air-cooled outdoor units. The HVAC equipment is to be configured to operate on running and standby mode for redundancy, including automatic change over between the units in case of failure of any one unit and at pre-set intervals to allow equal running time between the units.

The units are to have a cooling only mode of operation and are to provide cooling 24 hours a day, seven day a week throughout the year.

Each Air Handling Unit (AHU) is to comprise of the following:

- a) Fresh air and return air dampers
- b) Axial return air fan
- c) Mixing plenum
- d) Washable primary air filters
- e) Disposable secondary (bag type) air filters (to 85% Dust Spot Efficiency - EU7)
- f) Differential pressure gauges for filtration System
- g) Belt driven centrifugal supply air fan.
- h) Sound attenuators (external to AHU's)
- i) Externally insulated supply air ducting
- j) Drainpipe to a suitable drain point

The condenser section is to be equipped with direct driven centrifugal condenser fans to enable heat rejection exhaust to outside the HVAC plant rooms. The refrigerant circuit is to be equipped with compressors, high and pressure switch, access valves, 4-way valves, filter drier, electronic expansion valve, strainer, accumulator, solenoid valve, bypass capillary tube, evaporator and condenser coils, check vales, compensator and capillary tube.

1.6.4.3 DX System Fresh Air and Air Distribution Ducting Network

Filtered and conditioned air is to be supplied from the AHUs to the different spaces via externally insulated ducting and matching air terminals. The air is to be returned to the unit via return air ductwork.

Fresh air is to be provided to various rooms via the fresh air intake of the custom-built DX unit, supplying 10% fresh air to the return air side. The custom-built DX unit fresh air intake side is to be equipped unit and be fitted with washable primary air filters and disposable secondary (bag type) air filters (to 85% Dust Spot Efficiency - EU7).

1.6.4.4 Extraction Ventilation System

2-off existing ducted exhaust fans are to be retained and be utilised for smoke extraction purposes. In the event of a fire break out, the fire detection system is to send a signal to the HVAC system controllers to indicate that there is a fire in a specific zone; the HVAC controllers are to automatically stop the HVAC system supply serving the respective areas; and start the smoke extraction fans to exhaust the smoke out.

1.6.4.5 HVAC system controls

The HVAC equipment in each CEP VSD room is to be configured to operate on running and standby mode for redundancy including automatic change over between the units in case of failure of any one unit and at pre-set intervals to allow equal running time between the units. The provision of standby units will allow hot maintenance to be carried out on the main plant whenever required and manual override switch will also be installed to have any HVAC equipment switched on/off by maintenance when required.

The 2-off DX industrial air conditioning units in each room is to be programmed to provide cooling when the CEP VSD room temperatures rise above 25°C and cool down the room until a room set point of 22°C & below is reached. The two units in each room is to be linked to a common controller and are to be further programmed such that should the switchgear room temperatures rise above 28°C or should a fault occur on the running unit, the controller will automatically start the standby unit.

The complete HVAC system is to be interfaced to the fire detection system. In the event of a fire break out, the fire detection system is to send a signal to the HVAC system controllers to indicate that there is a fire in a specific zone; the HVAC controllers are to automatically stop the HVAC system supply serving the respective areas; and start the smoke extraction fans to exhaust the smoke out. The HVAC system is to automatically return to normal operation once the fire alarm signal to the ventilation system switchboard is cleared.

The control system will be able to generate alarms that will be routed to future Central Building Management System (CBMS) for monitoring purposes.

1.6.5 Electrical System Design Requirements

The *Contractor* is to specify the power requirements for the HVAC to provided and installed. The load schedule template (240-56227927) provided is to be utilized to specify the power requirement.

The *Contractor* is to size, supply, pull, terminate and safety clear the cables from source to destination (primary cabling). Furthermore, verify the adequacy of the supply switchgear as per the drawings issued by *Employer*.

The *Contractor* is to design, supply, pull and terminate any secondary cabling, that is all interfacing cabling between the *Contractor's* provided equipment.

The *Contractor* is to be responsible for any additional primary racking as well as all the secondary racking associated with the *Works*. The *Contractor* is to comply with the Eskom Cabling and Racking Standard 240-56227443. for all *Works* associated with cabling and racking.

The *Contractor* is to be responsible for all connections to the earth mat. The connection points to the earth mat shall be advised by the *Employer*. The *Contractor* is to comply with Eskom Earthing and Lightning Standard 240-56356396 for all *Works* associated with earthing. The *Contractor* is to supply all consumable materials associated with the electrical *Works*, including all the cabling, and earthing material.

The *Contractor* is to design, supply, install and safety clear any required secondary LV switchgear and control gear. Supply to the HVAC Units is to be redundant (running and standby).

The *Works* are to fully comply to Eskom standard specification 240-56227516 (LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and Including 1000V AC and 1500V), SANS 10142-1 (The wiring of premises Part 1: Low-voltage installations) and IEC 60947-4-1 — Low voltage switchgear and control gear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters.

The *Contractor* is to issue electrical Certificates of Compliance (COCs).

The available boards to supply the new HVAC system are the unitised CPP Board 1 and the unitised Air Conditioning Board. The 400V CPP Board 1 is fed from the 400V Unit Turbine Board 1, and the Air Conditioning Board is fed from the 15kV Unit Board 1 via 15/0.4kV, 2 MVA transformer. See drawing number 0.90/13, sheet 7, rev 1: Unit 1 MV and LV Single Line Diagram. Both electrical board panels from the CPP and Aircon Board are to supply both HVAC DX Units simultaneously.

The currently used power supplies for two of the CEP rooms northern side fans are to be decommissioned and kept as spares whilst the two southern side fans are to be kept operational for smoke extraction purposes as detailed by HVAC system design section above.

The new CEP VSD Room HVAC electrical panel in each area is to feed power to each Direct Expansion (DX) HVAC Units supplies via two cables. The electrical panel is to be fed from the 400V CPP Board and to the 400V Air Conditioning using cables capable of supplying the power requirements for one Direct Expansion HVAC Units at a time as well as the control requirements as indicated by typical figure below.

1.7 HVAC PLANT AND MATERIAL SELECTION

The complete HVAC system is to be procured, manufactured, supplied, delivered, installed, commissioned, and tested in accordance with the requirements of Eskom General Technical Specification for HVAC Systems (240-102547991).

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

The procedure for submission and acceptance of *Contractor's* Design is detailed under section 7.5 of the specification.

The following documents are supplied to the *Employer* by the *Contractor* as a minimum.

- a) Detailed design report, including detailed calculations such as hydraulic and pipe stress analysis (where required), pipe supports, plinths, handers and racks.
- b) Documents including equipment data sheets and specification for selected equipment, electrical cabling and other associated equipment.
- c) Dimensioned shop drawings showing the general arrangement of all plant and equipment including isometrics and P&ID's or PFD's where required. Sufficient views must be given to ensure clarity and the drawings are to have at least a plan and two different elevations or sections giving overall dimensions.
- d) Dimensioned shop drawings showing proposed method of fixing of all the plant and equipment
- e) Detailed electrical wiring diagrams including schematic and control circuits.
- f) Detailed sequencing manner for installation procedure of *Works*
- g) Detailed programme for the *Works* in sufficient detail as to represent the units of work to enable the representative to assess the progress of the *Works*
- h) Technical specification and literature for all items of equipment that forms part of the complete installation
- i) Proposed corrosion protection systems, including data sheets for coating proposed of equipment
- j) List of recommended spares and technical specifications for the spares, part numbers and the stock levels required
- k) Detailed building *Works* for complete *Works* including detailed design calculations and construction drawings. All building works calculations and analysis models to be submitted in native format as well as in doc/pdf format as part of the detailed design report.
- l) Detailed maintenance, reliability, control and operating philosophies
- m) Testing, balancing and commissioning procedures
- n) Plant and material acceptance testing
- o) Detailed operation & maintenance manuals with As-Built drawings & Commissioning Results
- p) Plant codification lists for each section of the *Works*
- q) Construction competition reviews
- r) Acceptance testing reviews
- s) Quality assurance reports
- t) Close out reports

1.8 OTHER REQUIREMENTS OF THE *CONTRACTOR'S* DESIGN

The *Contractor* is to comply with all legislated safety requirements as well as *Employer's* health and safety standards.

The decommissioning, removal of all redundant equipment and making good where required is to include the following, however not limited to:

- a) The *Contractor* is responsible for decommissioning, dismantling, removal, lifting, transport and storing (including making good thereof) of existing redundant or retired equipment to the allocated space provided by the *Employer*.
- b) The scrapping of the existing equipment to the nearest scrap-yard outside of Kusile Power Station will be the responsibility of the *Employer*. The responsibility of the *Contractor* is the removal of existing equipment, storing it and making good thereof.

The term “making good” refers to the following, however not limited to:

- a) All areas where old plant or material is removed on the plant are made neat by means of closing of holes, grinding of old anchor points and welding, repainting and resurfacing.
- b) The interface point between the new system and existing plant or material is made neat and functional to prevent weak points in the final delivered product e.g. the fixing of brackets and supports of interface boxes, covers, locking nuts etc.

The *Contractor* provides all scaffolding, crane, transport, etc necessary for decommissioning, dismantling, removal, lifting, transport and storing of existing redundant or retired equipment to the allocated space provided by the Employer; and scraping thereof.

The *Contractor* provides dust sheets and everything necessary for clearing and removal of all rubble due to the work, for the protection of the work from damage due to the operations. Contractor is to take adequate precautions to the satisfaction of the Employer to prevent damage to existing apparatus during erection operations.

The retired HVAC equipment is to be decommissioned and dismantled according to the manufactures' instructions and the relevant codes & standards. The retired HVAC equipment containing a refrigerant is to be pumped down of both refrigerant & oil and should be labelled as containing no refrigerant as soon as it's been decommissioned, dismantled and stored away.

Items to be removed are marked clearly before decommissioning start in order to avoid the removal of incorrect plant or material.

All existing plant that is removed is deemed re-usable and remains the property of the *Employer*.

Decommissioning and dismantling of retired HVAC equipment that maybe required for future use should include the following however not limited to:

- a) Disconnection of power supply and making safe thereof.
- b) Safe dismantling of the existing machines and the safe removal from site to the allocated storage area provided by *Employer*.

1.9 DESIGN OF EQUIPMENT

The minimum general HVAC equipment design criterion that is to be met is as follows:

- a) The equipment is to be designed to facilitate efficient manufacture, inspection, transportation, installation, maintenance, cleaning and repairs.
- b) The equipment is to be designed to ensure safe and satisfactory operation for at least 15 years for DX Systems; under the conditions prevailing at Kusile Power Station, in Mpumalanga.
- c) The equipment is to be designed to prevent undue stresses being produced by expansion and contraction due to temperature change and other local natural and manmade conditions.
- d) The equipment is to be designed to keep maintenance costs to a minimum.
- e) The equipment is to be designed to comply with all the legal requirements in respect of safety and the prevention of environmental pollution.
- f) The equipment is to be designed to satisfy any specific requirements contained in the relevant statutory codes and standards.
- g) The equipment is to be designed for operation of 365 day per annum, 24hrs per day.
- h) The equipment is to be designed such that all material from which the equipment is manufactured from is compatible with the intended duty and service conditions. All equipment is suitable treated and protected from corrosion.
- i) After the design freeze, the information stated in the data sheets is to be fully complied with through the installation, unless otherwise agreed upon by both *Eskom* & *Contractor* in writing.

1.10 EQUIPMENT REQUIRED TO BE INCLUDED IN THE WORKS

The *Contractor* is required to provide lifting facilities and other equipment required for the execution of the complete *Works*.

1.11 AS-BUILT DRAWINGS, OPERATING MANUALS AND MAINTENANCE SCHEDULES

The importance of managing the "as-built", "operate-to" and the "maintain-to" operation and maintenance manuals including maintenance schedules for each piece of equipment is critical to the life of the plant. The operating & maintenance manuals are to be detailed enough to operate, maintain, dismantle, reassemble, adjust and repair plant & equipment.

1.11.1 As-built Drawings

The *Contractor* is to provide "As Built" drawings based on the shop drawings embodying all modifications made during construction. The "As Built" drawings are to include general arrangement and sections of all plant and equipment including isometrics and P&ID's or PFD's. Safety, instrumentation, control and operation drawings are to also be included "As Built" drawings indicating the intended functioning, capacity data and control functioning of all Systems.

The As Built drawing is to indicate all relevant plant coding and labelling. The determination of these codes and labels are to be done in accordance with the documents listed in this Technical Specification.

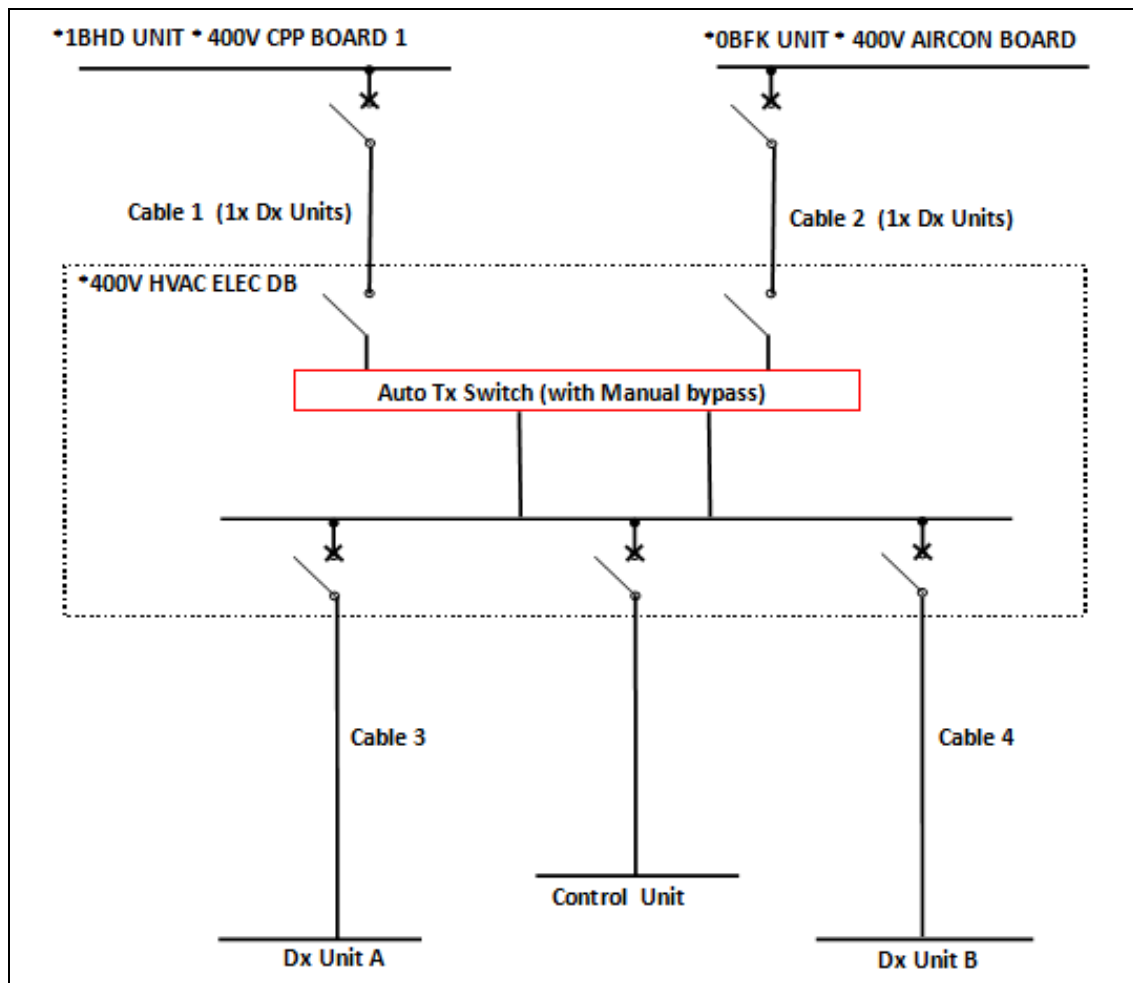
Two hard copies and one soft copy (submitted in native format DGN) of "As Built" drawings are to be submitted to the Employer for approval.

1.11.2 Operating Manuals and Maintenance schedules

The Operating & Maintenance Manual must describe how the facility is to be operated and by whom, as well as the desired level of training and orientation required for the building occupants.

The operation and maintenance manuals are to consist of the following as the minimum:

- a) List of Contents (Index)
- b) Introduction
- c) General description of the functions of each of the Systems including detailed description of each element of each System, how it functions, how it operates and how to maintain it and what attic stock or tools to carry.
- d) Full as-built drawings and detailed drawings, brochures and catalogues for each System and each element of each System.
- e) The format of the O&M documentation is to be A4 and is to be a specially bound document with hard cover and with metal ring binding. (All drawings folded into A4 format.)
- f) The names, addresses and telephone/fax numbers/email addresses of all responsible persons and manufacturers/suppliers are to be listed in the O&M document.
- g) A full list with reference numbers are to be included to enable the *Employers* O&M staff to order materials and equipment.
- h) Colour diagrams are to be provided to illustrate the operation and function of each System with reference to the relevant as-built drawings or brochures of equipment. These diagrammatic drawings are to also indicate the locations of valves with their numbers.



1.6.6 Control and Instrumentation Design Requirements

The new HVAC system is to be interfaced to the fire detection system. In the event of a fire break out, the fire detection system is to send a signal to the HVAC controllers to indicate that there is a fire in a specific zone; the HVAC controllers are to automatically stop the HVAC system serving the respective areas and close all fire dampers to that specific area. After the fire has been extinguished, smoke evacuates by a manually operated switch in a break glass box positioned on each zone which re-opens fire dampers, re-starts extraction fans and over-ride damper control, closing return air dampers and opening exhaust dampers in the air conditioning plant rooms. The HVAC system is to automatically return to normal operation once the fire alarm signal to the air conditioning switchboard is cleared.

The interface between the fire detection and HVAC systems is to be implemented at the controller level between the Fire Detection Control Panel (FDCP) and the HVAC Controllers. The HVAC controller interface with the fire system is to be via potential free normally closed contacts, receiving signal from fire panels via hard wired links. The HVAC control system should have capability to communicate with the standard HVAC equipment supplied, so that the sub-system can be tested, logged, stopped, started, load-shed, reset temperature and commanded at the central operator's terminal and locally, so as to manage the relevant sub-systems in terms of operation, energy and maintenance.

The HVAC controllers and associated instruments, if not contained within temperature and humidity-controlled environments, will be suitable for the environmental conditions prevailing at Kusile Power Station, without any negative impact on the performance, reliability, availability or life expectancy of the equipment. All equipment will also be provided with the appropriate level of ingress protection for the environment in which they are installed.

The HVAC controller is to be able to provide the following status, measurements, and control locally and from the CBMS system:

- Power supply status and measurements and alarming

- Fire damper test control
- Fire damper position
- HVAC system mode status and control
- Air flow monitoring
- Room temperature measurement and alarming
- Room humidity measurement and alarming
- Room pressure measurement and alarming
- Air filter differential pressure measurement and alarming

The HVAC controller is to be ready to transfer status and measurement data to CBMS and DCS systems interfaces. The controller is to be configurable from a personal computer interface for potential future expansions or control philosophy changes. All process information operator actions and alarms are to be archived in the HVAC historian. All interfaces to fire detection and CBMS are on existing interfaces of the Kusile Power station fire detection and CBMS systems.

The *Contractor* is to be responsible to interface the HVAC Controllers to the CBMS which is supplied by others. The *Contractor* is to use approved P&ID and AFS drawings to complete 5 x C&I schedules per building as follows:

- a) Alarm list
- b) Cable schedules
- c) Driver and actuator schedule
- d) Virtual signal list
- e) Instrument schedule

All HVAC Controller related documents, drawings and schedules are required to be fully KKS coded to Level 3. This 3rd level coding of the HVAC Controller is required to complete the 5 x C&I schedules noted above. *Contractor* to ensure that the Single Line Diagrams (SLD's) are updated to reflect the as-built panels in accordance with the specification before being sent to *Employer's* Configuration for KKS coding. Once documents are approved it is the *Contractor's* responsibility to physically label (KKS code) the HVAC Controller internal components.

The *Contractor* is to apply for *Employer* to inspect and sign off all labelling. The completed 5 x C&I schedules per building must be submitted to *Employer's* Configuration Team for KKS coding of the soft signals and alarms.

1.6.6.1 Alarm Schedule

Alarm rationalisation will be the combined responsibility of *Eskom* Engineering and the *Contractor's* designer. The *Contractor's* designer will review the Alarm and Virtual Signal Schedule submissions primarily for completeness of alarms, alarm priorities and rationalisation.

1.6.6.2 Cable Schedule

Cables are all must be coded as cable schedules contains connection details.

1.6.6.3 Driver and Actuator Schedule

Driver and actuator schedules are to include the following, however not limited to:

- a) Fan motors
- b) Actuated Dampers

1.6.6.4 Virtual Signal List

All monitoring and control signals must be listed.

1.6.6.5 Instrument Schedule

All instruments on AFS and P&IDs are to be listed.

1.6.7 Civil, Structural and Building Works Design Requirements

The *Works* include the design, supply and construction of all Building, Civil and Structural scope described in this specification. The Building, Civil and Structural related scope is detailed below:

- a) Design and install a single tier High Security Mesh Fence around the perimeter of the DX plant yards. The fence panels are to be at least 3000mm wide and 2400mm high (above ground level), with 4mm diameter high tensile wires and aperture size, 76.2mm x 12.7mm (centres). The fence posts are to be supported on reinforced concrete footings. A manual lockable swing access gate is to be provided at the entry point to the plant. The gate is to have aperture size: 76.2mm x 12.7mm (centres).
- b) Design and construct support plinths for the DX industrial air conditioning units.
- c) Provide 2-off supply (1000 x 800mm) and 1-off return (600x1200mm) air openings for each area on CEP room walls at all units to accommodate HVAC ducting.
- d) 1-off 600x1200 mm opening is to be provided in each area on the wall separating the CEP and VSD area for pressure relief purposes.
- e) Modify two installed single push bar doors to auto-close to maintain positive pressure within the room areas. Seal around roller shutter door.
- f) Remove installed fresh air grille/steel louver and seal wall openings at each of the room areas.
- g) Seal the CEP VSD room in order to prevent dust ingress and air losses (to preserve positive pressure within the room), this includes but not limited to the access doors, piping and ducting entry points and drain points within the VSD room.
- h) Issue a Professional Engineering Certificate (PEC) in terms of the Construction Regulations, 2014, Occupational Health and Safety Act, 1993, for the completed Works.

PROCUREMENT

1.1 PLANT AND MATERIAL

1.1.1 Quality

The *Contractor* is not use Plant or Materials which are generally recognised as being unsuitable or otherwise to be avoided for the purpose for which they are intended.

Only components of high reliability are to be utilised, with a proven operating history, to enable the Plant to achieve required reliability and availability. Plant and Material design, engineering and manufacture to accord with the best modern practice applicable to high-grade products of the type to be furnished, so as to ensure the efficiency and reliability of the *Works* and the strength and suitability of the various parts for the *Works*.

Plant and Materials withstands ambient conditions and the variations of temperature arising under working conditions without distortion, deterioration or undue strains in any part.

All parts are made accurately, and where practicable, to standard gauges so as to facilitate replacement and repairs. Like parts are interchangeable.

No repair of defective Plant and/or Materials are to be permitted without the *Employer's* approval and any such repair, if approved, are to be carried out to the satisfaction of the *Employer*.

The *Employer* is free to specify hold and witness points during the installation and on-site testing stages of the project. The *Contractor* issues preliminary notification of such hold and witness points as per agreed schedule to the *Employer* and confirms such hold and witness points at least seven working days prior to the activity.

Typical hold points are listed below:

- a) Design Review
- b) Factory Acceptance Test

- c) Delivery to Site
- d) Erection
- e) Site Acceptance Test
- f) All manuals and drawings (in the specified format)
- g) Commissioning

In addition to maintaining appropriate inspection and test records to substantiate conformance to requirements, the following records are safely stored for a minimum period of seven (7) years following the final completion of the *Works*:

- a) Construction, layout and component approvals
- b) Type and routine test certificates
- c) Construction drawings and approvals

After this period, the *Contractor* offers these records to the *Employer* (in writing) and obtains a disposal instruction.

Documentation regarding quality procedures is submitted as per agreed schedule after Contract Award. The *Employer* is review and comment on the acceptability of these documents in a time frame as per the requirements of the contract for contractual correspondence. If controlled copies of these documents have been submitted to the *Employer*, then the controlled copy numbers may be quoted in the submission.

1.1.2 Plant & Materials Provided “free issue” by the *Employer*

None.

1.1.3 *Contractor's* Procurement of Plant and Materials

The *Contractor* is to take all necessary steps to ensure that all Plants and Materials are adequately protected against damage during shipping, transport and storage.

1.1.4 Spares and Consumables

The *Contractor* provides as part of the operating & maintenance manual, a recommended parts list as well as a proposal for the execution thereof:

- a) The *Employer* is responsible for procurement of recommended spares.
- b) The *Contractor* is responsible for ensuring that consignment spares are available in time of need.

Each recommended spare part is to be uniquely identified with a part number, which can be cross referenced to a part list and associated drawing. The *Employer* prefers that support from the Original Equipment Manufacturer (OEM) is available locally in South Africa.

1.2 TESTS AND INSPECTION BEFORE DELIVERY

The *Employer* carries out quality inspections at own discretion. The *Employer* is to inspect and approve stages of manufacture of all equipment necessary to ensure the correct quality of equipment as prescribed in the approved project quality plan.

All inspections and testing to be performed in accordance with the Quality Control Procedure (QCP) developed by the *Contractor* after approval by the *Employer*.

The *Contractor* is to provide facilities for inspection of all items of equipment at the place of the manufacture and this requirement is to be extended to all *Sub-contractors* and suppliers. All material labour or assistance, tools, gauges, articles or apparatus that the *Employer* may require for the purpose of testing, gauging and inspection, are to be provided by the *Contractor*. The *Contractor* is to provide all such facilities for testing and the contract price is to include for this.

The *Employer* reserves the right to reject items that do not conform to the *Employer's* requirements. When the plant has passed the test referred to in this specification, the *Employer* is to furnish to the *Contractor* a certificate or endorse the *Contractor's* test certificate to that effect. Examination by the *Employer* is not to

relieve the *Contractor* from the responsibility of carrying out all tests which may be necessary to ensure the required standard of manufacture or from any obligations in terms of the contract.

The achievement of adequate standards during the tests at the place of manufacture, if performed, is only the first requirement. The final criterion is the performance onsite, and any of the requirements which prove defective due to bad workmanship or material are to be replaced forthwith by the *Contractor* at his/her own cost on the instruction of the *Employer*.

The following tests are conducted by the *Contractor* and are to be witnessed by the *Employer* at the manufacturer's *Works* or *Contractor's* premises as a minimum requirement:

- a) Visual inspection of the equipment.
- b) Review of the certification requirements.
- c) Functional tests of the systems and controls including starting & stopping procedures.
- d) Inspection of paint work and corrosion protection.
- e) Verification that all components are delivered to the *Contractor's* premises.
- f) Verification that all power plugs is correct.
- g) Verification that components installed is correct.
- h) Verification that all labels are correct.
- i) Phase rotation.

1.3 MARKING PLANT AND MATERIAL OUTSIDE THE WORKING AREAS

All Plant and Material paid for by the *Employer* must be clearly labelled as being the *Employer's* property.

1.4 CONTRACTOR'S EQUIPMENT (INCLUDING TEMPORARY WORKS)

The *Contractor* provides the following in order to complete the *Works*:

- a) All scaffolding required.
- b) Any equipment necessary to complete the *Works*.
- c) Lifting facilities.

The *Contractor* supplies, installs, maintains and removes all temporary construction facilities and utilities necessary to provide the *Works*.

CONSTRUCTION

CONSTRUCTION OF HVAC WORKS

The construction of the new HVAC system is to be undertaken while Kusile Power Station remains live during the complete duration of the execution of works. Hence, the installation of new HVAC system is to be carried out in a systematically manner to ensure no loss of ventilation in essential areas can be accommodated at any stage.

COMPLETION, TESTING, COMMISSIONING AND CORRECTION OF FAULTS

Work to be done by the Completion Date

The contract is deemed to be complete when the following have been completed in accordance with the relevant specifications:

- a) The Plant is erected, and commissioned
- b) Signed erection and safety clearance certificates.
- c) The final as built drawings have been submitted.

- d) All documentation has been submitted including testing reports and the associated certificates received. All Quality Control Plan (QCP) documentation received. Final draft of the technical, operating, maintenance manuals delivered.
- e) The plant and all documentation, drawings are coded and labelled.
- f) All special tools have been supplied.

Materials Facilities and Samples for Tests and Inspections

The *Contractor* provides all Materials, facilities and/or samples required for tests and inspections.

The *Employer* reserves the right to call for samples of equipment offered to inspect the workmanship as the work proceeds and either accept or reject the equipment or workmanship. The *Employer's* approval of the design, material and workmanship are to in no way reduce the *Contractor's* liability to provide a complete and proper working plant which is abreast with modern technology.

The *Contractor* must allow for control samples of the following which are to be approved by the *Employer* and are to be held in the site office to establish the quality standards:

- a) Control sample of ducting to establish the ductwork quality standard.
- b) Control sample of welded, insulated, and cladded piping to establish the pipework quality standard.
- c) Air terminals

Commissioning

The complete HVAC system with interfaces are to be commissioned in accordance with the following SANS and Chartered Institution of Building Services Engineers (CIBSE) codes or such other recognized commissioning procedure or code approved by the client:

- a) Air distribution systems
 - i. SANS 10173: Code of Practice for the Installation, Testing and Balancing of Air Conditioning Ductwork, or
 - ii. CIBSE Commissioning Code A: 2006 or latest revision
- b) Automatic controls: CIBSE Commissioning Code C: 2001 or latest revision
- c) Refrigerating Systems: CIBSE Commissioning Code R: 2002 or latest revision
- d) Water Distribution Systems: CIBSE Commissioning Code W: 2002 or latest revision

The *Contractor* does comprehensive pre-commissioning, commissioning as well as quality monitoring on all the HVAC and its sub-systems and is to provide a report with the following details.

- a) Demonstrate that the services were commissioned in compliance with SANS OR CIBSE Commissioning Codes or ASHRAE Commissioning Guideline for all mechanical services.
- b) Include commissioning dates, records of all functional/commissioning testing undertaken, a list of any future seasonal testing, and a written list of outstanding commissioning issues.
- c) Include the outcomes and changes made to the building as a result of the commissioning process, accounting for all of the recommendations; and
- d) Reference appended extracts of commissioning records for major plant and equipment.
- e) Ensures that the correct performance of the equipment, safety of plant and personnel, and compliance with the Technical Information before commissioning of plant commences is achieved.

The commissioning procedure to be adopted is prepared by the Commissioning Authority. During commissioning the *Contractor* set the installation to work and competent personnel demonstrates and explain the operation and maintenance procedures for the installation and for each item of plant to the *Employer*. During commissioning if any item is found to be unsatisfactory the fault is rectified and/or new components fitted and commissioned by the *Contractor* at their own expense. The *Contractor* then rebalances and commission the system or part thereof affected at their own expense.

After successful completion of the commissioning and proof period of the installation and any maintenance materials as listed in the Specification and those normally supplied by equipment manufacturer are handed over, the maintenance period commences. Items of equipment which are of a specialist nature e.g automatic controls etc. are to be commissioned by the manufacturer's representative who instruct the *Employer* on the function and proper operation of the equipment.

Start-up Procedures required to put the Works into Operation

No alterations or adjustments are to be made to the *Works* after functional checks are done without the *Employer's* written permission.

At this stage the following is to be achieved:

- a) Installation and pre-commissioning completed.
- b) Testing report and the associated certificates received.
- c) Signed erection and safety clearance certificates.
- d) Final draft of the technical, operating, maintenance manuals delivered.
- e) All Quality Control Plan (QCP) documentation received.

Take Over Procedures

The *Employer* takes over the *Works* on the date of safety clearance of the HVAC and its sub-systems in accordance with the sectional completion dates of the Accepted Program.

Performance Tests after Completion

All HVAC systems are to be subjected to performance tests under full working conditions as follows:

- a) The *Contractor* is to supply the necessary field-testing instruments (thermometers and flow meters etc) and detailed description of field-testing arrangement to prove a capacity/performance measurement accuracy of $\pm 5\%$ for equipment supplied.

Training and Technology Transfer

After completion of the contract, the *Contractor* is required to provide training and transfer system knowledge to the *Employer* by submitting documented Design Intent, As-built drawings, Operational and Maintenance Manual, Commissioning Records, Commissioning Report and by providing training on all the systems to the *Employer's* personnel to ensure that they have all the information and understanding needed to operate and maintain the features and systems in the various areas.

The *Contractor* is to provide on-site training and training material to the Engineers, Operators and Maintenance personnel prior to taking-over of the *Works*. The training is preferable to be offered during the commissioning and testing for a minimum of ten (10) personnel. The *Contractor* is to, prior to handing over of the *Works*, satisfy the *Employer* that maintenance, engineering and operational personnel are competent and adequately trained to maintain and operate the equipment supplied.

The training is to cover the following, however not limited to:

- a) Information provided in the design intent report (including energy/environmental features)
- b) Review of controls set up, programming, alarms and troubleshooting
- c) Review of O&M manuals
- d) Building operation (start up, normal operation, unoccupied operation, seasonal changeover, shutdown)
- e) Measures that can be taken to optimise energy efficiency
- f) Occupational health and safety (OH&S) issues
- g) Maintenance requirements and sourcing replacements

- h) Obtaining and addressing occupant satisfaction feedback
- i) Development and creation of HMI mimics, logic and parameters

Steps for conducting On-site Training are to include:

- a) Preparation
- b) Introduction
- c) Explanation
- d) Demonstration
- e) Practice Under Supervision
- f) Conclusion

The operating and maintenance manual are to be available during the training of *Employer's* personnel. *Employer's* personnel are to be made familiar with the contents of that manual.

Operational Maintenance after Completion

After successful completion of the commissioning and proof period of the installation and any maintenance materials as listed in the Specification and those normally supplied by equipment manufacturer are handed over, the maintenance period commences. The *Contractor* is to execute maintenance and maintenance management under the supervision of *Employer* for a period of 12 (twelve) months from the date of Taking over of the *Works*.

The *Contractor* is to return to site following the issuing of the Taking over Certificate whenever is required or as defined by the detailed maintenance schedule submitted on Operating & Maintenance manuals. The minimum intervals for the *Contractor* to be onsite for inspection after taking-over of *Works* are to be 3, 6, 9 and 12 months respectively.

A report after each visit is to be submitted to the *Employer* in writing. The *Contractor* is to rectify such items in accordance with the requirements of the conditions of Contract. The *Contractor* is responsible for any faults that may arise during the guarantee and maintenance period and will be called out to repair such faults as required; therefore, it is important that a responsible/contact person and alternatives are to be provided as part of the Operating & Maintenance manual submissions.

The *Contractor* is to make all adjustments necessary for the correct operation of the plant and equipment for a period of 12 (twelve) months after the date of issue of taking-over certificate. The *Contractor* is to make good any faults due to inferior material or workmanship that may arise during this period. If during this period, the plant is not in working order for any reason for which the *Contractor* can be held responsible or if the plant develops faults, the *Contractor* will be notified, and immediate steps are to be taken by him to remedy the faults or to make any adjustments required. Should such faults occur so frequent as to become objectionable or should the equipment otherwise prove unsatisfactory during the above-mentioned period, the *Contractor*, if called upon by the *Employer*, is to replace at his/her own expense the whole or such parts thereof as the *Employer* may deem necessary, with apparatus to be specified by the *Employer*.

Final acceptance is to be taken once all the equipment has been replaced and the plant is in working order again. The *Contractor* is to confirm by means of instrumentation that the plant is delivering the same duty that it was at first acceptance. These readings and measurements are to be witnessed by the *Employer*.

Principles of Effective Maintenance and Maintenance Management

The following principles are to prevail to ensure effective maintenance management and maintenance of the HVAC facilities/equipment, namely:

- a) The principle of disciplined configuration management/control is to be complied with during this period. The maintenance execution should apply strict control/discipline not to change/alter the configuration status of the equipment without either approval by or notification of the change. The importance of managing the "as-built", "operate-to" and the "maintain-to" information data packs (operation and maintenance manuals including maintenance schedules for each piece of equipment) of the equipment. Any discrepancies between the actual configuration and the information data pack information could lead to cost-inefficient maintenance (wrong information on

equipment leads to wrong maintenance execution and therefore the operation and maintenance manual will be 100% correct.

- b) The principle of applying optimum maintenance management and the desire to continuous improvement, learning from lessons of the past and wanting to apply intelligent maintenance management principles, should be accommodated as the driving force for maintenance management. The *Contractor* will therefore start with the built of each HVAC Systems history for future continuous improvement.
- c) The sound principle of the maintenance Contractor having an independent quality assurance (QA), quality control (QC) and even an inspectorate service of the maintenance execution, where the *Employer* should only execute quality assurance (check a % of the QA and QC of the *Contractor*). It is therefore the responsibility of the *Contractor* to provide the *Employer* with maintenance QC lists and QA methods that are to be used during the one-year maintenance period.
- d) Management information is of the utmost importance, especially in areas where huge sums of money are spent or where decisions are highly dependent on accurate information. Good performance measurement and management is highly dependent on accurate information (Maintenance report back information). The *Employer* will determine with the *Contractor* before *Works* completion, the maintenance information requirements and format that will be provided by the *Contractor* during the maintenance period.
- e) Given the complexity/diversity of the HVAC equipment, it becomes obviously important to name and number the different System equipment to determine the exact maintenance history of each piece of equipment during the maintenance year and thereafter. The *Contractor* will therefore number each unit of each System in accordance the numbers that will be provided by the *Employer* before the *Works* commences.
- f) Statutory regulations and Eskom standards should be adhered to in the maintenance execution period in conjunction with the normal preventative and corrective maintenance actions. Where facilities/equipment is found that do not comply are to be rectified to create a working environment that is safe and without risk to safety and health. The SANS 10147 is an OHS Act Regulation and should always be complied with during the maintenance period.
- g) Although the initial focus of maintenance management should be on optimising/reducing the maintenance-cost, the focus should shift to incorporate optimising/reducing of the entire operating cost and ultimately optimising/reducing the life cycle cost (LCC). The *Contractor* will therefore incorporate measurements such as "Coefficient of Performance" (COP) measurements as part of the year's PM maintenance program. Other energy saving methods will be provided by the *Employer* to the *Contractor* to be included in *Contractors* PM schedule. Power consumption readings of each System provided with meters will be part of the *Contractor's* monthly Planned Maintenance (PM) schedule.
- h) Trade-off studies should continuously be analysed or conducted to ensure optimal use of preventative maintenance and corrective maintenance for each respective/individual situation (e.g. - more preventative, less corrective to increase item MTTF/MTTR).
- i) Trade-offs regarding repair or replace decisions should continuously be made, as well as decisions on whether equipment/Systems should be phased out due to too high operating cost. Trade-offs involving decisions to purchase more reliable equipment with lower maintenance cost versus less reliable (also less costly) equipment with higher maintenance-cost will be executed.
- j) A strategy will be developed by the *Contractor* regarding different standard levels of repair during the maintenance period in order to ensure focus/cost-effectively of the *Contractor's* service (supplier cost versus *Contractor* cost).
- k) Re-commissioning of equipment after System breakdowns will be implemented as part of the *Contractor's* Corrective Maintenance (CM) procedure.
- l) The *Contractor* will provide a maintenance service to the level defined in a quality plan (service level agreement standard). All the activities performed will comply with the required standard. The *Contractor* will supply procedures, documentation, and testing methods to support the committed level of service. The *Contractor* will have a documented process that verifies that all Kusile Power Station requirements (maintenance specification requirements and standards) are met. The PM and CM response times as required by *Employer* will be applied by the *Contractor* during the year

maintenance period. Refer to *Employer* maintenance response times in accordance with the Service Level Agreement (SLA) between *Contractors* and *Employer*.

Service Level Agreement

The *Employer* expects the *Contractor* to at least meet the following service requirements however not limited to:

- a) Ensure a continuous supply of conditioned air to all the facilities requiring conditioned air and that are fitted out with HVAC equipment.
- b) Restore any interruption to conditioned air supply within the agreed restoration times.
- c) Maintain an accurate database of all assets maintained.

Maintenance Requirements after Completion of Works

The *Contractor* is to be responsible for any failures as a result of the installation during this period.

A maximum response time of 4 hours will be allowed for all failures from the time the notification had been delivered to the *Contractor*.

The planned maintenance is to be execution in 3-monthly maintenance service, except if the OEMs recommend a different service interval; the later are to take preference. The *Contractor* will provide a PM schedule that will include the following:

- a) Inspections time periods of applicable HVAC equipment/items including manufacturer's inspection requirements.
- b) All HVAC equipment/items that require cleaning, removal of contaminants and waste, correct adjustment and setting, tightening, testing, fixing, refill, lubrication, rust prevention, touch up, refrigeration charge, servicing, inspection, replacement, re-installation, troubleshooting and calibration during a specific period e.g. weekly, monthly, 3 or 6 monthly, yearly or when required such as dirty filters, evaporators, etc. This is to include the manufacturer's maintenance requirements.
- c) The schedule will be associated with PM guides/instruction list indicating the function to be executed and the material to be used for each piece of HVAC equipment that will be used by the *Contractor* during the one-year maintenance period. Each guide/instruction list will include the General instructions, Special instructions, Tools and materials to be used, List of codes/standards that are applicable to the equipment being maintained and Maintenance check points & maintenance execution including manufacturers maintenance requirements.
- d) The *Contractor* will indicate all materials to be used for each instruction e.g. "Replace or clean filters if required" – Material required = Three (3) panel filters (600mm X 600mm X 50mm).

A process used to determine maintenance requirements of any physical asset in its operating context is to make use of the "Reliable Centre Maintenance" (RCM) process (RCM by John Moubray – distributed by Butterworth-Heinemann) or similar. The RCM process entails asking seven questions about the asset or System under review, as follows:

- a) What are the functions and associated performance standards of the asset in its present operating context?
- b) In what ways does it fail to fulfil its functions?
- c) What causes each functional failure?
- d) What happens when each failure occurs?
- e) In what way does each failure matter?
- f) What can be done to predict or prevent each failure?
- g) What should be done if suitable proactive task cannot be found?

To apply the above questions a table should be drawn up of each HVAC unit's component/item function, function failure, failure cause, failure consequences and proactive tasks. The *Contractor* will provide detail tables of each installed HVAC units items which will be discussed and agreed with the *Employer* before any maintenance tasks e.g. inspection period (e.g. daily inspections) or preventative maintenance tasks is taken

up in the maintenance schedule (drawn up by the *Contractor*) that will be executed by the *Contractor* during the one year maintenance period.

Maintenance Information Requirements

The *Contractor* will provide maintenance information on each PM and CM executed during the one-year maintenance period. The report template to be used for providing the required reporting will be agreed upon between the *Employer* and *Contractor* before execution of the maintenance & servicing commences.

All PM's are to be executed by means of *Employer* request number which is to form part of the procedure.

Although maintenance is executed on a unit/System more detail is required of that unit/System and specific detail is required of the components/items of that unit/System as follows:

- a) Time reported or request/order generated
- b) Time in - Time *Contractor* arrived on site
- c) Time out - Time *Contractor* finished breakdown/complain
- d) Total time spend on breakdown maintenance
- e) Components/item description maintained
- f) Was component/maintenance item:
 - i. Repaired
 - ii. Replaced
 - iii. Inspected
- g) Remarks on repair, replace or inspection and quantity/number of materials used
- h) Power measured
- i) Cooling capacity measured
- j) COP (if applicable)
- k) Cost of maintenance or servicing

Maintenance Management

From information received on the PM's and CM's reports, logbook (produced by the *Contractor*) and *Employer* service requests, maintenance management will be executed by the *Contractor* in conjunction with the *Employer*. A maintenance meeting will be held once a month during the maintenance period where the *Contractor*, *Employer* will discuss all areas of the maintenance execution process, problems, maintenance information, and non-compliances and introduce maintenance management processes to be implemented by the *Contractor* during the maintenance period.

The following are some of the areas of maintenance on which maintenance management will be executed:

Improve Maintenance Cost-Effectiveness

The capability to improve maintenance cost-effectiveness will be developed by all parties at the monthly maintenance meeting, based on the data received from the *Contractor* and *Employer* requests. The following minimum capability will be developed:

- a) Failure Report Analysis (FRA). FRA will be done for each specific piece of equipment and the following analysis will be carried out:
 - i. Time between failures (TBF), draw a process control chart of the TBF showing the MTBF, each TBF as recorded in sequential order and TBF control limits.
 - ii. Monthly preventative and corrective maintenance times/cost. Draw a process control chart of the monthly time/cost showing average monthly time/cost spend on PM's and CM's.
 - iii. Draw a process control chart of the downtime showing the average downtime; each downtime as recorded in sequential order and downtime control limits.

- iv. Draw a process control chart of the average availability, availability as calculated in sequential order and availability control limits.
- v. Identify those entire specific pieces of equipment of which the most recent TBF, monthly cost, downtime or availability is outside the control limits of the specific of generic equipment type or downtime is not within specified/contracted levels.
- vi. List the following for each of the above identified pieces of equipment for the most recent failure, as well as all previous failures:
 - All of the failure descriptions
 - All of the failure causes
- b) Corrective Action (CA). From the FRA, the activity report obtained from the maintenance contractor, as well as standardisation considerations, one of the following actions will be taken for each of those equipment identified in the previous section a).:
 - i. Don't do any corrective action and monitor the performance of the specific piece of equipment.
 - ii. Replace the specific piece of equipment or phase the equipment out.
 - iii. Updates the "maintain to" info data pack (improve preventative maintenance such as more frequent lubrication etc. or specify a more realistic downtime values).
 - iv. Do maintenance concept trade-off studies and update the maintenance concept (i.e., improve the lines of repair, maintenance processes, inventory levels/contents (e.g., filters), etc.).
 - v. Carry out an equipment design/application analysis and/or a LCC analysis to determine whether it is cost-effective to change the equipment configuration (i.e., a different model/producer in need of more/less reliability, performance, capacity, etc.).

Replace Identified Equipment As Soon As Possible

This task comprises that specific part of maintenance improvement whereby it is determined as soon as possible that the existing equipment should be replaced by other or new identical piece of equipment, mainly due to a result of an analysis showing that the existing equipment requires excessive maintenance and excessive costs. The disciplined replacement needs to be managed together with its configuration control regarding series number and warranty control. The equipment database needs to be updated and controlled.

Maintenance Guide for Three Monthly Service or As Required

"Maintenance" or "CHECK" in the guide are to mean the efficient and effective examination, inspection, service, repair and replacement of components and parts of an air conditioning unit or System so that the air conditioning unit or System complies to the manufacturers, design and commissioning operational specifications and statutory/company requirements. This includes the cleaning, removal of contaminants and waste, correct adjustment and setting, tightening, testing, fixing, refill, lubrication, balancing, rust prevention, touch up and refrigeration charge of the air conditioning unit or System.

The guide indicates maintenance check points, components and items that are all applicable to the different HVAC units and Systems of the company. When maintenance is executed in accordance with the guide the maintenance check points, components and items not applicable to the specific HVAC unit and System, are to be excluded from the service to be executed. The exclusion of any maintenance check points components and items are to be the responsibility of the *Contractor*. Any error exclusions are to be the responsibility of the *Contractor* and no considerations are to be given to claims made by the *Contractor* for the rectification thereof.

The following schedule is to be used for execution of maintenance and commissioning tests.

Table 4: Guide for execution of maintenance and commissioning tests

Check Points	Action
Compressor	Suction and discharge pressures, leaks, high- and low-pressure setting,

Check Points	Action
	mountings, current drawn
All coils	Finned surface area, coils fins, coils and plates, coil and plate mountings, leaks, temperature of refrigerant in, temperature of refrigerant out, air on coil temperature and air off coil temperature
Refrigeration circuits and accessories	Valves, piping, leaks and ice formation
All motors	Bearings, current drawn, speed, coupling, guards, shaft, protection, housing, mountings, belts, pulleys, gaskets, seals, nuts and bolts
All fans	Volume flow, bearings, seals, shaft, pulley, belts, protection, mounting, housing, blades, dampers, current drawn, bolt and nuts
Casing and frame	Openings, nuts, bolts, rust, paint, mounting brackets and covers
Filter(s)	Media condition, pressure difference, no bypass of air, seals, holding frame, catches and mountings
Louvers, dampers and grilles	Frames, blades, fixing, air throw, direction of discharge, mountings and supports
Heaters	Elements, protection, safety, heating steps and mountings
Electrical	Compliance with regulations, electrical supply, conduit, joints, thermal blocks, wiring, cables, insulation, trunking, switchgear and protection
Controls	Wiring, sensors, set points, indicators, alarms and signalling
Sound	Required NC level.
Drainage	Piping, leaks, connections, fittings, joints, water flow, trap and clamps
Ductwork and insulation	Sheet metal, material, joints, seals, fasteners, seams, hangers, supports and clamps
Alarms	Casing, controls, wiring, indicators, communication and faceplates
Other actions however not limited to.	Clean condenser, cooling coil fins, drain pan and fans. Slime or mould found on the coils or drain pan are to be cleaned with appropriate solution
	Inspect all coil fins. Straight with a fin comb as required
	Remove dirt or rust from parts, casing and frame. Touch up as necessary
	Replace or clean filter if required
	Inspect and adjust air damper
	Lubricate motor and fan bearings
	Inspect gaskets. Look for leaks between unit and frame. Caulk as necessary
	Check for refrigeration leaks with leak detector and correct. Refrigerant charge as required
	Drain and clean humidifier if applicable
	Start unit and observe operation including all controls and set properly
	Check all temperatures and record (see general checkpoints)
	Check frame of unit for proper electric ground

Check Points	Action
	Replace covers, clean casing and louvres
	Check ductwork and alarms if applicable (see general checkpoints)
	Clean-up work area
	Fill in and complete maintenance report

CONFIGURATION AND DOCUMENTATION MANAGEMENT

DOCUMENT MANAGEMENT

All documents supplied by the *Contractor* are to be subject to Eskom's approval. The language of all documentation is to be in English. All documentation is to be controlled and managed in accordance with Document and Records Management Procedure (32-6).

DOCUMENT IDENTIFICATION

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

DOCUMENT SUBMISSION

All project documents must be submitted to the delegated *Employer's* Representative with transmittal note according to Project / Plant Specific Technical Documents and Records Management Work Instruction (240-76992014). In order to portray a consistent image, it is important that all documents used within the project follow the same standards of layout, style and formatting as described in the Work Instruction. The *Contractor* is required to submit documents as electronic using SharePoint transmittal and hard copies and both copies must be delivered to the *Employer's* Representative.

In addition, the *Contractor* is to be provided with the following standards which must be adhered to:

- Project Plant Specific Technical Documents - Handover Works Instruction 240-124341168
- Project Documentation Deliverable Requirement Specification 240-65459834
- Technical Documentation Classification and Designation Standard 240-54179170
- Project/ Plant Specific Technical Documents and Records Management Work Instruction 240-76992014

The *Contractor* list all project soft copies and hard copies for submittal on the transmittal with the following metadata fields, use *Employer's* transmittal template (240-71448626):

- a) Title of the document
- b) Document unique identification number
- c) Revision number
- d) Name of discipline
- e) Reason for issuing/submission
- f) Sender's details
- g) Sent date
- h) Recipient's details

- i) Date received
- j) Quantity of documentation referenced on the transmittal
- k) Number of copies
- l) Format/medium submitted (e.g. paper, CD/USB Stick, etc)
- m) Sender signature
- n) Recipient signature, once submitted, to acknowledged receipt

The format of the final documentation handover will be specified in the Vendor Document Submittal Schedule. The Vendor Documentation Submittal Schedule (VDSS) specifies the following:

- a) The limits of supply of the documentation, i.e. whether the documentation is provided / maintained by the *Contractor* or the *Employer*.
- b) The type of documentation provided.
- c) The software format (where applicable) in which the documentation is provided.
- d) The stage in the project execution during which the documentation is provided as a deliverable.
- e) The *Contractor* is to be responsible for planning the supply of the documentation during the various project stages and to provide the documentation in accordance with the Vendor Documentation Submittal Schedule (VDSS).

The documents are to be submitted to the Eskom Representative accompanied by the Transmittal Note. The *Contractor* submits all documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:

SharePoint Transmittal

Electronic copies will be submitted to Eskom Documentation Centre via the SharePoint Transmittal space that will be setup for the project.

Bulk Submission

Electronic copies large for transmitting via SharePoint (>700MB) will be delivered on CD/USB Stick, large file transfer protocol and/or hard drives to the Project Documentation Centre. For bulk document submission, the following link can be used <https://zendto.eskom.co.za/>

Emails and other submission methods

Where applicable and contractually agreed, e-mail submissions can be used, as well as other submission methods employed in the relevant project e.g. Box; Norman Secure, etc

Hard Copies

Two hard copies of documents are to be submitted to the Employer's Representative accompanied by the Transmittal Note.

DRAWINGS FORMAT AND LAYOUT

The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of engineering drawing Standard 240-86973501. Drawings issued to Eskom will be a minimum of two hardcopies and an electronic copy that is editable. The *Contractor* is required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in pdf format. No drawings in TIFF, AUTOCAD or any other electronic format will be accepted. Drawings issued to Eskom may not be "Right Protected" or encrypted. The *Employer* reserves the right to use these drawings to meet other contractual obligations. The

Contractor is to include the *Employer's* drawing number in the drawing title block. Drawing numbers will be assigned by the *Employer* as drawings are developed.

The *Contractor* submits all drawings in accordance with the requirements stipulated in the *Employers* Engineering Drawing Standard 240-8673501. Manufacturing of the equipment commences when drawings are accepted for construction, by the *Employer*. Two paper print, editable native CAD format (.dgn) and in .pdf format of each drawing are submitted to the *Employer* for acceptance as per agreed schedule before manufacturing of equipment commences, by the *Contractor*.

The *Contractor* submits a 3D Model in DGN format. The structure of the 3D model is to be according to the Plant Breakdown Structure. The 3D model is to clearly indicate all interfaces.

The *Contractor* submits all relevant drawings, documents and design information for approval before commencing any work. After the *Employer* accepts the drawings and design information, the *Contractor* is not allowed to depart from the accepted drawings in any way except when it is with the written consent of the *Employer*.

The *Contractor* is responsible for any error or deficiency in any drawings or documents supplied by him and for any loss, damage or expense arising out of such error or deficiency, notwithstanding that such drawing or document may have been accepted by the *Project Manager*.

Drawings are submitted to *Employer* in editable native CAD format (.dgn) and in .pdf format, after commissioning of the equipment. The drawings reflect any changes made during commissioning and are submitted as "As built" drawings.

The *Contractor* notes that all General Arrangement (GA) and detailed manufacturing and erection drawings become the property of the *Employer*. The *Employer* is permitted to purchase replacement parts off these drawings from the lowest cost suppliers.

CONFIGURATION MANAGEMENT

Plant Coding and Labelling

Coding and labelling of all Plant & Materials and documentation supplied is part of the *Works* and is the responsibility of the *Contractor*. The *Contractor* is to code the plant structures, systems, and components according to the KKS (Kraftwerk-Kenzeichnungs System) as developed by the VGB.

The *Contractor* is responsible for ensuring that he/she is fully familiar with the standard and concepts of KKS system. The *Contractor* is responsible for codification of plant, equipment and components which is under his/her supply.

The specific code for each item of the plant, equipment, measuring point, junction box, cable etc. is to appear on all documents, drawings, maintenance schedules etc.

A list of all KKS codes used by the *Contractor* is to be provided according to *Employer* standard documentation. The allocation of the codes is to be approved by *Employer*.

All designs, testing, commissioning, operating maintenance and training documentation and databases are to be suitably and comprehensively marked, cross-referenced, and indexed with the allocated KKS codes.

Functional Location of Components

The list of functional locations is to be arranged in Alfa-numeric order from 1st level KKS to 3rd level KKS number to show Hardware breakdown structure in specific plant area. The list as a minimum is to include all the maintenance significant items. It is assumed that items excluded, will automatically have a run-to-failure maintenance strategy and the impact of such failure would be insignificant. Where required, breakdown can be down to 4th level of KKS.

All equipment requires 3rd level KKS coding to comply with Eskom's specifications:

- a) KKS Plant Labelling & Equipment Description Standard.
- b) The Application of KKS Plant Coding

The *Contractor* is responsible for the following:

- a) Generating coding and obtaining *Employer* approval prior to installation.
- b) Produce drawings (MCC & HVAC Controller – GA & SLD, AFS & P&ID) to reflect approved codes and obtaining approval. (Note that QC inspections cannot proceed without these approved drawings).
- c) Supplying and installing labels/mimic to specification (Aluminium, stainless steel, laminated PVC, or cable labels depending on application).
- d) Applying for inspection by Employer.
- e) Rectifying any incorrect labels.
- f) Obtaining individual KKS certificates for mechanical, electrical and C&I.

The Contractor is to employ the services of an experienced KKS engineer for the purpose of plant coding and labelling.

KKS Coding

The plant codification system is to be uniform to entire project. The Kusile power station utilises KKS system, and this is to be applicable to HVAC system including all Mechanical, Electrical & C&I equipment that forms part of the works which needs to be coded. The codification is to be reflected on the relevant drawings and Equipment Label Lists (ELL)

The HVAC system is to be coded to at least up to 3rd level coding as follows:

Mechanical Plant

For the mechanical equipment 3rd level coding is to be implemented. For example, for an Air Handling Unit (AHU):

- a) Level 1 – Equipment (AHU, etc.)
- b) Level 2 – Components (Fan, etc.)
- c) Level 3 – Subcomponents (Fan belts, pulley, motor, etc.)

Electrical Plant

The Motor Control Centres (MCC)/HVAC Electrical Panels and cabling are to be coded to 3rd level. For example, for an MCC is to be coded as follows:

- a) Level 1 – HVAC controller panel – single code
- b) Level 2 – Tiers & individual buckets – coded on outside of panel
- c) Level 3 – Components inside MCC to be coded for example, (MCB's, contactors, terminals etc.)

Cables are all must be coded as cable schedules contains connection details.

C&I Installation

The HVAC controllers and cabling have to be coded 3rd level. For example, for an HVAC controller is to be coded as follows:

- a) Level 1 – Main board – single code
- b) Level 2 – Tiers – coded on outside of panel
- c) Level 3 – Components inside HVAC controller to be coded for example, (Controllers, relays, terminals etc.) A mimic table must be installed in panel door.

Cables are all must be coded as cable schedules contains connection details.

Once the MCC and HVAC controller 3rd level KKS codes are approved, labels or mimics will be produced and physically installed on the MCC or HVAC controller internal components. The *Contractor* is to update the MCC and HVAC controller document pack with the approved KKS signal codes as received on the 5 x C&I schedules.

The KKS signal codes must be implemented in the HVAC controller software and HMI graphics. HMI Graphics (HVAC controller touch screen) is to be configured as follows:

- a) The approved AFS and P&ID drawings will be used to update the HMI homepage graphics.
- b) All equipment on the HMI to have KKS codes. The approved equipment lists must be used.
- c) The KKS codes on the HMI can be displayed either in the bottom corner of the HMI or to be displayed when hovered over with mouse. Last option is the preference of Eskom Generation.
- d) All equipment descriptions as per the approved equipment lists. Descriptions can be shortened since the faceplate of the HMI will contain building/location name and system name.
- e) A clear description is required for each alarm state especially for multi-state variables.
- f) Legend to be generated on HMI with the following:
 - i. Green: On or Running
 - ii. Red: Alarm
 - iii. Grey: Off
 - iv. Purple: Override
 - v. Orange: Offline

Interface to CBMS and the HVAC panel controllers will be via BACnet/IP communication protocol. The KKS signal code must be transmitted to the CBMS.

Change Management

All Design change management is to be performed in line with the Eskom Project Engineering Change Management Procedure 240-53114026 and the *Employer* ensures that *Contractor* is provided with latest revisions of this procedure. Any uncertainty regarding this procedure is to be clarified with the *Employer* and clarification updates should be reflected in updated versions of this procedure.

Design Review Documentation

The *Contractor* conducts design reviews as per the *Contractors* official design review procedure. *Contractor* further takes note of the *Employers* Design Review Procedure 240-53113685 and participates in all design reviews as specified by the *Employer*. The *Employer* may "Accept"; "Accept with Comments" or "Reject". If required, the *Contractor* makes the necessary revisions on the documentation and ensures acceptance is obtained from *Employer*. The *Contractor* includes these design reviews as part of the schedule and suggests appropriate timing for such reviews.

Procedure for Submission and Acceptance of Contractor's Design

The *Contractor* ensures the following:

- a) The design is prepared, supervised and managed in accordance with the *Employer's* principles and quality procedures.
- b) The design is prepared, reviewed and verified by individuals who are competent and are registered with ECSA or other international recognised bodies.
- c) The design of the *Works* complies with the Contract Specification, generic specifications, standards, drawings, the *Project Manager's* instructions and other documents.
- d) The design is accurately recorded in the design submissions including calculations, verifications, detailed construction drawings, specifications, test and commissioning plans and operation and maintenance manuals.

- e) The design is reviewed and endorsed as compliant by an internal Reviewer prior to sending it for verification by the *Employer*.
- f) The design is developed and submitted for review in accordance with the Contract Specification and agreed schedule.
- g) All design information, data, drawings and other documentation is produced for the *Works* in accordance with the Contract.
- h) The Detail design report is to be according to the *Employer's* Detail Design Report Template, 240-49910707.

Design Review Procedure

The *Contractor* is the Design Authority for HVAC System, Controls, Electrical, Civil, Structural and Building related *Works* of the contract as defined in the *Employer's* Design Review Procedure 240-53113685. The *Contractor* is responsible for following this design procedure and conducts all the design reviews as specified in this procedure. The *Contractor* is responsible for conducting the following reviews:

- a) Design Freeze Review (Detail Design)
- b) Pre-Commissioning Review
- c) Acceptance Testing Review
- d) Handover Review

For design review purposes the designs will be reviewed per part of the *Works* as well as an integrated design where all interface issues between the various parts are addressed as follows:

- a) The interim design stage will be an iterative process between the *Employer* and the designer with regular progress meetings.
- b) The interim design stage will culminate with the submission of a report.
- c) After receipt of the design report, the *Employer* will have ten (10) working days to review and submit comments to the designer.
- d) The designer will then have five (5) working days to submit the updated final design report.
- e) The submission will then constitute the End of Phase review and the *Employer* will accept the final design report with comments by the *Employer* and updates by the designer within five (5) working days.

Process for Submission of Documents

The *Contractor* submits all documents according to the templates that are referenced on the list of Standards. The process for the submission of documents is described below:

- a) The *Contractor* submits the documents/drawings to the *Employer*.
- b) The *Employer's* Document Controller registers the documents.
- c) The *Employer's* Document Controller will supply the documents/drawings to all relevant parties within the *Employer's* project team.
- d) The *Employer's* project team reviews the documents/drawings and will submit all comments or inputs to the *Employer* and the *Employer* submits to the *Contractor* for consideration.
- e) If the *Employer* finds major deficiencies in the submitted documents/drawings, the *Contractor* revises the documents/drawings and resubmits to the *Employer*.
- f) The *Employer* reviews the documents/drawings and if no major deficiencies are found, the *Contractor* organises a Design Review session.
- g) The *Employer* and the *Contractor* conduct a Design Review.
- h) If any fundamental errors were found in the designs or further actions are required, the *Contractor* record all concerns raised and revises the designs.

- i) The *Contractor* organises a Design Review session once all designs were revised according to the concerns raised by the *Employer*.
- j) If no fundamental errors were found in the designs during the Design Review session, the *Contractor* compiles the Design Review minutes or report and submits it to the *Employer*.
- k) The *Employer's* Document Controller registers the report.
- l) The *Employer's* project team reviews the *Contractor's* report/minutes. If the report/minutes are not acceptable, the *Contractor* revises the report/minutes and resubmits to the *Project Manager*.
- m) The *Project Manager* accepts the *Contractor's* design once the report/minutes are accepted by the *Employer's* project team.

The *Contractor* is to implement the following activities for approval:

- a) The *Contractor* reviews, stamps, dates and signs to signify his/her approval and submit in the manner required by the *Employer* in orderly sequence so as to cause no delay in the work, all *Contractor's* drawings, equipment selections and/or samples required by the *Works* or subsequently by the *Employer*. *Contractor's* drawings, equipment selections and samples are to be properly identified as specified or as the *Employer* may require.
- b) At the time of submission, the *Contractor* informs the *Employer* in writing of any deviation in the *Contractor's* drawings, equipment selection or samples from the requirements of the *Works*.
- c) Each individual plant & material selection submission is to be accompanied by a copy of the applicable detailed technical specification. Each clause of this specification to be marked "Complies" or "Does not comply", complete with reason stated, alternative offered and countersigned by the *Contractor*.
- d) Plant & material selection submissions are to be indexed similar to the index for plant & material part of the "Operating Instructions and Maintenance Manual".
- e) The *Contractor* is to submit two copies of drawings and plant & material selections along the channels agreed.
- f) By submitting drawings, plant & material selections and/or samples, the *Contractor* represents that he/she has determined and verified all site measurements, site instruction criteria, materials, catalogue numbers and similar data, and that he/she has checked and co-ordinated each services drawing and sample with the requirements of the *Works*.
- g) The *Employer* reviews *Contractor's* drawings, plant & material selections and samples so as to cause no delay, but only for conformance with the design of the *Works*. The *Employer's* approval of a separate item does not indicate approval of an assembly in which the item functions.
- h) The *Contractor* makes any corrections required by the *Employer* and re-submits the required number of corrected copies of the *Contractor's* drawings, plant & material selections or new samples until approved. The *Contractor* directs specific attention in writing on resubmitted drawings to revisions other than the corrections required by the *Employer* on previous submissions.

The following documents are supplied to the *Employer* by the *Contractor* as a minimum:

- a) Documents, including detailed calculations such as hydraulic and pipe stress analysis (where required), pipe supports, handers and racks,
- b) Documents including equipment data sheets and specification for selected equipment, electrical cabling and other associated equipment.
- c) Dimensioned shop drawings showing the general arrangement of all plant and equipment including isometrics and P&ID's or PFD's where required. Sufficient views must be given to ensure clarity and the drawings are to have at least a plan and two different elevations or sections giving overall dimensions.
- d) Dimensioned shop drawings showing proposed method of fixing of all the plant and equipment
- e) Detailed electrical wiring diagrams including schematic and control circuits.
- f) Compliance and Electrical Certificates
- g) Detailed sequencing manner for installation procedure of *Works*

- h) Detailed programme for the *Works* in sufficient detail as to represent the units of work to enable the representative to assess the progress of the *Works*
- i) Technical specification and literature for all items of equipment that forms part of the complete installation
- j) Proposed corrosion protection systems, including data sheets for coating proposed of equipment
- k) List of recommended spares and technical specifications for the spares, part numbers and the stock levels required
- l) Detailed building *Works* for complete *Works*
- m) Detailed maintenance, reliability, control and operating philosophies
- n) Testing, balancing and commissioning procedures
- o) Plant and material acceptance testing
- p) Detailed operation & maintenance manuals with As-Built drawings & Commissioning Results
- q) Plant codification lists for each section of the *Works*
- r) Construction competition reviews
- s) Acceptance testing reviews
- t) Quality assurance reports
- u) Close out reports

TIME REQUIRED FOR ACCEPTANCE OF DESIGNS

The *Project Manager* will return one copy of the drawing marked “Accepted”; “Accepted with Comments” or “Rejected”. as may be appropriate.

The notations “Accepted” and “Accepted with Comments” authorize the *Contractor* to proceed with the manufacture of the Plant covered by such drawings subject to the corrections, if any, indicated thereon.

Where prints or drawings have been “Rejected” or “Accepted with Comments” the *Contractor* makes the necessary revisions on the drawings and submit further copies for acceptance in the same procedure as for the original submission of drawings.

Every revision shows by number, date and subject in the revision block on the drawing.

The *Contractor* is to allow for 10 calendar days for review of documentation by the *Project Manager*.

APPLICABLE STANDARDS AND CODES

Table 5: List of Applicable Standards and Codes

Number	Title
ISO 9001	Quality Management Systems
OHSACT	Occupational Health and Safety Act 85 of 1993
240-50237146	Medium Voltage AC Variable Frequency Drives Standard
240-102547991	General Technical Specification for HVAC Systems
240-70164623	Eskom Heating Ventilation and Air Conditioning (HVAC) Design Guideline
240-143112846	Heating Ventilation and Air Conditioning System Design Work Instruction
240-53665024	Engineering Quality Manual
240-53114026	Project Engineering Change Management Procedure
240-53113685	Design Review Procedure

Number	Title
240-53114002	Engineering Change Management Procedure
240-511486	Documents and Record Management
240-56227443	Requirements for Control and Power Cables for Power Stations Standard
240-61379718	Instrument Schedule Template
240-61379755	Drive and Actuator Schedule
240-72344339	C&I Virtual Signal List for External Signal Exchange Template
240-72350241	C&I Hardwired Signal List for External Signal Exchange Template
	Alarm Schedule Template
240-56356396	Earthing and Lightning Protection Standard
240-56227516	LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and Including 1000V AC and 1500V Standard
240-57617975	Procurement of Power Station Low Voltage Electric Motors Specification Standard
240-56227443	Cabling and Racking Standard
240-56356396	Earthing and Lightning Protection Standard
240-56176097	Electrical Cable Schedule Template
240-56227927	Electrical Load List Template
240-77301384	Electrical LV Load Schedule Template
240-56356421	Electrical LV Switchgear Schedule Template
240-56356465	Electrical LV List of Switchboards Template
240-77302094	Electrical Termination Schedule Template
240-56364545	Structural Design and Engineering Standard
240-56737448	Fire Detection and Life Safety Design Standard
240-54937439	Fire Protection - Detection Assessment Standard
240-54937450	Fire Protection & Life Safety Design Standard
240-56737654	Inspection Testing and Maintenance of Fire Detection Systems Standard
240-76992014	Project / Plant Specific Technical Documents and Records Management Work Instruction
240-124341168	Project Plant Specific Technical Documents - Handover Works Instruction
240-65459834	Project Documentation Deliverable Requirement Specification
240-54179170	Technical Documentation Classification and Designation Standard
240-71448626	Transmittal template
240-86973501	Engineering Drawing Standard
240-61227631	Piping and Instrumentation Diagram (P&ID) Standard
240-7143250	Plant Labelling Standards
240-58552870	Smart Plant for Owner Operators (SPO) Documentation Metadata Standard
240-109607736	Eskom KKS Key Part Standard

Number	Title
240-109607332	Eskom Plant labelling and Abbreviation Standard
240-93576498	KKS Coding Standard
200-4190	The application of KKS plant coding (NMP 45-7)
200-18202	KKS Key Part-Fossil Power Station (NPSZ 45-45)
200-94660	Issuing of KKS certificate
200-46362	Site Inspections Procedure
32-6	Document and Records Management Procedure
36-681	Generation Plant Safety Regulations
32-95	Occupational Health and Safety Incident Management Procedure
32-727	Safety, Health, Environment and Quality (SHEQ) Policy
SANS 10142-1	The wiring of premises Part 1: Low-voltage installations)

LIST OF DRAWINGS ISSUED BY THE EMPLOYER

The drawings prepared by the *Employer* show general layout of all equipment and distribution systems, complete with schematic arrangements. These, together with the specification, give sufficient information to enable the *Contractor* to estimate the cost and to determine how the System must be installed, tested, balanced, inspected, operated, serviced and maintained. These drawings are not dimensioned shop drawings and cannot be used as shop drawings. Location dimensions shown are only indicative of the routes and zones in which the service must be installed.

The following drawings are applicable to the contract and issued with this tender documentation for tendering purposes only:

Table 6: Existing Floor Layouts

Drawing No.	Sheet No.	Revision	Title
0.90/13	7	1	Unit 1 MV and LV Single Line Diagram
0.90/2295			Air Cooled Condenser Auxiliary building ventilation Piping and Instrumentation Diagram
0.90/1323			Air Cooled Condenser General Arrangement Unit 1,2,3
			Auxiliary Building Units 1-6 Condensate Pumps and VRD Area
0.90/5473			400V Air Conditioning Board Single Line Diagram
0.90/54739			Unit 1 400V Air Conditioning Board Single Line Diagram
0.90/54744			Single Line Diagram Unit 1 400V CPP Board 1
0.90/54745			Single Line Diagram Unit 1 400V CPP Board 2
0.90/40159			MCC General Arrangement 400V AC CPP Board 1 Unit 1
0.90/40160			MCC General Arrangement 400V AC CPP Board 2 Unit 1
0.90/40165			MCC General Arrangement 400V AC Air Condition Board Unit 1
0.90/5473			400V Air Conditioning Board Single Line Diagram
0.90/1599			ACC Unit 1 to 6 – Auxiliary Building Foundation Plan and Sections

Drawing No.	Sheet No.	Revision	Title
0.90/1614			ACC Unit 1 to 6 – Auxiliary Building Architectural Plans
0.90/1613			ACC Unit 1 to 6 – Auxiliary Building Architectural Doors Schedule
0.90/1615			ACC Unit 1 to 6 – Auxiliary Building Architectural Sections and Details
0.90/1616			ACC Unit 1 to 6 – Auxiliary Building Architectural Views
0.90/101483			ACC Auxiliary Building Piping and Equipment Arrangement
0.90/57590			Site Finishing – Site Key Plan, General Notes & Legend
0.90/57595			Site Finishing – Site Plan Area 16A
0.90/71672			Site Finishing – Site Plan Area 16B
0.90/71681			Site Finishing – Site Plan Area 17B

CONTRACTOR'S TECHNICAL TENDER RETURNABLES

The *Contractor* must complete the *Contractor's* technical tender returnable (proposed specifications and schedules for items of Plant and Materials and workmanship). The *Contractor* ensures that all information in the *Contractor's* Works Information complies with the *Employer's* Works Information and the Contract.

Any ambiguity or gap in the *Contractor's* Works Information is the *Contractor's* responsibility. The *Employer* accepts no responsibility for any change to the Prices, Key Dates or Completion Date as a result of above.

GENERAL

Works shall be performed at the highest standard and satisfaction of the *Employer*. The *Employer* shall have the authority to reject any work and materials which are not in full accordance with best practices and approved standards and codes.

The following information is required in the tender stage:

- Documents including equipment data sheets and specification for selected equipment, electrical cabling and other associated equipment.
- Electrical wiring diagrams including schematic and control circuits.
- Detailed sequencing manner for installation procedure of *Works*.
- Detailed programme for the *Works*
- Technical literature for all items of equipment that forms part of the complete installation, including, evaporators, condensing units, refrigerant circuits, ventilation fans, electrical and control circuits etc.
- Proposed corrosion protection Systems, including data sheets for coating of proposed equipment

All major equipment and devices offered by the tenderer must be of proven technology. The reference list of identical equipment as offered should indicate the projects on which the technology was implemented, including the names of the clients, the country and the year in which the technology was utilised. The referenced projects must have a minimum duration of five years since installation.

All major equipment and devices offered must be supplied by the Original Equipment Manufacturers (OEMs). If the equipment concerned is manufactured under licence, the tenderer is to provide a proof of licence agreement made with the OEM. The distributors or agents provide a copy of the contract agreement made with the OEM for the distribution of their equipment and the duration of the agreement should match that of the Contract.

The tenderer must have a track record of five completed projects as a minimum: construction, commissioning and testing of HVAC Systems. In case the tenderer intends to subcontract or form a joint venture, a letter of agreement, together with a track record for all parties involved must be provided. The detailed design (where required) in terms of this Contract is to be executed by a qualified professional for each discipline (Mechanical, Electrical C&I, Civil and Structural) who is a member of Engineering Council of South Africa (ECSA) or equivalent international acknowledgement.

The tenderer must have a proposed work plan indicating intent to undertake full scope of work whilst the Kusile Power Station remain live, activities divided up realistically in schedule and timelines realistic for execution of activity.

The tenderer is to a letter of indicating intent to full scope of work, and compliance to standards and specifications.

CV's of proposed employees are to contain all relevant qualification certificates.

The Tenderer is to provide proof of Construction industry Development Board (CIDB) certification.

HVAC SYSTEM TECHNICAL DATA SHEETS

The *Contractor* provides the plant components with minimum technical specification required by the *Employer*, presented in this section. If the *Contractor* considers any additional information (than presented in this section) that provides more clear understanding on requirement, the *Contractor* is allowed to provide such information. The *Contractor* lists the additional information clearly and provides to the *Employer* along with the bidding documents.

The HVAC equipment is to be located on the 0-meter level of auxiliary bays, unit 1 to 6 CEP VSD Rooms.

Table 7: 105 kW Ducted Type Direct Expansion (DX) Built-up Units or Similar Units

Description	Unit	Number Required	Specified	Tendered
1. DX Unit Design Conditions				
1.1. Direct Expansion (DX) Built-up Units or Similar Units Manufacturer	-	12	To be specified by the Contractor	
1.2. Location	-	-	Outdoors	
1.3. Site Altitude	m	-	1545	
1.4. Summer Ambient Design Temperature DB	°C	-	40°C	
1.5. Nominal Cooling Capacity	kW	-	105 (each)	
1.6. Constant or Variable Air Volume	-	-	Variable Volume	
1.7. Supply Air Discharge Direction	-	-	Front	
1.8. SA Fan Type	-	-	EC Plug	
1.9. Fan Static Pressure at Site Altitude	Pa		750	
1.10. ESP Required, at Site Altitude	Pa		200.0	
1.11. Supply Air Quantity	m³/s	-	9.200	
1.12. Return Air Quantity	m³/s	-	8.28	
1.13. Fresh Air Quantity	m³/s	-	0.92	
1.14. Heating - Reverse Cycle	-	-	None	

Description	Unit	Number Required	Specified	Tendered
1.15. Heating - With Electric Heaters	-	-	None	
1.16. Refrigerant	-	-	R410A or similar	
1.17. Housing (Internal / External)	-	-	Chromadek / Chromadek	
1.18. Insulation	-	-	Polyurethane	
1.19. Framing	-	-	Sealed tongue-and-groove	
1.20. Drip Tray of Stainless Steel	-	-	Yes	
1.21. Damper Filter/s	-	-	Yes	
1.22. Carel pCo Controller	-	-	Yes	
1.23. Remote Control - PGD Display	-	-	Yes	
1.24. Compressors	-	-	Scroll	
1.25. Lead Compressor Starting	-	-	DOL	
1.26. Lag Compressor Starting	-	-	DOL	
2. Indoor Coils / Evaporator Cooling Cycle				
2.1. No. of Coils	-	-	To be specified by the Contractor	
2.2. Make & Model of Indoor Coil	-	-	To be specified by the Contractor	
2.3. Total Cooling Capacity	kW	-	105 (each)	
2.4. Total Air Flow	m³/s	-	9.200	
2.5. On-Coil Conditions	°C	-	24.0 / 16.0	
2.6. Off-Coil Conditions	°C	-	15.2 / 13.1	
2.7. Size of each Coil - Height x Length	mm	-	To be specified by the Contractor	
2.8. No of Rows & Fin Spacing	-	-	To be specified by the Contractor	
2.9. Face Velocity / Air Pressure Drop	m/s / Pa.	-	To be specified by the Contractor	
2.10. Tube / Fin / Frame Materials of Construction	-	-	Cu Tube / Al Fins / Galv. Casing	
3. Primary Filters				
3.1. Type of Filters	-	-	Washable Panel Filter - 50mm Thk. / Aluminium Frames	
3.2. Number & Size (W x H x D)	-	-	To be specified by the Contractor	
3.3. Filter Face Area	m²	-	To be specified by the Contractor	

Description	Unit	Number Required	Specified	Tendered
3.4. Face Velocity				
4. Secondary Filters				
4.1. Type of Filters	-	-	Bag Filter 95% efficiency - 300mm Deep	
4.2. Number & Size (W x H x D)	-	-	To be specified by the <i>Contractor</i>	
4.3. Filter Face Area	m ²	-	To be specified by the <i>Contractor</i>	
4.4. Face Velocity				
5. Outdoor Coils / Condenser Cooling Cycle				
5.1. No. of Coils	-	-	2	
5.2. Make & Model of Outdoor Coil	-	-	To be specified by the <i>Contractor</i>	
5.3. Total Condensing Capacity	kW	-	To be specified by the <i>Contractor</i>	
5.4. Head Pressure Control System	-	-	Condenser AC Fans - Speed Controller	
5.5. On-Coil Conditions Temperature DB	°C	-	40	
5.6. Condensing Temperature DB	°C	-	55	
5.7. Tube / Fin / Frame Materials of Construction	-	-	Cu Rifle Bore Tube / Al (Epoxy) Fins / Galv. Casing	
5.8. Condenser Panels	-	-	Galvanised (Powder Coated)	
6. Electrical				
6.1. Power Supply	V/Hz/ph.	-	400V / 50Hz / 3ph	
6.2. Power Input	kW	-	To be specified by the <i>Contractor</i>	
6.3. Running Amps	Amps	-	To be specified by the <i>Contractor</i>	
6.4. Full load Amps	Amps	-	To be specified by the <i>Contractor</i>	
7. Unit Details				
7.1. Overall Length	mm	-	To be specified by the <i>Contractor</i>	
7.2. Overall Width	mm	-	To be specified by the <i>Contractor</i>	
7.3. Overall Height	mm	-	To be specified by the <i>Contractor</i>	

Description	Unit	Number Required	Specified	Tendered
7.4. Approximate Rigging Weight	kg	-	To be specified by the Contractor	
7.5. Rigging Lugs	-	-	Permanently Attached	
7.6. Panel Thickness	mm	-	50mm	
7.7. Base Profile and Finish	-	-	Steel Channel 178 x 54 + Black Enamel Finish	
7.8. Unit Drain	mm	-	Ø40	
7.9. Lights	-	-	Lights and switch	
7.10. Wiring Termination	-	-	Wiring to switchboard	
7.11. Access Panels / Doors	-	-	Light Weight Doors - Galvanised	
7.12. Unit Trim	-	-	Inner: 50mm x 50mm Al + Outer: 50mm x 50mm Al	

HVAC ASSOCIATED ELECTRICAL WORKS

Table 8: LV AC Cabling, Electrical Panel and Motor Circuits Components

Item No.	Description	Unit	Required	Tendered
1	General requirements			
1.1	Cable Manufacture	-	To be provided by Tenderer	
1.2	Cable Type	-	To be provided by Tenderer	
1.3	Cables rated for interior and outdoor condition, and suitable for working environment	Yes/No	Yes	
1.4	Name of Panel ASSEMBLY Manufacturer	-	To be provided by Tenderer	
1.5	KKS or Plant Coding required	Yes/No	Yes	
1.6	Expected period of use	years	≥ 25	
2	Dimensions of Distribution Board ASSEMBLIES			
2.1	Maximum overall length	mm	To be provided by Tenderer	
2.3	Maximum overall height mm	mm	To be provided by Tenderer	
2.4	Maximum overall dept mm	mm	To be provided by Tenderer	
2.5	Degree of Protection	IP	To be provided by Tenderer	

Item No.	Description	Unit	Required	Tendered
3	Technical requirements			
3.1	Cable's Cross Sectional Area (Size)	mm ²	To be provided by Tenderer	
3.2	Conductor material	-	Copper	
3.3	Maximum operating temperature range	°C	Max. +90	
3.4	Rated AC Voltage	V	400	
3.4.1	Rated short-duration power-frequency withstand voltage	V	2.5 kV	
3.4.2	Rated lightning impulse withstand voltage (common value)	V	5 kV	
3.5	Insulation	-	Halogen free	
3.6	Trademark and Code designation on cable	Yes/No	Yes	
3.7	Fire resistant	Yes/No	Yes	
3.8	Installation method	-	All outdoor cables are to be installed using metal conduits. All installations according to SANS 10142-1 requirements and Eskom Standard 240-56227443.	
3.9	Ground conditions	-	To be provided by Tenderer	
3.10	Number of conductors per cable	-	To be provided by Tenderer	
4	Switches, disconnectors, switch-disconnectors and fuse-combination units for HVAC Panel and Unequipped circuits			
4.1	General			
4.1.1	Manufacturer	-	To be provided by Tenderer	
4.1.2	Type	-	To be provided by Tenderer	
4.1.3	Number of poles	-	To be provided by Tenderer	
4.1.4	Neutral pole type	-	To be provided by Tenderer	
4.1.5	Utilization category (IEC 60947-3)	-	AC-23B	
4.1.6	Heat dissipation from the breaker	W	To be provided by Tenderer	
4.2	Rated Voltages			
4.2.1	Rated operating voltage (Ue)	V	To be provided by Tenderer	
4.2.2	Rated insulation voltage (Ui)	V	1000	

Item No.	Description	Unit	Required	Tendered
4.2.3	Rated impulse voltage withstand(Uimp)	kV	To be provided by Tenderer	
4.2.4	Control voltage	V	To be provided by Tenderer	
4.3	Rated currents			
4.3.1	Rated operational current (Ie)	A	To be provided by Tenderer	
4.3.2	Conventional free-air thermal current (Ith)	A	To be provided by Tenderer	
4.3.3	Conventional enclosed thermal current (Ithe)	A	To be provided by Tenderer	
4.3.4	Rated uninterrupted current (Iu)	A	To be provided by Tenderer	
4.4	Rated frequency	Hz	50	
4.5	Rated duty	-	Uninterrupted	
4.6	Rated making capacity	A	To be provided by Tenderer	
4.7	Rated breaking capacity @ rated voltage	kA @ Ue	To be provided by Tenderer	
4.8	Rated conditional short-circuit current (to SANS 1973-1)	kA	To be provided by Tenderer	
4.9	Operating device (Closing & opening)	Yes/No	Yes	
5	Contactors			
5.1	General		To be provided by Tenderer	
5.1.1	Manufacturer	-	To be provided by Tenderer	
5.1.2	Manufacturer's type (provide rating and type for each load current)	-	To be provided by Tenderer	
5.1.3	Utilisation category (to IEC 60947-4-1)	-	AC3	
5.1.4	Type	-	Held-in	
5.1.5	Recovery voltage	%	To be provided by Tenderer	
5.1.6	On-load operations	-	1 000 000 for Ie <17A 300 000 for Ie >17A	
5.1.7	Type of contact and contact material (e.g. butt/silver)	-	To be provided by Tenderer	
5.2	Operating coil (for held-in contactors) or closing coil (for latched contactors)s			
5.2.1	Rated burden	VA	To be provided by Tenderer	

Item No.	Description	Unit	Required	Tendered
5.2.2	Control supply voltage (Us)	V	230	
5.2.3	Maximum continuous voltage	V	253	
5.2.4	Minimum closing voltage as percentage of Us	%	85	
5.2.5	Maximum drop-out voltage as percentage of Us (held-in contactors only)	%	75	
5.2.6	Minimum drop-out voltage as percentage of Us (held - in contactors only)	%	To be provided by Tenderer	
5.3	Contactor rated voltages			
5.3.1	-rated operational voltage (U_e)	V	To be provided by Tenderer	
5.3.2	-rated insulation voltage (U_i)	V	1000	
5.3.3	-rated impulse withstand voltage (U_{imp})	kV	2	
5.4	Contactor rated current			
5.4.1	Conventional enclosed thermal current (I_{the})	A	To be provided by Tenderer	
5.4.2	Rated operational current (I_e)	A	To be provided by Tenderer	
5.5	Rated making capacity	A	To be provided by Tenderer	
5.6	Rated breaking capacity	A	To be provided by Tenderer	
5.7	Rated frequency	Hz	50	
5.8	Auxiliary contacts (utilisation category AC 14 or DC 13 to IEC 60947-5-1)			
5.8.1	Number of auxiliary contacts (N/O & N/C) – according to standard schematic diagrams including Spares	-	See schematic diagrams	
5.9	Maximum rating capacity of auxiliary contacts (AC)			
5.9.1	Make	A	To be provided by Tenderer	
5.9.2	Break	A	To be provided by Tenderer	
5.9.3	Continuous	A	To be provided by Tenderer	
5.10	Maximum rating capacity of auxiliary contacts (DC)			
5.10.1	Make	A	To be provided by Tenderer	
5.10.2	Break	A	To be provided by Tenderer	

Item No.	Description	Unit	Required	Tendered
5.10.3	Continuous	A	To be provided by Tenderer	
6	Motor starters			
6.1	General			
6.1.1	Switching device / contactor / overload relay combination	Yes/No	Yes	
6.1.2	Heat dissipation from motor starters	W	To be provided by Tenderer	
6.2.1	Manufacturer	-	To be provided by Tenderer	
6.2.2	Type.	-	To be provided by Tenderer	
6.2.3	Tripping current as percentage of set value	%	To be provided by Tenderer	
6.2.4	Operating time at 105 % of set value (hot)	S	To be provided by Tenderer	
6.2.5	Operating time at 600 % of set value(hot)	S	To be provided by Tenderer	
6.2.6	Tripping characteristic curve to be provided	-	Yes	
6.2.7	Condition monitoring functionalities	-	Yes	
6.2.8	Data communication functionalities	-	Yes	
7	Certifications of compliance			
7.1	Type Test Certificate	Yes/No	Yes	
7.2	CE label or equivalent	Yes/No	Yes	
8	Supportive Documents			
8.1	General Physical information	Yes/No	Yes	
8.2	Electrical Properties data sheet	Yes/No	Yes	
9	Additional Information – To be listed by the Tenderer			
9.1	To be defined by the Tenderer	-		
9.2	To be defined by the Tenderer	-		
9.3	To be defined by the Tenderer	-		
9.4	To be defined by the Tenderer	-		
9.5	To be defined by the Tenderer	-		

SPARE PARTS

The *Contractor* includes in his offer all the proposed spare parts for operation and maintenance of the Project. The *Employer*, at its option, may decide to purchase such additional spare parts subject to schedule of delivery to be agreed with the *Contractor*.

1.14. Employer's objectives and purpose of the works

Design, supply and installation of the HVAC VSD Room Modification for Kusile Power station Unit 1- Unit 6

1.15. Interpretation and terminology

Definition	Description
Contractor/Consultant	Service provider contracted to provide a specific service to Eskom, Kusile Power Station.
Client/Employer	Eskom, Eskom Kusile Power Station or representative
Engineer/Engineering Professional	A registered Professional Engineer or a registered Professional Engineering Technologist specialising in and having experience in the design of civil works or structures
Project Manager	Party responsible for managing the contract on behalf of the Employer for the execution of the works

The following abbreviations are used in this Works Information:

Abbreviation	Explanation
AC	Alternating Current
ACC	Air Cooled Condenser
AHU	Air Handling Unit
AFS	Air Flow Schematic
ASHRAE	American Society of Heating Refrigeration Air Conditioning Engineers
BMS	Building Management System
BS	British Standard
CA	Corrective Action
CAV	Constant Air Volume Terminals
CBMS	Consolidated Building Management System
CEP	Condensate Extraction Pump
CIBSE	Chartered Institution of Building Services Engineers
C&I	Control and Instrumentation
CM	Corrective Maintenance
CoE	Centre of Excellence
COP	Coefficient of Performance
CPP	Condensate Polishing Plant
DC	Direct Current
DCS	Distributed Control System
DGN	MicroStation CAD drawing, vector format
DWG	AutoCAD drawing, vector format
DX	Direct Expansion
EFP	Electric Feed Pump
ELL	Equipment Label Lists
FAT	Factory Acceptance Testing
FDCP	Fire Detection Control Panel
FDS	Fire Detection System
FRA	Failure Report Analysis

GA	General Arrangement
HCFC	Hydro chlorofluorocarbon
HBS	Hardware Breakdown Structure
HMI	Human Machine Interface
HVAC	Heating Ventilation and Air Conditioning
ISO	International Organisation for Standardisation
LCC	Life Cycle Cost
LPS	Low Pressure Services
LV	Low Voltage
MCC	Motor Control Centres
MTTF	Mean Time To Failure
MTTR	Mean Time To Repair
MV	Medium Voltage
NKP	National Key Points
O&M	Operating and Maintenance
OEM	Original Equipment Manufacture
OH&S	Occupational Health and Safety
PBS	Plant Break Down Structure
PEC	Professional Engineering Certificate
PFD	Process Flow Diagram
P&ID	Process & Instrumentation Diagram
PM	Planned Maintenance/Project Manager
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Procedure
RAM	Reliability, Availability and Maintainability
RCM	Reliable Centre Maintenance
RCC	Regional Control Centre
RH	Relative Humidity
SANS	South African National Standards
SAT	Site Acceptance Testing
SLA	Service Level Agreement
SLD	Single Line Diagrams
TBC	To be Confirmed
TBF	Time between failures
V	Voltage
VSD	Variable Speed Drive
WB	Wet Bulb

2 Management and start up.

2.1 Management meetings

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

Title and purpose	Approximate time & interval	Location	Attendance by:
Project Kick-off Meeting	3 days Contract Award	Kusile Power Station	Employer, Contractor and Others
SHEQ Requirements Clarification Meeting	3 days after Kick – off meeting	Kusile Power Station	Employer, Contractor and Others
Execution Progress Meeting	Daily	Kusile Power Station	Employer, Contractor and Others
Overall contract progress and feedback	Weekly on Thursdays	Kusile Power Station	Employer and Contractor
Risk register and compensation events	Daily	Kusile Power Station	Employer, Contractor and Others
Other	as and when required		Employer, Contractor and Others
Title and purpose	Approximate time & interval	Location	Attendance by:
Risk register and compensation events	Weekly on _____ at _____		
Overall contract progress and feedback	Monthly on _____ at _____		Employer, Contractor, Supervisor, and _____

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the conditions of contract to carry out such actions or instructions. Attendees shall have the necessary delegated authority to make decisions in respect of matters discussed at such meetings. Records of these meetings shall be submitted to the Service Manager by the person convening the meeting within five days of the meeting.

2.2 Documentation control

All communication between Eskom and a tenderer shall be to or from the Eskom Representative only, in writing, and in a form that can be read, copied and recorded. For this purpose, 'in writing' means hand-written, type-written, printed or electronically made, and resulting in a permanent record. Communication shall be in the English language. Eskom takes no responsibility for non-receipt of communications from or by a tenderer. Any enquiries/comments prior to awarding the contract should be sent to the appointed buyer, enquiries after the award of contract will be dealt with by the responsible project manager on a project basis. Documents for a specific project will be using the project name for identification. All contractual communications will be in the form of properly compiled letters or forms attached to emails and not as a message in the email itself.

Health and safety risk management

Roles and Responsibilities

Appointed contractors and sub- contractors

Note 1: Most of the roles and responsibilities listed apply to both appointed contractors and any sub-contractors. Where some of the listed do not apply to both, then the specific responsibilities will be listed and titled. The contractors shall:

1. Carry out all duties as listed in section 8, 9 and 10, the various other regulations that form part of the OHS Act.
2. Carry accountability and responsibility for the safety and health of their employees and their sub-contractors within their working area, as contemplated by section 37(2) of the OHS Act;

3. Shall keep a record of all employees including the sub- contractor employees, including date of induction, relevant skills and licenses and be able to produce this list at the request of the Kusile power station Project/Contract Manager.
4. Ensure that all their appointees are made aware of their accountabilities and responsibilities in terms of their appointment and that they advise and assist these appointees in the execution of their duties.
5. Ensure that the minimum legislative, regulatory and Kusile power station SHE requirements are complied with on all work sites.
6. Compile a SHE (health and safety) file where all relevant health and safety records must be kept.
7. The Appointed Contractor must hand over a consolidated (to include any sub- contractor's files) health and safety file to the Kusile power station project/contract manager on completion of the project. This is to include all drawings, designs, lists of materials used and other applicable information about the completed project, as well as the list of sub- contractors, the agreement, and the type of work completed.
8. The appointed contractor must provide the project manager **with a certified copy of his/her Compensation Commissioner's valid letter of good standing before the commencement of work and any future renewal letters obtained during the project for record-keeping purposes.** The letter of good standing shall reflect the name of the contractor's company. The nature of business reflected on the issued Logs must be in line with the issued scope of work. Similarly, the appointed contractor must provide the Kusile power station project manager with all the valid letters of good standing from their sub- contractors.
9. Appoint competent staff to perform the project work and ensure that all employees are trained in the health and safety aspects relating to such work and that the employees understand the hazards associated with all other work being carried out on the project.
10. Ensure that all employees are conversant with all relevant work procedures and that they adhere to such procedures. Similarly (without removing the appointed contractors' responsibilities), ensure that their sub- contractors and their employees are conversant with all relevant work procedures and that they adhere to such procedures.
11. Co-ordinate the activities of all the sub- contractors in the interests of safety and health;
12. Ensure that potential contractors (whom they intend appointing) submitting tenders have made detailed provision for the cost of safety and health measures throughout the project.
13. Stop his /her employees and any sub- contractors if project work is not in accordance with the safety health and environmental plan or if such work poses a threat to the health and safety of persons or a risk of degradation to the environment.
14. Only appoint contractors to do work, if satisfied that the contractor has the necessary competencies and resources to perform the work safely.
15. Appoint full-time competent employees in writing to supervise the performance of all specified work throughout the contract period.

Note 2: No work may commence and or continue without the presence of the project manager or project supervisor during performance of the contracted work.

Note 3: In determining the number of competent supervisors, the nature and scope of work being performed, shall be taken into consideration.

Note 4: If a sufficient number of competent employee(s) have been appointed to assist the works supervisor, the works supervisor may supervise more than one site.

16. Appoint a safety officer full time as per project risk.
17. Not victimise or dismiss employees, by virtue of the employees divulging health and safety information or suspecting such information has been divulged, in the interests of health and safety requirements;

18. Follow a process of disciplinary action if any of their employees or their sub- contractor employees has transgressed any of the requirements of the health and safety specification, safety and health plans, site rules or any other requirements.
19. Ensure that all appropriate precautions are taken to protect persons (visitors, members of the public, and other contractors) present at work or in the vicinity of a construction site against all risks that may arise from such site.
20. Ensure that pre-task risk assessments are conducted and documented daily and prior to the starting of any new task, irrespective of whether it is a repetitive task or not.
21. Take prime responsibility for all aspects of environmental management associated with the project activity for which they are responsible.
22. Provide any sub- contractor who is making a bid or is sub- to perform work on Kusile power station's behalf, with the relevant sections of the documented Kusile power station's SHE Specification.
23. Principal contractors are required to approve sub- contractor's health and safety plans if they meet all the requirements.
24. Prior to having pre-employment and periodic medicals fitness examinations conducted, person/man job specifications must be compiled and handed to the occupational health practitioner.
25. Ensure that pre-employment, periodic and exit medicals are carried out on their employees. Medical assessments must be conducted by a registered Occupational Health Practitioner. During the pre-employment medical, where employees will be required to work at heights, they will also be required to undergo the required employee physical and psychological fitness examinations.

Note 5: should the appointed contractor or his/her sub- contractors entertain visitors on site, they will be held responsible for the provision and wearing PPE.

26. Where performing work with the environment, ensure that minimal damage is done and that where an Environment Management Plan is in place, then adhere to the plan.
27. Must have a substance abuse program which must be in line with the requirements of the OHS Act.
28. Ensure that no alcohol or other intoxicating substances are brought on to, or remains on the work sites.

Note 6: Kusile Power Station will not tolerate the presence of anyone who is or who appears to be under the influence of alcohol or any other intoxicating substance whilst performing work for them or on any work site.

29. Ensure that all equipment and tools used comply with OHS Act requirements with respect to condition, use, care, storage, maintenance, and the management of these;
30. Ensure that all incidents are reported and investigated timeously by competent incident investigators.
31. Be involved in all of their sub- contractor's investigations.
32. Establish health and safety committees, hold such committee meetings on all sites, and ensure that sub- contractors participate in their health and safety meetings.
33. Chair their own health and safety committee meetings and record such meetings.
34. Appoint sufficient number of health and safety representatives in terms of legislative requirements and ensure that the sub- contractors appoint health and safety representatives for their work sites.
35. When appointing contractors, advise the project manager in writing timeously and obtain his/her approval prior to them commencing work.
36. Shall keep a record of all employees including the sub- contractor's employees, including date of induction, relevant skills and licenses and be able to produce this list at the request of the Kusile Power Station Project Manager.

Site Managers

1. Must be competent and at least be in a possession of OHS Act and legal liability competencies.
2. Assist the safety officer in conducting site induction training for new staff and site visitors;
3. Communicate to all employees under their control on any hazardous and related work procedures, before any work commences and thereafter, at such times as may be determined by a risk assessment;
4. Ensure that the minimum legislative and Kusile Power Station SHE requirements are complied with on all work sites;
5. Stop any work that is not in accordance with the safety and health plan or if such work poses a threat to the safety and health of persons or a risk of degradation to the environment;
6. Ensure that risk-based personal protective equipment (PPE) has been issued and employees wear/use the PPE as instructed.
7. Inspect such PPE on a regular basis and record the inspections;
8. Ensure that all incidents are reported to the client and are investigated as stipulated in the Incident Management procedure (32-95).
9. Be involved in all investigations that occur within their area of responsibility.
10. Carry out audits and or inspections on their sub- contractors on instructions of their contractor.
11. Ensure that employees under their control are conversant with all relevant work procedures and that they adhere to such procedures;
12. Ensure that daily or pre-task risk assessments are conducted and documented daily and prior to the starting of any new task, irrespective of whether it is a repetitive task. Ensure that the team are involved in the abovementioned risk assessments.
13. Hold tool box talks at the start of each day/ task to discuss health and safety issues as well as confirming the requirements of the daily risk assessments;
14. Ensure that all appropriate precautions are taken to protect persons (visitors, members of the public, and other contractors) present at work or in the vicinity of a construction site against all risks that may arise from such site.
15. Ensure that no alcohol or other intoxicating substances are brought on to, or remains on, the premises / work sites and that no employee remains on site if he/she is under the influence. Furthermore, report such instances to contract management.
16. Ensure that all equipment and tools used on site comply with OHS Act requirements with respect to condition, use, care, storage, maintenance, and the management of these.
17. Not victimise their employees by virtue of their employee's divulging health and safety information or suspecting such information has been divulged, in the interests of health and safety requirements (reference – section 26 of the OHS Act).
18. Where any work is performed which involves the environment, ensure that minimal damage is done to the environment and that where an Environment Management Plan is in place, then the plan adhere to the plan.
19. Stop any employee under his/her control from performing work which is not in accordance with the appointed contractor's and or sub- contractors' health and safety plan which poses a threat to the health and safety of persons.

Contractor site supervisor or Contract Supervisor

Must:

1. Be competent to perform the required supervisory tasks; have attended OSH Act and legal liability, safety for supervisors and HIRA competency training with a minimum of 3 years supervision experience.
2. Ensure their employees and all sub- contractors comply with the required statutory and Kusile Power Station requirements;
3. Inspect all work done by the employees and all sub- Contractors to ensure adherence to Kusile Power Station's standards and specifications
4. Conduct follow-up inspections to ensure findings are closed out and preventative action is in place.
5. Ensuring a Safe working environment is established and maintained by the contractor for the elimination of unsafe acts by all people whilst on the project site.
6. Discuss all SHE related problems with the relevant contractor management timeously in the first instance and thereafter the Kusile Power Station project manager in the second instance relating to procedure requirements, non-conformance's identified, corrective actions, audits and inspection schedules.

7. Ensuring that quality records are maintained in accordance with legislative and Kusile power station requirements;
8. Continual liaison between the appointed contractor, sub- contractors and employees.
9. Ensures that employees and sub- contractors are aware of latest standards, procedures, work instructions and safety regulations issued by Kusile power station:
10. Conduct site Inspections for compliance to SHE requirements and compiles the relevant inspection reports.
11. Participate in all sub- contractor incident investigations.
12. Participate in the appointed contractor's emergency preparedness planning.
13. Ensure that their own employees and those of any sub-contractor are competent to perform the tasks assigned.
14. Issue site instructions on behalf of the appointed contractor where and when the sub- contractors deviate from safety requirements.
15. Assist the appointed contractor with the handing over process, in particular the SHE files and relevant documentation.

Contractor Health and Safety officer

1. The Safety Officer must be suitably qualified with recognised safety qualification and relevant experience.
2. Must be full time on site as per project risk.
3. Promote a SHE culture within the organisations involved in the project / contract.
4. The contractor's safety and health officer shall assist in the control of all health and safety-related matters on the sites.
5. Be involved in the developing the project SHE plan and SHE policy.
6. Be in constant liaison and cooperate with Kusile Power Station's SHE professionals responsible for providing them with a health and safety service.
7. Ensure that this SHE specification is adhered to by his/her appointed contractor and is submitted to any sub- contractors.
8. Conduct audits and inspections of all work sites for the duration of the project.
9. Be involved in the organisations incident investigations when required.
10. Participate in the organisation's statutory and non-statutory health and safety committees meetings.
11. Conduct organisational, site and visitor induction training.
12. Stop any employee or contractor from performing work which is not in accordance with the appointed contractor's and or sub- contractors' health and safety plan which poses a threat to the health and safety of persons.
13. Carry out audits and or inspections on their contractors at least monthly and any sub- contractors on instructions of their contractor;
14. Carry out frequent behaviour observations of employees under their control at least monthly and any sub- contractors on instructions of their contractor.

Specification

Scope of work

The scope of work includes the design, supply and Installation of the HVAC VSD Room Modification for Kusile Power Station Unit 1 – Unit 6

Legal Compliance

Section 37(2) (Legal) Agreement

A section 37(2) agreement must be signed between Kusile Power Station and the appointed contractor at the time of awarding the contract. The appointed contractor must ensure that a section 37(2) agreement is compiled between the appointed contractor and all their sub- contractors for the contract.

The original copy of the section 37(2) Agreement must be retained by the contractor and a copy retained by the responsible project manager.

A copy of all the agreements must form part of the respective appointed contractor's SHE file.

Note: The agreement must be signed by both parties i.e Kusile Power Station (GX) Project Manager and the Appointed Contractor. The authorization shall not be issued to the appointed contractor without the signed 37(2) document.

Site Access requirements

The OHS file package must be submitted to the OHS department electronically **2 weeks** before the agreed project commencement date.

Before the successful Contractor commences with any work, the Kusile Power Station Project Manager/Contract Manager shall ensure that;

- A copy of the SHE Specification document is in the possession of the principal contractor as well as the Kusile Power Station baseline risk assessment.
- The responsible person of the contracting company and the Kusile Power Station project manager/contract manager have signed the Occupational Health and Safety Act Section 37 (2) agreement.
- The appointment of the appointed Contractor have been concluded and signed by the Contractor and Appointed Project Manager.
- The SHE plan has been discussed with the responsible person of the contracting company and approved in writing by the Kusile Power Station Contract Manager.
- A task specific baseline risk assessment must be part of the SHE Plan and accompanied by a risk assessment procedure applied. A monitoring and review plan must form part of the baseline risk assessment
- Where a Sub Contractor(s) is appointed by the Appointed Contractor, the Contractor supplies the applicable Kusile Power Station SHE specifications to the Sub Contractor(s).
- Where a Sub Contractor(s) is appointed by the Appointed Contractor, the safety file for the sub-contractor must also be submitted to safety department for approval
- The OHS department shall assess and give written feedback to the contract manager.
- The safety file shall be approved by a form of a written letter, the letter shall authorise the appointed contractor to commence with site establishment.

Hazardous work by children (Child Labour)

The constitution of the Republic of South Africa, in the "Bill of Rights" is clear on the rights of children, especially when it comes to:

1. being protected from exploitative labour practices;
2. not to be required or permitted to perform work or provide services that
 - i. are inappropriate for a person of that child's age; or
 - ii. Place at risk the child's well-being, education, physical or mental health or spiritual, moral or social development; and the Basic Conditions of Employment Act, Chapter six Section 43 "Prohibition of employment of children".

Before resorting to the use of child labour, due consideration must be given to the rights of the child in terms of the constitution. Where work is being performed which is not prohibited in terms of the constitution, then such work must be conducted in terms of the OHS Act "Regulations on Hazardous Work by Children in South Africa" with emphasis on paragraph 2 Purpose and Interpretation. Kusile Power Station does not condone the use of child labour and therefore all effort must be exercised and child labour should not be used.

OHS Act

The appointed contractor and sub- contractors shall have an up to date copy of the OHS Act and regulations which will be available to all employees. The copy of the OHS Act must be placed conspicuously where all employees can easily access it.

Legislative compliance

All contractors will comply with all the legislation pertaining to this contract being:

The appointed contractor and all sub- contractors which may be appointed by the principal contractor will comply with all the legislation pertaining to the issued scope of work.

Requirements specific to the issued scope of work

- The issued scope of work falls under a high risk category as the Contractor employees will be designing, supplying and constructing dust shields structures at the Compressor East and West buildings at Kusile Power Station.

In compliance with legal and other requirements, the following requirements must be complied with fully:

- Submit a detailed SHE plan which must be suitable, practical, site specific, well- documented and a workable SHE document, compiled to satisfy the requirements of the OHS Act 85 of 1993, the Sub-'s safety specifications and other relevant legislation. The SHE plan must be aligned in terms of suitability and adequacy to the extent of the scope of work. The SHE plan should detail how health and safety would be implemented while on site looking at the scope of work as well as any legal and other requirements applicable to the project to be carried out.
- The SHE plan must show and describe the assignment of responsibilities, procedures and actions to be taken in the process of implementing and maintaining the SHE plan as well as include how deviations/non-conformances shall be managed.
- The SHE plan must be accepted by the OHS functionary before commencement of work.
- Employees must be medically fit to perform the task.
- Medical certificates of fitness that are valid must be part of the safety file package including identification documents of the employees and their competency certificates.
- The safe work procedures must indicate how the maintenance and outage repairs for boiler pressure parts and high pressure pipework will be done safely without endangering the health and safety of employees.
- The Appointed Contractor to ensure that all persons who work at height or who will be required to do rescue at height shall receive three days of FAS training and two days of rescue training in accordance with unit standard 229998 and 229995 employees that will be working at heights are trained to the correct Unit standard.
- A detailed Risk Assessment to be submitted for all working at height activities, developed by a competent fall protection planner.
- The working at height Risk assessment to be supported with a sound rescue plan.

The method statements must be approved in writing by the Eskom Kusile Generation Project Manager assigned for this project.

- The method statements must be approved in writing by the Eskom Kusile Generation Project Manager assigned for this project.
- The contractor must identify suitable PPE required for the activities including the identification of appropriate tools.
- The contractor must submit job descriptions supported by proof of competencies for all employees.
- First aid appointments must be made to meet the requirements, appointees must be trained to level 2 from SAQA approved training provider.
- Applicable legal appointments must form part of the safety file with competency certificates per appointment.
- The appointed contractor must submit a Covid-19 risk assessment, Covid-19 management plan, Covid19 policy and an appointment letter for a Covid-19 compliance officer in line with the guidelines as issued by the Department of Employment and Labour
- No vulnerable employees are allowed to come to Kusile Power Station site as identified by the Department of Employment and Labour
- The appointed contractor must supply hand gloves and hand sanitizers to the employees
- The transport used to transport employees must be disinfected as per prescribed frequency
- All risk assessments must be compiled by competent person, who has a certificate of competency for Risk Assessment from SAQA approved training provider.

Confined Spaces

- At least one door or manhole giving access to each confined space must be provided with a means to lock such door or manhole in the open position. A confined space warning sign must also be attached next to such entrance of a confined space when entry into this area will be required.
- The door or manhole concerned must be locked in the open position and a confined space warning sign attached before any person is allowed to enter such confined space. The locking, or other preventative measure, must constitute an integral part of the isolation required before the permit to work is issued.
- Before any door giving access to a confined space is closed, the person closing such door must ensure that there are no persons inside the confined space, and that all tools, equipment and debris have been removed.
- Where a confined space can be isolated and adequately ventilated, this must be done before the space is environmentally tested and certified. Thereafter a gas test certificate, environmental certificate as well as a safe entry certificate (where required) must be issued before any person is allowed to enter.
- In addition:
 - i. Adequate ventilation, gas monitoring and thermal stress monitoring (heat stress – WBGT index - cold stress) must be maintained while persons remain in the space.
 - ii. Only approved lighting and portable electrical tools shall be allowed, (Refer Electrical Machinery Regulation 10 of the Act).
 - iii. A permit to work must be issued.

Safety, Health and Environmental file package requirements

The following documentation must form part of the SHE file:

- The appointment contractor and each sub-contractor shall each have a SHE Policy that shall be duly signed by an authorised signatory concerning the protection of the health and safety of contractor's personnel and others in and about the execution of the works, including a description of his organisation and the arrangements for carrying out and reviewing such policy.
- A copy of the SHE Policy shall be provided as a tender returnable. Tenderers shall furthermore supply method statements containing sufficient detailed information to demonstrate compliance to this Schedule.
- Proof of communication of the SHE policy to employees must be attached with the submitted signed SHE policy.
- All contractors shall prominently display a copy of the policy in the workplace where the contractor's personnel normally report for service.
- The sub-contractor's SHE Plan shall demonstrate the management process and procedures that shall be adopted to ensure compliance to requirements listed in this schedule and other contract documents requirements.
- These management processes shall identify each activity, the foreseeable internal and external hazards, the specific precautions and controls that shall be necessary to ensure that the Works commence and continue safely and without risks to health or to adjacent operations
- The SHE Plan shall further demonstrate the Contractor's commitment to safety, health and environmental requirements and shall, as a minimum include the following elements:
 - Compliance to this SHE specification
 - Relevant applicable legal and other requirements as per issued scope of work.
 - Roles and responsibilities.
 - Process for hazard identification and risk assessment including monitoring and review plans, a further identification of opportunities must be part of the process. Interested and affected parties must be clearly outlined.
 - Process for change management.
 - Process for employee training, competency, communication, awareness and participation.
 - Process for incident management and investigation.
 - Process for setting objectives and programmes.
 - Process in place to review the SHE plan.

- Process for performance management and monitoring.
- Process for internal audits.
- Process for document and records management.
- Planning of conduct of work activities including planning for changes and emergency work
- Personal Protective Equipment procedure and rules.
- Emergency planning and fire risk management
- Vehicle and driver behavior safety
- Competency, training, appointments
- Communication and awareness
- Identification of Environmental Aspects, their associated impacts, mitigation measures and management thereof.
- Management commitment and visible felt leadership
- The sub- contractors SHE Plan shall be reviewed from time to time (and in any event as and when required by the client) to ensure that it fully addresses all the issues and complies with these requirements to the satisfaction of the client.

The following competencies are mandatory for this type of work:

- Risk assessor competency
- Working at height competency (FAS training in accordance with unit standard 229998 and 229995)
- Level 2 first aider competency
- Supervisor competencies i.e. Technical competencies, OSH Act and legal Liability, HIRA and safety for supervisors course.
- SHE Rep competency
- Safety officer competency
- Fall protection plan developer
- PDP and driver licences where applicable
- Emergency Coordinator and Evacuation wardens
- Incident Investigator

Costing for SHE within the Project

The SHE costing must be itemised and must take into consideration the scope of work. The appointed contractor must make sure that he/she made adequate provision for the cost of health and safety measures during tendering process. However this does not replace the normal SHE requirements pertaining to the organisation in terms of the OHS Act, General Safety Regulations 2 and Section 8 (2)(e).

COLD

The appointed contractor and all his/her sub- contractors shall be registered and in good standing with compensation fund or with a licensed compensation insurer as contemplated in the compensation for occupational injuries and diseases Act , 1993 (Act No. 130 of 1993). The obligation lies with the contractors to ensure that the LoG remain valid throughout the contract period. A copy of the LoG must be filed in the contractor SHE files.

Legal and other Appointments

- For the duration of the contract, the appointed contractor and all sub- contractors shall appoint competent employees who will meet the requirements of the OHS Act.
- Where appointments are made, contractors shall ensure that the appointees have been suitably trained and or informed of their responsibilities before getting them to accept such appointment.
- The relevant statutory appointments shall be made in accordance with the requirements of the OHS Act which includes the requirement of a competent person being appointed in the relevant roles. The statutory appointments must reflect the extent of the scope of work issued.

Eskom Life-saving Rules

1. Six Life-saving rules have been developed that will apply to all Eskom Employees, agents, consultants, and **contractors**. Failure to adhere to these rules by any Eskom employee or employee of an Appointed Contractor or sub- contractor will be considered a serious transgression. These rules are being implemented to prevent serious injury or death of any employee, labour broker or contractor working in any area within Eskom.
2. If any contractual work will be performed on any Eskom premises (including delivery of any product), then the rules **shall be obeyed** by any contractor and their employees.

The Life-saving rules are:

RULE	DESCRIPTION OF RULE
Rule 1	OPEN, ISOLATE, TEST, EARTH, BOND, AND/OR INSULATE BEFORE TOUCH (That is plant, any plant operating above 1000 V)
Rule 2	HOOK UP AT HEIGHTS Working at height is defined as any work performed above a stable work surface or where a person puts himself/herself in a position where he/she exposes himself/herself to a fall from or into.
Rule 3	BUCKLE UP No person may drive any vehicle on Eskom business and/or on Eskom premises: Unless the driver and all passengers are wearing seat belts.
Rule 4	BE SOBER No person is allowed to be under the influence of intoxicating liquor or drugs while on duty
Rule 5	PERMIT TO WORK Where an authorisation limitation exists, no person shall work without the required permit to work.
Rule 6	NO REVERSING WITHOUT A SPOTTER/FLAGMAN Whenever a construction vehicle has to reverse, there must be a flagman to guide the driver at all times.

Eskom will take a stance of zero tolerance on these rules.

Non-compliance to a Life Saving rule will be considered serious misconduct and will lead to serious disciplinary action, which may include dismissal.

This is to ensure that **every person** who works on or visits an Eskom **returns home safely to his or her family**.

Substance Abuse

1. Alcohol and substance abuse poses a significant threat to any business, more so in industrial incidents and the driving of vehicles. Eskom is therefore, entitled to take reasonable steps to ensure that intoxicated persons are identified and prevented from entering Eskom.
2. General Safety Regulation 2A is clear on the legal stance regarding intoxication.
3. The alcohol and drug permissible level is 0%.
4. All contractors shall comply with Eskom's procedure 32-37 ("Substance Abuse Procedure"), taking into account that this is an Eskom Life-saving Rule number 4: BE SOBER).
5. Due to COVID-19, ESKOM as suspended ad hoc alcohol test at entry points. Alcohol tests will only be performed when there is reasonable evidence that an employee is under the influence of alcohol.
6. Contractors are encouraged to compile their own manual and to carry out alcohol testing of their own employees when there is reasonable evidence that the employee is under the influence of alcohol. The legislative alcohol level is deemed to be zero.

7. Test records must be treated as "Confidential" and filed in the employees' personal file.

Contractor organisational Structure

Appointed Contractor Organogram

The appointed contractor must provide an organisational organogram related to this contract, depicting all the levels of responsibility from the CEO down to the supervisors responsible for the contract. List the relevant positions held, names of appointees and legal appointments. The organogram must be accompanied by CVs of the workforce as well as proof of competencies.

The appointed contractor must ensure that all sub- contractors comply with this requirement. The appointed contractor is responsible for keeping copies of all the organograms as well as submitting them with the SHE plan. All organograms shall be updated timeously when appointments are changed.

This diagram must be kept up to date and filed in the project SHE files.

Sub- Contractor/s Organogram

1. Sub- contractors are required to compile their company organogram for the project, listing the reporting structure from their CE down to their project supervisors. The diagram must list the names, positions held and any appointments made.
2. This diagram must be kept up to date, a copy of which must be given to the appointed contractor and a copy filed in the relevant project SHE files.
3. This diagram must be kept up to date and filed in the project SHE files.

Risk assessment (refer sec 8 & 9 of the OHS Act)

It is a legal requirement in terms of Section 8 (2)(d) of the OHS Act for an employer to carry out risk assessments, to establish which risks and hazards are attached to the health and safety of persons due to any work which is performed, any article or substance which is, handled, stored, transported.

Kusile Power Station shall prepare and provide a Baseline Risk Assessment for an intended work as per the scope of work to the contractor as part of the contract package.

The appointed contractor shall develop a risk assessment in line with Section 8 (2)(d) of the OHS Act, in alignment to Eskom 32-520 procedure. Emerging risks and hazards must be managed during the duration of the contract. This means that if there are significant changes to a process or activity, or any new process, then these should also be subjected to risk assessment.

All risks must be rated. Activity based risk assessments shall be conducted by a competent person of the Appointed Contractor.

High Risk Activities

When the appointed contractor and/or his contractors are working in an area where a high health and safety hazard exists, the appointed contractor shall:

- Ensure that permanent and adequate on-site supervision is available for the entire duration of the work that is being conducted.
- Ensure correct PPE is worn for the task
- Provide, erect and maintain all the required barricading, lighting, flags, flashing lights, or other safety control equipment to enable operations to proceed in a safe manner;
- Maintain, at all times, defined access ways, which are clear of objects or obstructions, so as to allow for emergency vehicle entry; and
- Provide any temporary protective shielding required for protecting nearby operations, at his own cost.
- The appointed contractor shall on a daily basis and for every task to be performed, conduct an issue based risk assessment with all contractors' personnel involved with the task(s). The issue based risk assessment shall form the basis of the daily pre-job briefings / tool box talks prior to the start of work. Proof of communication that contractor employees were involved in the assessment will be noted on a standard form, which shall be kept at the job site during the job execution.
- The completed risk assessment must be signed by a competent risk assessor.

Working at Height Procedure

General Requirements

Persons may only work from a fall risk position if a site-specific fall protection plan is in place and correctly implemented and consists of the following:

1. A fall protection plan developer must be appointed in writing.
2. Baseline risk assessment, which is specific and incorporates the working at height risk assessment, as well as the site-specific risk assessment, has been completed for the work to be conducted.
3. Safe working procedure/task analysis and work instructions, approved by a competent person, are in place.
4. The procedure addressing the inspection, testing and maintenance of all fall protection equipment is in place.
5. A fall rescue plan detailing the necessary procedure, personnel and suitable equipment required to affect a rescue of a person in the event of a fall incident to ensure that the rescue procedure is implemented immediately following the incident. Appropriate training, as determined by the risk assessment, has been provided.
6. Appropriate fall prevention equipment and fall arrest equipment have been issued and used when there is a fall exposure.
7. There are equipment inspection procedures and up-to-date inspection records.
8. Individuals are medically fit to work at height, and records of this are kept.
9. A site-specific risk assessment is performed.
10. All persons who at height or who will be required to do rescue at height shall receive three days of FAS training and two days of rescue training in accordance with unit standards 229998 and 229995
11. The contractor must ensure that all persons who work at height and those who will be required to do rescues at height shall receive training according to the relevant unit standards. As a minimum, individuals who work at height and are responsible for performing a rescue must undergo three days FAS training (Unit Standard 229998), and rescuers must furthermore undergo two days of rescue training in accordance with unit standard 229995. Rescuers must be appointed in writing for that particular site/project.

While work is in progress, adequate warning signs and/or barricades shall be used in all areas where there is a risk of persons being injured by materials or equipment falling from the work area. Barricades should be continuous and easily visible.

A drop zone shall be established with appropriate warning signs and barricading, warning personnel below of workers above and potential falling objects.

Every employer shall ensure that work at height is:

1. Properly planned.
2. Appropriately supervised; and
3. Carried out in a manner that is, as far as is reasonably practicable, safe and that its planning includes the selection of work equipment.

Fire Equipment and maintenance

1. All firefighting equipment's that have been provided shall:

- a. Be clearly labelled
 - b. Conspicuously numbered
 - c. Entered in a register
 - d. Inspected monthly by a competent person
2. Tested and serviced at recommended intervals by an accredited supplier
 3. Results entered in the register and signed by competent person.

First Aid and Equipment

1. The requirements of the OHS Act GSR 3 must be observed.
2. First Aid appointments must be made to meet the requirements, this includes construction sites. Appointees must be trained to level 2. It is good practice for all employees to be trained to at least level 1.
3. When appointing employees for work sites, cognisance must be taken into account the type of work performed, the distance teams are working apart and the terrain to be covered if an emergency should arise.
4. A list of emergency numbers must be displayed on the notice boards and made accessible for all employees.
5. Appointed contractor must ensure that his /her employees and sub- contractor employees are familiar with the emergency numbers.
6. Contractors shall have one first aid box for the first 5 persons and thereafter one for every 50 or team of workers on site or part thereof, taking into account the type of work performed and the distance between teams.
7. More first aid boxes shall be provided in accordance with the risk assessment. Boxes must be available and accessible for the immediate treatment of injured persons at the workplace.
8. For offices, signs indicating where the first aid box or boxes are kept as well as the name and contact details of the first aider of such first aid box or boxes shall be erected.
9. The appointed contractor and sub- contractor shall ensure that alternative arrangements be made for incidents occurring after working hours.

SHE Communication Systems

- Appointed contractor/s and their sub- contractors must develop a communication procedure outlining how they intend to communicate SHE issues to their staff, the mediums they will employ and how they will measure the effectiveness of their SHE communication. Communications shall include:
 - ✓ The daily Tool box talks that shall be documented and accompanied by proof that employees were part of the talks.
 - ✓ Pre- job briefing before commencement of tasks and post- job briefing after the completion of the task.
 - ✓ Any shift handover must be documented where applicable
- Where project meetings are conducted on site, SHE shall be included as a standing agenda point and minutes of these meetings shall be available on site at all times. Minutes of meeting must be compiled and filed in the relevant SHE files. All employees shall have access to these minutes. Attendance register shall be kept for all the health and safety meetings.

SHE Committees

1. The appointed contractor shall establish statutory health and safety committee in terms of Section 19 of the OHS Act, Act. Similarly, sub- contractors shall establish their own statutory health and safety committee.
2. All sub- contractors shall be members of the appointed contractor's safety committee.

3. The Committee shall meet to discuss SHE issues concerning the current work being performed, training, upcoming work and SHE requirements, incidents and lessons learned specific SHE problems, safety performance, action plans and other relevant SHE issues.
4. SHE representatives for a workplace shall be members of the relevant workplace safety committees (Refer to Section 19 (2) (a) of the OHS Act).
5. The number of persons nominated by employer must not be more than the Health and Safety Representatives on that specific statutory health and safety committee. (Refer to Section 19(2)(c) of the OHS Act)
6. A statutory health and safety committee meeting shall be held at least 3 monthly (where medium to high risk work is involved, more frequent if required), and all sub- members of the committee shall attend the meeting.
7. Statutory health and safety committees may make recommendations to the appointed contractor and the project manager and the Inspector at DoL.
8. All health and safety committees shall discuss all projects related OHS Act Section 24 and 25 incidents and other notified serious incidents.
9. Health and safety committees shall follow up on incident investigation recommendations and shall keep record of all recommendations made by the committee.
10. Statutory health and safety committees may make recommendations for the revision of current standards, procedures and practices.
11. The sub- contractor and sub- contractors shall ensure that statutory and non-statutory health and safety committees carry out their duties.
12. The chairperson of the health and safety committees shall be selected and sub- by the contractor. The sub- chairperson must be competent to chair meetings and be able to make informed decisions.

Non-statutory health and safety committees

1. Where there are large worksites, then non-statutory sub-committee must be established within that worksite to assist with the communication of health and safety related matters between the statutory health and safety committee and the workplace.
2. The duties and responsibilities of the non- statutory health and safety committees will be the same as the statutory safety committee

SHE Training

1. The appointed contractor, when making a bid for this project shall provide a breakdown list of the SHE training requirements and the costing of such requirements. Similarly, sub- contractor must provide the same requirements when bidding with the appointed contractor.
2. The scope of training includes but is not limited to the type of work being performed. Additional to the requirements, will be that the appointed contractor and sub- contractors must have the appropriate qualifications, certificates and employees should always be under competent supervision.
3. Where legislative and Kusile power station recommended appointments are made, the relevant training shall be given to those appointees prior to the acceptance of those appointments.
4. When there is an amendment to the Acts and/or to the regulations, SHE specification and SHE plan, all affected staff shall undergo the applicable refresher training.
5. Appropriate time must be set aside for training (induction and other) of all employees.
6. Records of all training and qualifications of all contractor employees must be kept on the SHE file.

Induction training

The appointed contractor shall ensure that all his / her employees, sub- contractors and their employees have undergone the Kusile Power Station Safety contractor management induction training prior to commencing work on site and shall be renewed annually.

Appropriate time must be set aside for training (induction and other) of all Contractors' personnel including the annual re-induction training.

1. Attendance registers must be completed of any induction training given, which must indicate that they have received and understood the induction training.
2. Prior to attending the induction training, all employees must undergo a pre-employment medical examination and found fit for duty. A copy of the certificate of fitness must be kept in the SHE file on site for the duration of the project.
3. All employees and visitors on site shall carry the proof of induction training.
4. MS teams will be used as a platform for inductions to contain the spread of COVID-19.

Site specific induction training

The appointed contractor shall ensure that all his / her employees and sub- contractor employees undergo site specific work induction with regard to the approved project SHE plan, general hazards prevalent on site, risk assessment, rules and regulations, and other related aspects. Records of site specific induction must be kept in the safety file

The induction training should also include identification of sensitive features such as wetlands/vlei areas, red data species, graves, etc.

Visitors to site induction

1. Visitors to the site shall be required to undergo and comply with the appointed contractor's site-specific safety induction prior to being allowed access to site.
2. All visitors must remain in the care and custody of a person (host) who has been properly inducted. No visitors are permitted to undertake any work onsite, of any nature.
3. Visitors who have completed site induction must be provided with a record of proof of Induction training.

Requirements for vehicles

1. The appointed contractor must have a system/ process to manage vehicle access to laydown area/site.
2. The appointed contractor must maintain their vehicles in a roadworthy condition and a vehicle license must be valid at all times.
3. Contractor vehicles can be subject to inspections by the contract/project manager
4. Vehicles which are not roadworthy will not be permitted to be used on site.
5. Precautions shall be taken to secure all loads properly. Loads projecting from vehicles shall be securely loaded and in daytime a red flag and during darkness a red light or red reflective material shall be attached to the extreme end of such projecting material.
6. All vehicles must be fitted with fire extinguisher and first aid kit.
7. Activities such as loading and offloading of material/equipment must be included in the fall protection plan and the risk assessment if there is a risk of falling.

Requirements for Drivers

1. The driver must have a valid national licence for the type of vehicle used
2. The driver must have level 1 first aid training and basic fire extinguisher training

3. It is the responsibility of the driver to ensure:
 - a. Their passengers wear seat belts whilst the vehicle is in motion.
 - b. Comply with all traffic road rules, safety, direction and speed signs.
 - c. Ensure that vehicle loads are properly secured prior to moving off.
 - d. Ensure that vehicles are not overloaded.
4. No drivers or operators may text, talk on cell phones or two way radios whilst driving, unless a hands free kit is used.
5. All drivers of such vehicles are to have valid medical fitness certificates.
6. Drivers of light vehicles must avoid stopping or parking in the vicinity of machines. At least 30 (thirty) meters must be left clear between such a vehicle and such a machine
7. Drivers/operators shall be responsible for the travel-worthiness of all loads conveyed by them.

Housekeeping and Order

1. All contractors shall maintain a high standard of housekeeping within their sites and vehicles for the duration of the project.
2. Prompt disposal of waste materials, scrap and rubbish is essential.
3. Materials/objects shall not be left unsecured in elevated areas –falling objects may cause serious injuries/fatalities.
4. Nails protruding through timber shall be bent over or removed so as not to cause injury.
5. All packaging material including boxes, pallets, crates, etc. to be removed from the work area immediately.
6. On completion of his / her work, the contractor is responsible for clearing his / her work area of all materials, scrap, temporary buildings and building bases to the satisfaction of the client/agent.
7. In cases where an inadequate standard of housekeeping has developed, compromising safety and cleanliness, anyone has the responsibility to bring it to the attention of the appointed contractor in the first instance and the Eskom Kusile project/site manager in the second instance.
8. The Kusile power station Project/Site Manager has the right to instruct the appointed contractor and sub- contractors to cease work until the area has been tidied up and made safe. Neither additional costs nor extension of time to the contract shall be allowed as a result of such a stoppage. Failure to comply with this requirement will result into site cleaning by another cleaning contractor company at the cost of the appointed contractor.
9. The sub- contractor shall carry out regular safety/housekeeping inspections (at least weekly) to ensure maintenance of satisfactory standards. The appointed contractor shall document the results of each inspection and shall maintain records for viewing.
10. All contractors must comply to the Kusile Power Station Barricading practice note: 240-131824200.

Workplace Signage and Colour Coding

1. When using, an explosive power tool the appropriate signage shall be erected, warning people of its use.
2. The principal contractors shall provide signage where work is conducted and where unauthorised entry is prohibited and/or where alerting and cautioning passers-by to be aware of potential dangers.
3. The meanings of the appropriate symbolic signage must be discussed during induction training and toolbox talks.
4. Where possible, within workshops, work areas and established premises, the appropriate sign indicating the meaning of symbolic safety signs must be displayed.

Tools and Equipment

1. Contractors shall ensure that all tools and equipment are identified, safe to be used and is maintained in a good condition.
2. Contractors shall ensure that all tools and equipment are listed on an inventory list, be regularly inspected at least monthly or as required by legislation and risk assessments.
3. The equipment should be numbered or tagged so that it can be properly monitored and inspected.
4. All tools that emit noise shall be clearly marked with the emitted noise levels
5. Where applicable, tools and equipment must have the necessary approved test or calibration documentation prior to being brought onto the project and the records shall form part of the SHE plan. Maintenance calibration shall be undertaken in terms of the manufacturer's requirements.
6. All fuel driven equipment must be properly maintained in accordance with the manufacturer's recommendations and legal requirements.
7. Kusile power station reserves the right to inspect tools or items of equipment brought to site by contractors for use on this project.
8. Explosive power tools must be treated with extreme caution and be operated by specially trained employees.
9. Should Kusile Power Station personnel find any item that is inadequate, faulty, unsafe or in any other way unsuitable for the safe and satisfactory execution of the work for which it is intended, the Kusile Power Station personnel shall advise the contractor in writing and the contractor shall forthwith remove the item from site and replace it with a safe and adequate substitute.
10. Pneumatic tools must be used according to the manufacture's specifications.
11. Users of the pneumatic tools must be trained in the use of such tools.
12. Pneumatic tools must be inspected regularly, and defective tools must be removed from site.
13. Where defective tools and equipment's are identified, such tools and equipment shall be removed out of site immediately, locked away to prevent further use until such time as the tool or piece of equipment has been repaired.
14. Contractors shall ensure that the appropriate records are kept for all tools and equipment used on the project. Such tools and equipment's shall be subjected to regular inspections.

Machinery, tools and equipment Machinery is considered as any article or a combination of articles assembled, arranged or connected and which is used or intended to be used for converting any form of energy to perform work, or which is used, or intended to be used, whether incidental thereto or not, for developing, receiving, storing, containing, conforming, transmitting, transferring or controlling any form of energy.

The requirements for the use of machinery are covered in the various regulations of the Occupational Health and Safety Act.

There are strict requirements regarding the supervision and use of machinery. Since incorrectly used machinery or using unsafe machinery can cause serious harm and/or damage, it is important to ensure that all mechanical equipment is safeguarded in order to protect the health and safety of persons who may be exposed to such mechanical equipment, and also to ensure that competent persons operate the machinery.

Hand tools

1. All hand tools (hammers, chisels, spanners, etc.) must be recorded on a register and inspected by the appointed supervisor on a monthly basis as well as by users prior to use.
2. Tools with sharp points in tool boxes must be protected with a cover.
3. The hand tools should be numbered or tagged, and colour coded so that it can be properly monitored and inspected.

4. All files and similar tools must be fitted with handles.
5. Tools with sharp points in tool boxes must be protected with a cover.
6. No make-shift tools allowed at Kusile Power Station.

Eskom SHE audits

Kusile Power Station shall evaluate the principal contractor SHE performance on monthly basis against the legal, Kusile Power Station requirements, SHE specification and the contractors SHE plans as the scope of works falls under a high risk category according to Kusile Power Station audit methodology risk matrix

These audits shall be attended by the contractor's site manager or the safety officer.

If there are any findings / non-compliance identified as serious in these audits, an activity will be stopped for that specific appointed contractor and sub- contractor. Refer to section on "Work Stoppage" in this SHE Specification.

Note: Kusile power station reserves the right to conduct unannounced audits and inspections on contractors

Contractor audits

The appointed contractor is required to audit their sub- contractors on the implementation of their SHE Plan on a monthly basis or when the scope of work changes. A summary of the findings and the proposed corrective actions shall be submitted to Kusile Power Station OHS department within one week after completion of the audit and a copy of the audit report shall be submitted to the sub- contractor within 7 days of the audit.

3.22 Smoking

The national smoking policy must be adhered to. At Kusile Power Station smoking is permitted in designated areas only (Eskom Smoking Procedure 32-36).

3.23 Cellular Phones

The national requirements regarding the use of cellular phones must be adhered to, in particular when driving and or operating mobile equipment and or machinery.

General Requirements as per the cellular phone usage generation directive

- Cell phones shall not be used while operating any crane, hoist, powered industrial trucks, pay loaders, forklifts or other lifting device.
- Not be used while engaged in any job task that requires the use of the hands and/or the full attention of the employee, contractor, or visitor (i.e. fire watch, equipment operator, operating a valve, etc).
- Be turned off in any area containing flammable/combustible vapours, e.g. turpentine system, methanol system, fuelling stations, oil and propane storage tanks, flammable/combustible material storage areas.
- Not to be used when climbing and descending any form of staircase.
- Not to be used for text messaging whilst walking.

Medicals

Note: Kusile Power Station will only accept medical surveillances conducted by an Occupational Health Practitioner who holds a qualification in occupational health.

1. Appointed contractors must ensure that their employees and their sub- contractor employees have a medical surveillance program whereby their employees under go entry, periodic and exit medical fitness examinations.
2. In order for the appropriate medical examinations to be conducted, each employee must have a man job specification, which must indicate the description of work, list of hazards and potential occupational exposure limits, physical hazards and required physical attributes.
3. Medical fitness certificates shall be renewed annually for employees who are working on site. This shall be maintained until completion of the contract.
4. The appointed contractor must ensure that his / her employees and sub- contractor employees have undergone pre-entry medical examination before starting work on the contract.

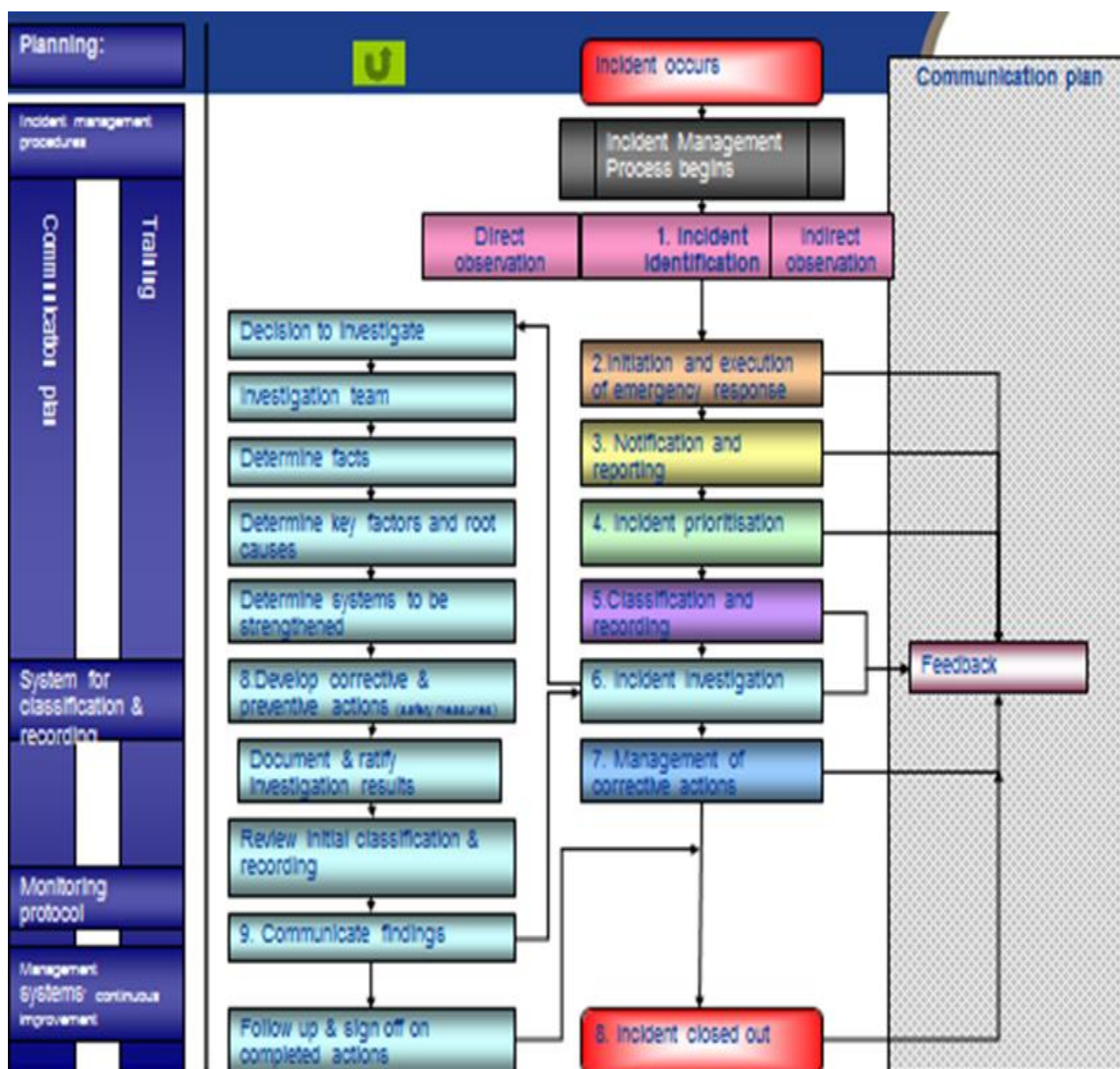
5. The sub- contractor shall provide a documented process for managing those employees who are issued with a conditional certificate of fitness.

Personal Protective Equipment Requirements

1. The appointed contractor must provide a detailed programme that includes the issuing, maintenance and replacement of PPE for all his employees and sub- contractors on site.
2. All contractors shall comply with the requirements of GSR 2 of the OHS Act.
3. The risk based PPE matrix must be compiled detailing the types of PPE that is required to be issued to employees performing the respective tasks.
4. Additional PPE shall be identified from task risk assessments for specific areas and tasks.
5. All contractors shall ensure that their visitors wear and use the correct PPE whilst on worksites.
6. Where PPE is required and visitors are not in possession of, then it is the individual contractor's responsibility to provide the PPE.
7. All PPE purchased and used by all contractor employees including visitors must comply with the relevant SANS standards.
8. Where deemed as a requirement, then high visibility vests shall be worn.

Incident Investigation

- All incidents shall be investigated in terms of OHS Act General Administrative Regulations 8 and 9, using Eskom Procedure 32-95 as a reference, and where injuries as contemplated in sections 24 and 25 have been sustained, be reported to the Department of Labour.
- Appointed contractor must develop their own incident management procedure that is in line with Eskom procedure 32-95.
- The appointed contractors shall use the standard General Administrative Regulation Annexure 1 "Recording of an Incident" form for all incident investigation reports.
- The objective of incident investigation should not only be a legal requirement, but should establish why and how the incident occurred and find out the real root cause of the incident and to decide on precautionary measures that are required to address the root cause to prevent any further recurrences of the same or similar incidents.



Emergency Management

The appointed contractor must develop their own emergency management procedure detailing the possible emergencies that could arise due to the activities that they conduct at Kusile Power Station premises and how they will evacuate their laydown areas in case of any emergency. The contractor emergency management procedure must be in line with Kusile Power Station emergency response plan.

The appointed contractor must familiarise themselves with the Kusile Power Station emergency response plan and procedure. Periodic emergency drills must be undertaken to test the effectiveness of the plan. This must be recorded and provided on request.

Fire Safety

The Contractor shall develop fire safety and evacuation procedures for any area under his control prior to the commencement of any work thereon. The procedure shall take into consideration the size of the area, types of work being done (e.g. cutting, welding, grinding, etc.), amount of combustible materials present etc. It shall take account of any hot work permit arrangements and all other applicable fire and evacuation procedures. All Contractor's Personnel entering and working on the Project Site, and other places, if any, as may be specified under the Contract as forming part of the Site, shall be trained in fire safety and emergency evacuation and any other duties they are required to perform e.g. Fire Warden.

The contractor shall be at all-times available for any meetings and interventions that are arranged by the Safety department in the sake of fire safety and emergency planning.

The contractor must develop a fire safety procedure for the construction site prior to commencing work. The procedure must take into consideration the size of the site/s, the type of work performed and amount of combustible materials. Cognisance of OHS Act CR 29 must be made.

It must be developed in accordance with the hot work permit of the Eskom Plant Safety Regulations, Eskom Fire Risk Management requirements and all other applicable Regulations. All workers entering and working in the construction site need to be trained in fire safety and any duties they are required to perform.

A suitable fire warning system for alerting site personnel of fire shall be provided, and capable of being heard in all areas of the site.

Appropriate portable extinguishers must be available on the construction site and in cases of hot work, be readily available at the location.

Storage of combustible and flammable liquid in the construction site is not permitted unless stored in approved flammable cabinets or outdoors away from the buildings.

Site Smoking Restrictions must be enforced. No open flames are permissible and where hot work is performed, the work areas must be cleared of any combustibles prior to commencement of work.

Non-Conformance and Compliance

1. Any non-compliance to any health and safety requirement in this SHE specification is subject to discipline in terms of the Eskom Procurement and Supply Management Procedure.
2. The appointed contractors are required to implement a non-conformance procedure (if not already in place) for issuing to contractors for transgressions. The procedure can include "quality" related non-conformance issues. Similarly, sub- contractors must implement a non-conformance procedure.
3. The procedure for the issuing and closing off of non-conformance reports shall be strictly adhered to.
4. Contractor project management must monitor the close out non-conformances issued, in not doing so; any recommendations made may not be implemented.
5. Where non-conformances are issued by Kusile Power Station, then one of the close-out steps of the procedure will be for the offender to be called by the responsible project manager to explain the non-conformance issued and what plan is in place to prevent a recurrence of the non-conformance.
6. Should the contractor fail to provide adequate PPE to their employees for the tasks being performed and/or to visitors; failure to enforce the wearing of such PPE will be viewed as a transgression of the legislative and Kusile power station requirements.

Work Stoppage

1. Any person may stop any activity where an unsafe act or unsafe condition that poses or may pose an imminent threat to the safety and health of an individual or create a risk of degradation of the environment.
2. This includes any unauthorised work or service performed by, or legally or contractually non-compliant acts or omissions by, any contractor contracted to work at that site.
3. Work stoppages that are initiated due to SHE concerns, non-compliance, or poor performance related to the contractor's works or services shall not warrant any financial compensation claim lodged against Kusile Power Station where the contractor has not met the requirements defined legally or contractually.
4. Where stoppages are carried out, the required non-conformance report shall be raised.
5. All work stoppages ideally should be investigated and documented by contract custodians.

Hours of Work

The requirements of the Basic Conditions of Employment Act, Chapter Two "Regulation of Working Time" must be adhered to. All contractors are required to maintain an accurate record of time worked by each employee.

Normal work

All work conducted on site shall fall within the legal requirements in accordance with the Basic Conditions of Employment Act. Contractors will notify their Kusile Power Station supervisor or project manager of any work that needs to be performed after hours according to the agreed arrangements. (The application needs to be submitted timeously). Where applicable, the notification should include proof of application, for overtime, to the Department of Labour and /or the letter of approval from the Department of Labour.

Overtime

When overtime is required to be performed, the sub- contractors shall inform the appointed contractor of such action. The appointed contractor shall inform the Kusile Power Station project manager of such function. Contractors shall be aware of the effects of human fatigue and regulate overtime accordingly. The baseline risk assessment must be reviewed to include the management of overtime work.

Omissions from Safety and Health Requirements Specification

By drawing up this SHE specification Kusile Power Station has endeavoured to address the most critical aspects relating to SHE issues in order to assist the contractor to adequately provide for the health and safety of employees on site.

Should Kusile Power Station not have addressed all SHEQ aspects pertaining to the work that is tendered for, the contractor needs to include it in the SHE plan and inform Kusile Power Station of such issues when signing the contract.

The principal contractor must submit their monthly safety statistics on the last day of the month at the OHS department.

Contract Sign-Off

On completion of the project, all sub- contractors shall close out their project documentation; SHE files and forward such to the appointed contractor. The appointed contractor shall likewise close out his/her project documentation and SHE files and forward such to the Kusile Power Station project manager.

Environmental constraints and management

Compliance Obligations

- a) The contractor and or supplier shall have a documented and implemented environmental management system e.g. environmental policy, operational procedures relating to their activities, Environmental Aspects and Impacts Register.
- b) The contractor and or supplier shall prepare an environmental management plan relating to their activities that will be carried out. The environmental management plan shall be based on, amongst others, Eskom Kusile Power Station's OEMP and any other applicable environmental legislation. The environmental management plan must include all the aspects and impacts relating to the activity and address the principle of continual improvement.
- c) The contractor and or supplier employees shall attend induction on environmental management prior to commencement of work at Kusile Power Station.
- d) The contractor and or supplier shall comply with all Eskom Kusile Power Station environmental requirements such as policies, standards and procedures.
- e) The contractor shall appoint trained and competent personnel in writing, who will have the responsibilities of implementing all environmental requirements on a specific contract.

f) Non-conformance and All spills/emergency incidents shall be reported to Eskom Contract Manager and Environmental Officer(s) immediately on occurrence, such reports must include but not limited to the following information:

- The date and time of the incident
- The cause of the non-conformance/incident.
- The proposed actions to correct and prevent recurrence.

g) Eskom Kusile Power Station shall issue non-conformances where there are deviations from Eskom Kusile Power Station Procedures and any other environmental requirements, and the Contractor or Supplier shall be responsible to provide an action plan and close out of such non-conformances timeously.

h) Environmental Incident Investigations shall be done jointly where responsible managers and the environmental team from Eskom and the Eskom subsidiary or contractor are present.

i) Environmental Incident investigation shall be done in accordance to Eskom Environmental Incident Management Procedure (240-133087117).

j) The contractor or supplier shall be responsible to ensure duty of care during execution of work at Kusile Power Station and shall be liable for the costs for the costs of remedying pollution, environmental degradation and consequent adverse health effects as indicated on the NEMA principles below:

National Environmental Management Act 107 of 1998 (NEMA) principles:

- Duty of care and remediation of environmental damage

Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the environment.

- Polluter Pays Principle

The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

k) The contractor and or supplier shall allocate funds for the implementation of environmental requirements.

l) All contractors shall abide to Eskom Zero Liquid Effluent Discharge through the process of reuse and recycling.

m) All waste generated during the execution of the scope of work shall be managed in accordance with Kusile Power Station Waste Management Work Instruction (240-105776552) and in compliance with applicable environmental legislation and bylaws.

n) All contractors should be aware of Eskom SHEQ Policy.

o) All contractors must take into account environmental consideration when carrying out Risk Assessments.

p) All equipment used on site must be in good working condition and no fuel and/or oil leaks on any plant will be tolerated.

Records to be kept onsite For Environmental Management

The following minimum records shall be kept on sites:

a) Contractor site specific Environmental Management Plan and Environmental aspect and impact register. Environmental aspect must be identified, and how they should be mitigated and also be communicated to employees. Proof of communication must be available

b) Environmental Incident registers and investigation reports;

Incident must be reported immediately or within 24 hours of occurrence, investigation must take place within 7 days and concluded with 30 days, lesson learned must be shared with employees. Record of environmental incidents must be made available.

c) Non-conformance register;

When non-conformances are closed, they should be investigated and close-out within the agreed timeframes.

d) Complaints register;

Where complaints are raised they should be reported to Kusile Environmental management Department, be investigated and closed out.

e) Waste disposal register

f) Hazardous Substances registers and SDS where applicable;

Where hazardous substances are used, a register should be maintained and all SDS should be available and communicated to employees.

g) Records of audit reports and audit findings close-out, where applicable;

Records of audit and how findings where closed should be maintained.

h) Records of environmental inspections conducted.

Monthly environmental inspection should be conducted and records of inspections should be maintained.

- j) Licences for Landfill sites/Waste Treatment plant for all waste streams generated and disposed by the contractor.
- k) Registration certificate for a waste service provider appointed by the contractor
- l) Safe disposal certificates or weighbridge certificates for all waste disposed.

3.34.3 Tender Submission Documentation

The following documentation shall be submitted with all tender submissions:

- a) Environmental Policy
- b) Aspect and impact register or an environmental management plan (relevant to the scope of work)
- c) Environmental Management System Certificate (if certified) if not, an environmental management system manual or procedures
- d) Waste Management Plan
- e) Proof of training of persons performing activities that could have significant impact on the environment.

Quality assurance requirements

It is important that all the contractors or service providers at Eskom meet the minimum requirements of ISO 9001 quality management system to maintain a high standard of products or services rendered to Eskom. It is therefore important that the contractor demonstrate commitment to the development, implementation and maintenance of its Quality management system which complies with the requirements of ISO 9001 standard.

This type of work falls under category 2 of quality requirements, The Supplier shall submit a valid ISO 9001:2015 certificate or submit the following evidence:

- Quality (SHEQ) Manual
- Quality (SHEQ) Policy
- Quality (Business) Objectives
- Control of documented procedure
- Procedure for control of non-conformity and corrective action.
- Documented information for defined roles, responsibilities and authorities.
- Procedure for control of externally provided products and services/purchase order.
- Latest copy of the internal management system audit Including Nonconformity, correction and /or corrective action.
- Project quality plan
- Quality control plan (QCP), Inspection Test plan (ITP) or previous work done.
- Completed and signed Form A.

Permit to Work System (PTW)

The Eskom Permit to Work System (PTW) specify and provide requirements for the application of compulsory health and safety standards and procedures for the safeguarding of Plant and persons. This system forms an integral part of the approval process for work under the Work Coordination Process. The following Eskom Regulations shall be complied with:

- Eskom Plant Safety Regulations, GGR 0992;
- Eskom Operating Regulations for High Voltage Systems, ESKPVAEY6

The contractor shall ensure that adequately experienced personnel with the required levels of education are nominated by the contractor to attend all relevant training specific to the Appointments required by the roles. Training shall be provided free of charge by Eskom, however, the candidates time shall be for the contractors own account.

2.3 Programming constraints

N/A

2.4 Contractor's management, supervision and key people

The Contractor must submit an organogram one month after Contract Start Date, to the Service Manager, based on the Contractor's plan and their lines of authority / communication.

2.5 Invoicing and payment

The Z clauses make reference to invoicing procedures stated here in this Service Information. Also include a list of information which is to be shown on an invoice.

Within one week of receiving a payment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice showing the amount due for payment equal to that stated in the *Project Manager's* payment certificate.

The *Contractor* shall address the tax invoice to Eskom Holdings SOC Ltd and include on each invoice the following information:

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

Add procedures for invoice submission and payment (e. g. electronic payment instructions)

2.6 Insurance provided by the *Employer*

First read ECC3 Core Clause 87.1 and then add anything necessary for the management of insurance related issues such as a cross reference to where procedures for making claims can be found. Also provide contact details for persons capable of being able to answer any insurance related queries the *Contractor* may have, as well as to whom the information required by Marine Insurance may be addressed.

2.7 Contract change management

Contract change management will follow the normal compensation event process. Any change implemented by the *Contractor* without following the compensation event process will not be assessed for payment by the *Project Manager*.

2.8 Provision of bonds and guarantees

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

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

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

Not applicable

2.10 Training workshops and technology transfer

Not applicable

3 Engineering and the *Contractor's* design

Employer to keep the designs after the contract lapse after approval from the Employers side

3.1 *Employer's* design

Design will be provided by the contractor after the service is done

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

The supplier to provide the drawings and designs

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

Refer to Scope of Work **Section 1.7 Documentation Requirements**

3.4 Other requirements of the *Contractor's* design

Applicable as per the Scope of Work

3.5 Use of *Contractor's* design

- Detailed drawings for fabrication and construction. Drawings shall be submitted in DWG/DGN and PDF formats.
- All submitted drawings to be signed by an applicable Professionally Registered Engineer.
- Construction/installation Specifications for the works including measurement and payment items

3.6 Design of Equipment

As per the Scope of Work

3.7 Equipment required to be included in the *works*

As per the scope of work, Contractor to provide their own Equipment

3.8 As-built drawings, operating manuals and maintenance schedules

As-built drawings for the Compressor East and West

4 Procurement

4.1 People

4.1.1 Minimum requirements of people employed on the Site

Minimum requirements of people employed

- All staff required to perform the activities within the works information
- All relevant personnel names and titles must be specified to the Service Manager
- All Contractors personnel specified in this contract as per 2.3 to be on site at all times
- All new staff to be appointed in writing.
- Contract Staff are not allowed to work on any other contract.
- All new staff to do induction training
- All replacements of staff will be in the same discipline (like an artisan with an artisan with proof of qualifications)
- All new staff to be approved by Service Manager before entering the site or commencing work
- All new staff must hand in all qualifications and relevant documentation to the Service Manager
- When changing personnel a new access to work form to be completed by the Contractor
- Only required specified approved amount of personnel to be allowed on site, pre-arrange with Service Manager

4.1.2 BBBEE and preferencing scheme

Specify constraints which *Contractor* must comply with after contract award in regard to any Broad Based Black Economic Empowerment (B-BBEE) or preferencing scheme measures.

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

If the ASGI-SA requirements are to be included in this contract specify constraints which *Contractor* must comply with after contract award in regard to any ASGI-SA requirements. The ASGI-SA Compliance Schedule completed in the returnable tender schedules is reproduced here. If ASGI-SA does not apply, delete this paragraph.

The *Contractor* complies with and fulfils the *Contractor's* obligations in respect of the Accelerated and Shared Growth Initiative - South Africa in accordance with and as provided for in the *Contractor's* ASGI-SA Compliance Schedule stated below

[Insert the agreed ASGI-SA Compliance Schedule here]

The *Contractor* shall keep accurate records and provide the *Project Manager* with reports on the *Contractor's* actual delivery against the above stated ASGI-SA criteria. [Elaborate on access to and format of records and frequency of submission etc.]

The *Contractor's* failure to comply with his ASGI-SA obligations constitutes substantial failure on the part of the *Contractor* to comply with his obligations under this contract.

4.2 Subcontracting

4.2.1 Preferred subcontractors

Not Applicable

4.2.2 Subcontract documentation, and assessment of subcontract tenders

Not Applicable

4.2.3 Limitations on subcontracting

Not Applicable

4.2.4 Attendance on subcontractors

Not Applicable

4.3 Plant and Materials

4.3.1 Quality

Quality is usually designed in or specified in the technical specifications referred to in section 6 of this Works Information. However to cover circumstances where quality may not be prescribed, this sub-paragraph could be used as an overarching default requirement. It could also be used to deal with how repairs are carried out after a Defect has been notified; for example can the item be fixed up or must it be replaced by a new one. See also SANS 1200A, sub-paragraph 3.1

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

- Water
- Ablution
- Electricity

4.3.3 *Contractor’s* procurement of Plant and Materials

Applicable as per the Scope of work

4.3.4 Spares and consumables

No spares required

4.4 Tests and inspections before delivery

Not Applicable

4.5 Marking Plant and Materials outside the Working Areas

Core clauses 70.1 and 71.1 require the Works Information to state how the *Contractor* is to “mark” Plant and Materials which is outside the Working Areas if they are to be paid for before delivery to the Working Areas. Specify here how the *Contractor* is to mark the Plant and Materials.

4.6 *Contractor’s* Equipment (including temporary works).

Contractor to provide their own Equipment

4.7 Cataloguing requirements by the *Contractor*

Not applicable

5 Construction

5.1 Temporary works, Site services & construction constraints

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

Employer's site entry and security control, permits, and site regulations

- Lifesaving rules to be adhered at all times
- Access is limited and controlled by Plant Safety Regulations requirements.
- No employee will be allowed to access the plant or to work without access permit issued.
- All personnel to work on the plant must be registered on the Worker's Register by the Responsible Person.
- All personnel must attend induction before working on site and must obtain gate permits via the Service Manager.
- Each personnel to have an Identification card at all times
- Unauthorized access to site is prohibited. The personnel are expected to be at their working site area at all times.
- No recruitment on site or at the main access gates or any Premises' of the Employer is allowed.
- All activities to comply with the OSHACT and Regulations
- All activities on plant must be preceded by a plant risk assessment – Risk assessment as per the standard of the Employer, to be current at all times (Live Document)
- All work to be done according to the contraction regulations at all times

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

Contractor to comply to the Eskom values and rules, e.g No taking Pictures without approval, no walking and texting

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

Normal working hours is the working hours of the business.

Monday to Thursday 07:00-16:15

Friday s 07:00-12:00

- Other hours will be determine as per critical path activities during outages / breakdowns
- Overtime on as and when required basis, but must be approved by the Service Manager
- Daily time sheets must be kept up to date of normal time and overtime worked at all Times. The Employer's Contractors time sheets to be used
- Overtime to be worked on an as and when required Basis when needed.
- All overtime worked must comply with the rest period requirements of the Employer.

5.1.4 Health and safety facilities on Site

Proto-team on each shift

- Medical Station and relevant staff on Site.
- Each workshop has a first aid box available.
- Yearly induction for all personnel.
- In an emergency the contract supervisor and Service Manager must notified immediately

First aid centre

The Contractor provides a first aid service to his employees and Subcontractors. In the case where these prove to be inadequate, like in the event of a serious injury, the Employer's medical centre and facilities are available.

Outside the Employer's office hours, the Employer's first aid services are only available for serious injuries and life threatening situations.

The Employer is entitled, however, to recover the costs from the Contractor for the use of the above Employer's facilities

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

Proper care of the natural environment is important to prevent nuisance and environmental degradation.

- All contractors shall comply with the environmental management procedures and Environmental legislation of the Employer.
- Environmental incidents shall be reported to the Employer's Environmental Department as per incident management requirements.

The Contractor is required to ensure that all goods, services or works supplied in terms of the contract conform to all applicable environmental legislation. Where work is done on the Site, the goods, services or works supplied will also conform to the Employer's environmental specifications.

Waste Management

- Waste segregation is important to facilitate recycling of waste. Ensure waste is disposed of in the correct colour bin.
- The people of the Employer periodically collect waste from the bins for disposal in the correct manner.
- No waste should be burned or buried on site.
- Where the Employer and the contractor have agreed that the contractor is responsible for the disposal of its waste, the contractor shall safely dispose of such waste and keep disposal certificates on file.

Types and colours of bins used on site:

- Yellow bin for domestic waste
- Orange bin for hazardous waste
- Maroon bin for scrap
- Green box for cartridges
- Blue box for recyclable paper

Radiation protection

The Contractor conforms to the Employer's procedure OMOP 2049 and OMOP 2051 when performing any industrial radiography.

Hazardous Substances

It is required in terms of the General Administrative Regulation (Regulation 7) of the Act that any manufacturer, importer, seller or supplier of hazardous chemical substances shall supply the receiver, free of charge with sufficient information for the user, to enable the user to introduce the necessary measures as regards the protection of the health and safety of persons. It is therefore the responsibility of the supplier (dealing directly with the Employer) to supply the information. If information is not available for whatever reason, the supplier must indicate and give reasons to the Employer.

Handling of waste produced by the Contractor

All waste introduced to and/or produced on the Employer's premises, by the Contractor, for this contract, must be handled in accordance with the minimum requirements for the Handling and Disposal of Hazardous Waste in terms of Government Legislation as proclaimed by the Department of Water Affairs and Forestry Act 1994 Ref.:BN0621-16296-5.

The Contractor is responsible to appoint a waste coordinator to ensure that all waste produced is handled according to the applicable legislation.

The Contractor is required to ensure that all goods, services or work supplied in terms of the contract conform to all applicable environmental legislation. Where work is done on the Employer's site, the goods, services or work supplied also conforms to the Employer's environmental specifications.

Waste from the cleaning and maintenance of equipment

The Contractor is responsible to contain all waste due to cleaning and maintenance of equipment and disposes of as described below.

Stockpiling of waste

Waste is removed promptly to the designated deposit areas. No stockpiling is permitted.

Hazardous waste

Waste declared as hazardous substances in terms of the Hazardous Substances Act no 15 of 1973 is the responsibility of the Contractor to ensure safe removal from the property to a registered Class 1 site

Pest Control

- Only approved herbicides with a low environmental risk shall be used for pest control.
- Only registered pest controllers may apply herbicides on a commercial basis.
- Application of herbicides shall be in accordance with the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act 36 of 194.

Water Conservation

- Incidents related to water pollution must be reported to the Employer's Environmental Department within 24 hours.
- Report/fix leaking taps and pipes to save water.
- Use water sparingly.
- Chemical substances shall not be disposed of in waste water or storm water drains.

Air Pollution

- Dust suppression measures must be in place to reduce airborne dust.
- Noxious and offensive odours arising from work activities shall be adequately controlled.

Ground Pollution

- Measures to prevent or control ground contamination shall be put in place e.g. drip trays, bund walls.
- Spill containment, clean-up and ground rehabilitation shall be done as per Kusile procedures

5.1.6 Title to materials from demolition and excavation

Not Applicable

5.1.7 Cooperating with and obtaining acceptance of Others

It is likely that other Contractors will be working in the same area. Others might however from time to time require limited access to the same area in order to execute maintenance activities and the Contractor is to be accommodating in such instances.

5.1.8 Publicity and progress photographs

The Contractor to Comply to Eskom rules of no Photography

5.1.9 Contractor's Equipment

Contractor to declare their equipments and tools

- Contractor's equipment (Cell phones with Camera's, Computers, Camera's etc.) to be and signed in at security.
- All test equipment must be calibrated and tested regularly and certificates must be handed in to the Service Manager for record keeping
- All equipment and tools needs to be marked and a list off all tools with the identification number to be provided to the Service Manager when entering site.
- All lost equipment and tools to be declared to the Service Manager and full details of incident.

5.1.10 Equipment provided by the Employer

Contractor to provide their own Equipment

5.1.11 Site services and facilities

The employer will provide Water, disposal and Electricity. The Employer shall provide a Contractor's employee with internet access for communication purposes.

5.1.12 Facilities provided by the Contractor

The Contractor will provide the following to the employees contracted at the Power Station:

- Local Cell Phones
- Stationary
- Standard Personal Protective Equipment
- Suitable transport (including provision for out-of-normal hours working).
- Suitable accommodation

Appropriate Computer Hardware and Software where the equipment provided by Employer is not sufficient for the service

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

The contractor shall do inspections as per Scheduled Work Order and report all defects to the Employer's Supervisor / Employer

5.1.14 Survey control and setting out of the works

Not applicable

5.1.15 Excavations and associated water control

Not applicable

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

Not applicable

5.1.17 Control of noise, dust, water and waste

All necessary and relevant PPE must be used at all time when entering or working on plant

- Risk assessments must be completed before commencing with any task to be current at all times (Live Document)
- All relevant procedures to be used at all times

5.1.18 Sequences of construction or installation

Contractor to provide us with the schedule

5.1.19 Giving notice of work to be covered up

The employer shall Issue notice as early as possible as per the ECC contract

5.1.20 Hook ups to existing works

Hooking up on heights is a non-negotiable Lifesaving rule of Eskom. Kusile Power Station applies Zero Tolerance to non-compliance of this rule or any other Lifesaving rule. The same disciplinary process procedure will be followed when any of the Lifesaving rules have been breached

5.2 Completion, testing, commissioning and correction of Defects

5.2.1 Work to be done by the Completion Date

This is mandatory. Core clause 11.2(2) defines Completion as when the *Contractor* has done all the work which the Works Information states he is to do by the Completion Date. Rather than list all work to be done by the Completion Date, state that all work is to be done by the Completion Date except for [●]. For example:

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 HVAC VSD Room Modification	Within 30 days after Completion
	Performance testing of the <i>works</i> in use as specified in paragraph of this Works Information. Not Applicable	See performance testing requirements. Not applicable

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

Completion is when the Contractor has done all the work, which the Works Information states he is to do by the Completion Date and has corrected notified Defects, which would have prevented the Employer from using the works. The Site is handed back to the Employer in a condition acceptable to the Service Manager

5.2.3 Materials facilities and samples for tests and inspections

The Employer shall conduct Civil checks

5.2.4 Commissioning

Contractor to follow the scope of work

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

Contractor to issue procedures to the employer

5.2.6 Take over procedures

Applicable as mentioned above on the scope of work section

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

Access will be granted to the contractor to correct defects

5.2.8 Performance tests after Completion

Not applicable

5.2.9 Training and technology transfer

Not applicable

5.2.10 Operational maintenance after Completion

Not applicable

6 Plant and Materials standards and workmanship

6.1 Investigation, survey and Site clearance

Not Applicable

6.2 Building works

Not Applicable

6.3 Civil engineering and structural works

Applicable as per SOW

6.4 Electrical & mechanical engineering works

Not Applicable

6.5 Process control and IT works

Not Applicable

6.6 Other [as required]

Not applicable

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.

NB: Please refer to Standards & Specifications and Drawing Pack and Concept Report

Drawing number	Revision	Title

C3.2 CONTRACTOR'S WORKS INFORMATION

This section of the Works Information will always be contract specific depending on the nature of the *works*. It is most likely to be required for design and construct contracts where the tendering contractor will have proposed specifications and schedules for items of Plant and Materials and workmanship, which once accepted by the *Employer* prior to award of contract now become obligations of the *Contractor* per core clause 20.1.

Typical sub headings could be

- a) *Contractor's* design
- b) Plant and Materials specifications and schedules
- c) Other

This section could also be compiled as a separate file.

PART 4: SITE INFORMATION

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

PART 4: SITE INFORMATION

Core clause 11.2(16) states

“Site Information is information which

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

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

Delete this note and others given in boxes like this one at final draft stage.

The compiler of this document should first consult the ECC3 2013 Guidance Notes page 24. Further notes are given under each heading below.

Site Information is information about the Site at the time of tender upon which the tendering contractor bases his prices. It is fixed and does not include anything about what happens on the Site after award; that is Works Information.

Site Information does not include weather data; that is included in the Contract Data.

If the *Contractor* subsequently encounters conditions which are different to those described here, he may be entitled to notify a compensation event.

General description

Provide a general description of the Site and its location. Reference would probably be made to a drawing showing the Site and its surroundings and the *boundaries of the site* as required by the Contract Data. It is particularly important that details of surrounding buildings be provided where crane operation is likely to be affected, or the *works* involve deep foundations adjacent to existing buildings.

Existing buildings, structures, and plant & machinery on the Site

If the *works* have interfaces or hook up points with existing facilities or comprise refurbishment of existing facilities, provide full details of these so that the tendering contractor can plan his design and construction to integrate with them as the Works Information requires. As built drawings of the existing facilities usually provide the necessary information; such drawings can be listed here stating where they are located for the *Contractor's* use.

Subsoil information

Provide details of geotechnical reports, borehole records and test results for parts of the Site where earthworks are required by this contract. These details may be referenced as an Annexure to this document where they are extensive.

Hidden services

As per the Scope of work

Other reports and publicly available information

This subsection may refer to mapping, hydro-graphic data, hydrological information, shipping movements, tides and published papers or Geological Surveys that the tendering contractor may need to be able to decide his method of working and programme and prepare any designs for which he would be responsible.