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NEC3 Term Service Contract (TSC3)

|  |  |  |
| --- | --- | --- |
| **Between** | **ESKOM HOLDINGS SOC Ltd**  **(Reg No. 2002/015527/30)** | |
| **and** | **[Insert at award stage]**  **(Reg No. \_\_\_\_\_\_\_\_\_\_\_ )** | |
| **for** | **The provision for C&I Maintenance service of** **Consolidated Building Management System for period of 60 months (5 Years)** | |
|  |  | |
| **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**  **[to be inserted from Returnable Documents at award stage]** | **[●]** |
| **C1.2a** | **Contract Data provided by the *Employer*** | **[●]** |
| **C1.2b** | **Contract Data provided by the *Contractor***  **[to be inserted from Returnable Documents at award stage]** | **[●]** |
| **C1.3** | **Proforma Guarantees** | **[●]** |

C1.1 Form of Offer & Acceptance

## Offer

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

# The provision for C&I Maintenance service of Consolidated Building Management System in Medupi Power Station for period of 60 months (5 Years)

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.

Delete the row for the Options which do not apply

|  |  |  |
| --- | --- | --- |
| Options A or C | The offered total of the Prices exclusive of VAT is | **R [●]** |
| Option E | The first forecast of the total Defined Cost plus the Fee 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]](#footnote-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:** |  | | | |
| Name & signature of witness | *(Insert name and address of organisation)* |  | Date |  |
| Tenderer’s CIDB registration number: | |  | | |

## Acceptance

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

The terms of the contract, are contained in:

Part C1 Agreements and Contract Data, (which includes this Form of Offer and Acceptance)

Part C2 Pricing Data

Part C3 Scope of Work: Service 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 and signed original copy of this document, including the Schedule of Deviations (if any).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Signature(s) |  |  |  | |
| Name(s) |  |  |  | |
| Capacity |  |  |  | |
| for the Employer |  | | | |
| Name & signature of witness | *(Insert name and address of organisation)* |  | Date |  |

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

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

Note:

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

|  |  |  |
| --- | --- | --- |
| No. | Subject | Details |
| 1 | **[●]** | **[●]** |
| 2 | **[●]** | **[●]** |
| 3 | **[●]** | **[●]** |
| 4 | **[●]** | **[●]** |
| 5 | **[●]** | **[●]** |
| 6 | **[●]** | **[●]** |
| 7 | **[●]** | **[●]** |
|  |  |  |

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

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | For the tenderer: |  | For the Employer |
| Signature |  |  |  |
| Name |  |  |  |
| Capacity |  |  |  |
| On behalf of | *(Insert name and address of organisation)* |  | *(Insert name and address of organisation)* |
| Name & signature of witness |  |  |  |
| Date |  |  |  |

C1.2 TSC3 Contract Data

# Part one - Data provided by the *Employer*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Clause** | Statement | Data | | | |
| 1 | General |  | | | |
|  | The *conditions of contract* are the core clauses and the clauses for main Option: |  | | | |
|  |  | **A: Priced contract with price list** | | | |
|  | dispute resolution Option | **W1: Dispute resolution procedure** | | | |
|  | and secondary Options |  | | | |
|  |  | **X1: Price adjustment for inflation** | | | |
|  |  | **X2 Changes in the law** | | | |
|  |  | **X17: Low service damages** | | | |
|  |  | **X18: Limitation of liability** | | | |
|  |  | **X19: Task Order** | | | |
|  |  | Z: *Additional conditions of contract* | | | |
|  | of the NEC3 Term Service Contract April 2013[[2]](#footnote-2) (TSC3) | If 2005 Edition is to be used delete “April 2013” and replace with “June 2005 with amendments June 2006”. Always delete this note before finalising this Data | | | |
| 10.1 | The *Employer* is (name): | **Eskom Holdings SOC Ltd (reg no: 2002/015527/30), a state owned company incorporated in terms of the company laws of the Republic of South Africa** | | | |
|  | Address | **Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg** | | | |
|  | Tel No. | **[●]** | | | |
|  | Fax No. | **[●]** | | | |
| 10.1 | The *Service Manager* is (name): | **Lerato Sehume** | | | |
|  | Address | **Medupi Power Station, Steenbok pan Road** | | | |
|  | Tel | **[●]** | | | |
|  | Fax | **[●]** | | | |
|  | e-mail | **[●]** | | | |
| 11.2(2) | The Affected Property is | **Medupi Power Station** | | | |
| 11.2(13) | The *service* is | **The provision for C&I Maintenance service of Consolidated Building Management System for period of 60 months (5 Years)** | | | |
| 11.2(14) | The following matters will be included in the Risk Register | **All risks will be identified prior and addressed and registered during the risk register meeting that will take place as agreed between the parties** | | | |
| 11.2(15) | The Service Information is in | **Part 3: Scope of Work and all documents and drawings to which it makes reference.** | | | |
| 12.2 | The *law of the contract* is the law of | **the Republic of South Africa** | | | |
| 13.1 | The *language of this contract* is | **English** | | | |
| 13.3 | The *period for reply* is | **Two (2) weeks** | | | |
| 2 | The *Contractor*’s main responsibilities | **Data required by this section of the core clauses is also provided by the *Contractor* in Part 2 and terms in italics used in this section are identified elsewhere in this Contract Data** | | | |
| 21.1 | The *Contractor* submits a first plan for acceptance within | **Two (2) weeks of the Contract Date** | | | |
| 3 | Time |  | | | |
| 30.1 | The *starting date* is. | **TBO** | | | |
| 30.1 | The *service period* is | **60 Months** | | | |
| 4 | Testing and defects | There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data | | | |
| 5 | Payment |  | | | |
| 50.1 | The *assessment interval* is | **between the 21 days 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 | **between 4 to 8 weeks.** | | | |
| 51.4 | The *interest rate* is | **the publicly quoted prime rate of interest (calculated on a 365 day year) charged by 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 | **There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data** | | | |
| 7 | Use of Equipment Plant and Materials | There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data | | | |
| 8 | Risks and insurance |  | | | |
| 80.1 | These are additional *Employer*'s risks | **1. As per Z-clause 12** | | | |
| 9 | Termination | **There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.** | | | |
| 10 | Data for main Option clause |  | | | |
| **A** | **Priced contract with price list** |  | | | |
| 20.5 | The *Contractor* prepares forecasts of the final total of the Prices for the whole of the *service* at intervals no longer than | **Four (4) weeks.** | | | |
| 11 | Data for Option W1 |  | | | |
| W1.1 | The *Adjudicator* | **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**](http://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 *Adjudicator nominating body* is: | **the Chairman of ICE-SA a joint Division of the South African Institution of Civil Engineering and the Institution of Civil Engineers (London) (see** [**www.ice-sa.org.za**](http://www.ice-sa.org.za) **) or its successor body.** | | | |
| W1.4(2) | The *tribunal* is: | **arbitration** | | | |
| W1.4(5) | The *arbitration procedure* is | **the latest edition of Rules for the Conduct of Arbitrations published by The Association of Arbitrators (Southern Africa) or its successor body.** | | | |
|  | The place where arbitration is to be held is | **South Africa** | | | |
|  | The person or organisation who will choose an arbitrator   * if the Parties cannot agree a choice or * if the arbitration procedure does not state who selects an arbitrator, is | **the Chairman for the time being or his nominee of the Association of Arbitrators (Southern Africa) or its successor body.** | | | |
| 12 | Data for secondary Option clauses |  | | | |
| **X1** | **Price adjustment for inflation** | **Suggested CPA** | | | |
| X1.1 | The *base date* for indices is | **Rates are fixed and firm for first 12 months after first order placement date. There after CPA escalation will apply. Base date will be the month before the month which the enquiry closes.** | | | |
|  | The proportions used to calculate the Price Adjustment Factor are: | **proportion** | **linked to index for** | **Index prepared by** | |
|  |  | **0,40** | **[Labour]** | **[SEIFSA TABLE C3 AHPE]** | |
|  |  | **0,25** | **[Material]** | **[SEIFSA TABLE G 1]** | |
|  |  | **0.20** | **[Transport]** | **SEIFSA Table L2 a** | |
|  |  | **[0,15]** | **non-adjustable** |  | |
|  |  | **1.00** |  |  | |
| **X2** | **Changes in the law** | **There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.** | | | |
| **X17** | **Low service damages** |  | | | |
| X17.1 | The *service level table* is in |  | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Item** | **Employers Requirements/ Descriptions** | **Damages payable by contractor** |
| 1 | PM/SC compliance | Station monthly PM/ SC compliance is 92%. Not complying within three (3) consecutive months. | 2% of monthly fixed rate per month not complying after three months of not complying. |
| 2 | PSR and authorization within 8 months of the contract | Unavailability of Responsible person (RP) beyond seven (7) days of being notified of non-compliant | 2% of monthly fixed cost of RP provided by the Employer per day. |
| 3 | PSR and ORHVS within 8 months of the contract | Unavailability of Responsible persons (RP) beyond sixty (60) days of being notified of non-compliant | 2, 5% of monthly fixed cost of RP provided by the Employer per day. |
| 4 | Response time to urgent breakdowns | Beyond 1 hour of being notified of urgent breakdowns during office hours | 1% of monthly fixed cost per incident/ call-out. |
| 5 | Delays in breakdown | Contract must submit a realistic plan/ schedule with timelines | 2% of monthly assessment per 1hr delay on the plan |
| 6 | Poor workmanship | Through an investigation and findings that proof poor workman ship. | Contractor to carry corrective cost |
| 7 | SDL&I Compliance | Contractor is expected to comply to SD&LI requirements as per contract. | 2,5 % retention of monthly fixed rate per month not complying. |

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| **X18** | | | **Limitation of liability** | |  | | |
| X18.1 | | | The *Contractor*’s liability to the *Employer* for indirect or consequential loss is limited to | | **R0.0 (zero Rand)** | | |
| X18.2 | | | For any one event, the *Contractor*’s liability to the *Employer* for loss of or damage to the *Employer*’s property is limited to | | **the amount of the deductibles relevant to the event** | | |
| X18.3 | | | The *Contractor*’s liability for Defects due to his design of an item of Equipment is limited to | | **The greater of**  **the total of the Prices at the Contract Date**  **and**  **the amounts excluded and unrecoverable from the *Employer*’s insurance (other than the resulting physical damage to the *Employer*’s property which is not excluded) plus the applicable deductibles** | | |
| X18.4 | | | The *Contractor*’s total liability to the *Employer*, for all matters arising under or in connection with this contract, other than the excluded matters, is limited to | | **the total of the Prices other than for the additional excluded matters.**  **The *Contractor’s* total liability for the additional excluded matters is not limited.**  **The additional excluded matters are amounts for which the *Contractor* is liable under this contract for**  **Defects due to his design, plan and specification,**  **Defects due to manufacture and fabrication outside the Affected Property,**  **loss of or damage to property (other than the *Employer*’s property, Plant and Materials),**  **death of or injury to a person and**  **infringement of an intellectual property right.** | | |
| X18.5 | | | The *end of liability date* is | | **[●] months after the end of the *service period*.** | | |
| **X19** | | | **Task Order** | |  | | |
| X19.5 | | | The *Contractor* submits a Task Order programme to the *Service Manager* within | | **[●] days of receiving the Task Order** | | |
| **Z** | | | **The *additional conditions of contract* are** | | **Z1 to Z14 always apply.** | | |
|  | | |  | | | | |
| **Z1** | | **Cession delegation and assignment** | | | | |
| Z1.1 | | The *Contractor* does notcede, delegate or assign any of its rights or obligations to any person without the written consent of the *Employer.* | | | | |
| Z1.2 | | Notwithstanding the above, the *Employer* may on written notice to the *Contractor* cede and delegate its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the Electricity Supply Industry. | | | | |
|  | |  | | | | |
| **Z2** | | **Joint ventures** | | | | |
| Z2.1 | | If the *Contractor* constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations then these persons or organisations are deemed to be jointly and severally liable to the *Employer* for the performance of this contract. | | | | |
| Z2.2 | | Unless already notified to the *Employer*, the persons or organisations notify the *Service Manager* within two weeks of the Contract Date of the key person who has the authority to bind the *Contractor* on their behalf. | | | | |
| Z2.3 | | The *Contractor* does not alter the composition of the joint venture, consortium or other unincorporated grouping of two or more persons without the consent of the *Employer* having been given to the *Contractor* in writing. | | | | |
|  | |  | | | | |
| **Z3** | | | **Change of Broad Based Black Economic Empowerment (B-BBEE) status** | | | |
| Z3.1 | | | Where a change in the *Contractor’s* legal status, ownership or any other change to his business composition or business dealings results in a change to the *Contractor*’s B-BBEE status, the *Contractor* notifies the *Employer* within seven days of the change. | | | |
| Z3.2 | | | The *Contractor* is required to submit an updated verification certificate and necessary supporting documentation confirming the change in his B-BBEE status to the *Service Manager* within thirty days of the notification or as otherwise instructed by the *Service 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 Service. | | | |
| 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 P4 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 *Service 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 Affected Property or any portion thereof, in the course of Providing the Service and after the end of the *service period*, requires the prior written consent of the *Service 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 *Service Manager* 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 *service*. 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 Affected Property;  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 the *service*; and  undertakes, in and about the execution of the *service*, 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 *service*, 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 *Service 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 Service 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 the last paragraph of core clause 61.3 and replace with:  If the *Contractor* does not notify a compensation event within eight weeks of becoming aware of the event, he is not entitled to a change in the Prices. | | | | |
|  | |  | | | | |
| **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 82.1 is provided for in 60.1(12) and the *Employer*’s liability under the indemnity is limited to compensation as provided for in core clause 63 and X19.11 if Option X19 Task Order applies to this contract. | | | | |
|  | |  | | | | |
| **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** | **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 Subcontractors or the Subcontractor’s employees, | |
| **Corrupt Action** | | | | means the offering, giving, taking, or soliciting, directly or indirectly, of a good or service to unlawfully or illegally influence the actions of an Affected Party, | |
| **Fraudulent Action** | | | | means any unlawfully or illegally intentional act or omission that misleads, or attempts to mislead, an Affected Party, in order to obtain a financial or other benefit or to avoid an obligation or incurring an obligation, | |
| **Obstructive Action** | | | | means a Committing Party unlawfully or illegally destroying, falsifying, altering or concealing information or making false statements to materially impede an investigation into allegations of Prohibited Action, and | |
| **Prohibited Action** | | | | means any one or more of a Coercive Action, Collusive Action Corrupt Action, Fraudulent Action or Obstructive Action. | |
| Z11.1 | A Committing Party may not take any Prohibited Action during the course of the procurement of this contract or in execution thereof. | | | | |
| Z11.2 | The *Employer* may terminate the *Contractor*’s obligation to Provide the Services if a Committing Party has taken such Prohibited Action and the *Contractor* did not take timely and appropriate action to prevent or remedy the situation, without limiting any other rights or remedies the *Employer* has. It is not required that the Committing Party had to have been found guilty, in court or in any other similar process, of such Prohibited Action before the *Employer* can terminate the *Contractor*’s obligation to Provide the Services for this reason. | | | | |
| Z11.3 | If the *Employer* terminates the *Contractor*’s obligation to Provide the Services for this reason, the amounts due on termination are those intended in core clauses 92.1 and 92.2. | | | | |
| Z11.4 | A Committing Party co-operates fully with any investigation pursuant to alleged Prohibited Action. Where the *Employer* does not have a contractual bond with the Committing Party, the *Contractor* ensures that the Committing Party co-operates fully with an investigation. | | | | |

**Z12 Insurance**

**Z \_12\_.1 Replace core clause 83 with the following:**

|  |  |  |
| --- | --- | --- |
| **Insurance cover** | 83 |  |
|  | 83.1 | 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. |
|  | 83.2 | The *Contractor* provides the insurances stated in the Insurance Table A from the *starting date* until the earlier of Completion and the date of the termination certificate.   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **INSURANCE TABLE A**   |  |  | | --- | --- | | **Insurance against** | **Minimum amount of cover or minimum limit of indemnity** | | Loss of or damage caused by the *Contractor* to the *Employer*’s property | The replacement cost where not covered by the *Employer*’s insurance.  The *Employer*’s policy deductible as at Contract Date, where covered by the *Employer*’s insurance. | | Loss of or damage to Plant and Materials | The replacement cost where not covered by the *Employer*’s insurance.  The *Employer*’s policy deductible as at Contract Date, where covered by the *Employer*’s insurance. | | Loss of or damage to Equipment | The replacement cost where not covered by the *Employer*’s insurance.  The *Employer*’s policy deductible as at Contract Date, where covered by the *Employer*’s insurance. | | The *Contractor*’s liability for loss of or damage to property (except the *Employer*’s property, Plant and Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor*) arising from or in connection with the *Contractor*’s Providing the Service | **Loss of or damage to property**  The replacement cost  **Bodily injury to or death of a person**  The amount required by the applicable law. | | Liability for death of or bodily injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract | The amount required by the applicable law | | |
|  |  |  |
|  |  |  |

**Z \_\_12.2 Replace core clause 86 with the following:**

|  |  |  |
| --- | --- | --- |
| **Insurance by the *Employer*** | 86 |  |
|  | 86.1 | The *Employer* provides the insurances stated in the Insurance Table B |
|  |  |  |
|  |  | **INSURANCE TABLE B**   |  |  | | --- | --- | | **Insurance against or name of policy** | **Minimum amount of cover or minimum limit of indemnity** | | Assets All Risk | Per the insurance policy document | | Contract Works insurance | Per the insurance policy document | | Environmental Liability | Per the insurance policy document | | General and Public Liability | Per the insurance policy document | | Transportation (Marine) | Per the insurance policy document | | Motor Fleet and Mobile Plant | Per the insurance policy document | | Terrorism | Per the insurance policy document | | Cyber Liability | Per the insurance policy document | | Nuclear Material Damage and Business Interruption | Per the insurance policy document | | Nuclear Material Damage Terrorism | Per the insurance policy document | |

|  |  |  |
| --- | --- | --- |
| **Z13** | **Nuclear Liability** | |
| Z13.1 | The *Employer* is the operator of the Koeberg Nuclear Power Station (KNPS), a nuclear installation, as designated by the National Nuclear Regulator of the Republic of South Africa, and is the holder of a nuclear licence in respect of the KNPS. | |
| Z13.2 | The *Employer* is solely responsible for and indemnifies the *Contractor* or any other person against any and all liabilities which the *Contractor* or any person may incur arising out of or resulting from nuclear damage, as defined in Act 47 of 1999, save to the extent that any liabilities are incurred due to the unlawful intent of the *Contractor* or any other person or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*. | |
| Z13.3 | Subject to clause Z13.4 below, the *Employer* waives all rights of recourse, arising from the aforesaid, save to the extent that any claims arise or liability is incurred due or attributable to the unlawful intent of the *Contractor* or any other person, or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*. | |
| Z13.4 | The *Employer* does not waive its rights provided for in section 30 (7) of Act 47 of 1999, or any replacement section dealing with the same subject matter. | |
| Z13.5 | The protection afforded by the provisions hereof shall be in effect until the KNPS is decommissioned. | |
|  |  | |
| **Z14** | **Asbestos** | |
| For the purposes of this Z-clause, the following definitions apply: | | |
| **AAIA** | | means approved asbestos inspection authority. |
| **ACM** | | means asbestos containing materials. |
| **AL** | | means action level, i.e. a level of 50% of the OEL, i.e. 0.1 regulated asbestos fibres per ml of air measured over a 4 hour period. The value at which proactive actions is required in order to control asbestos exposure to prevent exceeding the OEL. |
| **Ambient Air** | | means breathable air in area of work with specific reference to breathing zone, which is defined to be a virtual area within a radius of approximately 30cm from the nose inlet. |
| **Compliance Monitoring** | | means ccompliance 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 ooccupational exposure limit. |
| **Parallel Measurements** | | means mmeasurements performed in parallel, yet separately, to existing measurements to verify validity of results. |
| **Safe Levels** | | means airborne asbestos exposure levels conforming to the Standard’s requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles. |
| **Standard** | | means the *Employer*’s Asbestos Standard 32-303: Requirements for Safe Processing, Handling, Storing, Disposal and Phase-out of Asbestos and Asbestos Containing Material, Equipment and Articles. |
| **SANAS** | | means the South African National Accreditation System. |
| **TWA** | | means the average exposure, within a given workplace, to airborne asbestos fibres, normalized to the baseline of a 4 hour continuous period, also applicable to short term exposures, i.e. 10-minute TWA. |
| Z14.1 | The *Employer* ensures that the Ambient Air in the area where the *Contractor* will Provide the Services conforms to the acceptable prescribed South African standard for asbestos, as per the regulations published in GNR 155 of 10 February 2002, under the Occupational Health and Safety Act, 1993 (Act 85 of 1993) (“Asbestos Regulations”). The OEL for asbestos is 0.2 regulated asbestos fibres per millilitre of air as a 4-hour TWA, averaged over any continuous period of four hours, and the short term exposure limit of 0.6 regulated asbestos fibres per millilitre of air as a 10-minute TWA, averaged over any 10 minutes, measured in accordance with HSG248 and monitored according to HSG173 and OESSM. | |
| Z14.2 | Upon written request by the *Contractor*, the *Employer* certifies that these conditions prevail. All measurements and reporting are effected by an independent, competent, and certified occupational hygiene inspection body, i.e. a SANAS accredited and Department of Employment and Labour approved AAIA. The *Contractor* may perform Parallel Measurements and related control measures at the *Contractor*’s expense. For the purposes of compliance the results generated from Parallel Measurements are evaluated only against South African statutory limits as detailed in clause Z14.1. Control measures conform to the requirements stipulated in the AAIA-approved asbestos work plan. | |
| Z14.3 | The *Employer* manages asbestos and ACM according to the Standard. | |
| Z14.4 | In the event that any asbestos is identified while Providing the Services, a risk assessment is conducted and if so required, with reference to possible exposure to an airborne concentration of above the AL for asbestos, immediate control measures are implemented and relevant air monitoring conducted in order to declare the area safe. | |
| Z14.5 | The *Contractor*’s personnel are entitled to stop working and leave the contaminated area forthwith until such time that the area of concern is declared safe by either Compliance Monitoring or an AAIA approved control measure intervention, for example, per the emergency asbestos work plan, if applicable. | |
| Z14.6 | The *Contractor* continues to Provide the Services, without additional control measures presented, on presentation of Safe Levels. The contractually agreed dates to Provide the Services, including the Completion Date, are adjusted accordingly. The contractually agreed dates are extended by the notification periods required by regulations 3 and 21 of the Asbestos Regulations, 2001. | |
| Z14.7 | Any removal and disposal of asbestos, asbestos containing materials and waste, is done by a registered asbestos contractor, instructed by the *Employer* at the *Employer*’s expense, and conducted in line with South African legislation. | |

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 and would be required in relation to the option selected. In the event that the option is not required select and delete the whole row.]

**Notes to a tendering contractor:**

1. Please read both the both the NEC3 Term Service Contract April 2013 and the relevant parts of its Guidance Notes (TSC3-GN)[[3]](#footnote-3) in order to understand the implications of this Data which the tenderer is required to complete.
2. The number of the clause which requires the data is shown in the left hand column for each statement however other clauses may also use the same data.
3. Where a form field like this [     ] appears, data is required to be inserted relevant to the option selected. Click on the form field ***once*** and type in the data. Otherwise complete by hand and in ink.

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

|  |  |  |
| --- | --- | --- |
| Clause | Statement | Data |
| 10.1 | The *Contractor* is (Name): |  |
|  | Address |  |
|  | Tel No. |  |
|  | Fax No. |  |
| 11.2(8) | The *direct fee percentage* is | **%** |
|  | The *subcontracted fee percentage* is | **%** |
| 11.2(14) | The following matters will be included in the Risk Register |  |
| 11.2(15) | The Service Information for the *Contractor*’s plan is in: |  |
| 21.1 | The plan identified in the Contract Data is contained in: |  |
| 24.1 | The key people are: |  |
|  | 1 Name: |  |
|  | Job: |  |
|  | Responsibilities: |  |
|  | Qualifications: |  |
|  | Experience: |  |
|  | 2 Name: |  |
|  | Job |  |
|  | Responsibilities: |  |
|  | Qualifications: |  |
|  | Experience: |  |
|  |  |  |
|  |  | **CV's (and further key person's data including CVs) are in** **.** |
| **A** | **Priced contract with price list** |  |
| 11.2(12) | The *price list* is in |  |
| 11.2(19) | The tendered total of the Prices is | **R** |
| **C** | **Target contract with price list** |  |
| 11.2(12) | The *price list* is in |  |
| 11.2(20) | The tendered total of the Prices is | **R** |
| **E** | **Cost reimbursable contract** |  |
| 11.2(12) | The *price list* is in |  |

Part 2: Pricing Data

**TSC3 Option A**

|  |  |  |
| --- | --- | --- |
| **Document reference** | **Title** | **No of pages** |
| C2.1 | Pricing assumptions: Option A | 2 |
| C2.2 | The *price list* | **[2]** |

C2.1 Pricing assumptions: Option A

# How work is priced and assessed for payment

Clause 11 in NEC3 Term Service Contract (TSC3) core clauses and Option A states:

|  |  |  |
| --- | --- | --- |
| **Identified and defined terms** | 11  11.2 | (12) The Price List is the *price list* unless later changed in accordance with this contract. |
|  |  | (17) The Price for Services Provided to Date is the total of  the Price for each lump sum item in the Price List which the *Contractor* has completed and  where a quantity is stated for an item in the Price List, an amount calculated by multiplying the quantity which the *Contractor* has completed by the rate. |
|  |  | (19) The Prices are the amounts stated in the Price column of the Price List. Where a quantity is stated for an item in the Price List, the Price is calculated by multiplying the quantity by the rate. |

This confirms that Option A is a priced contract where the Prices are derived from a list of items of service which can be priced as lump sums or as expected quantities of service multiplied by a rate or a mix of both.

# Function of the Price List

Clause 54.1 in Option A states: “Information in the Price List is not Service Information”. This confirms that instructions to do work or how it is to be done are not included in the Price List but in the Service Information. This is further confirmed by Clause 20.1 which states, “The *Contractor* Provides the Service in accordance with the Service Information”. Hence the *Contractor* does **not** Provide the Service in accordance with the Price List. The Price List is only a pricing document.

# Link to the *Contractor*’s plan

Clause 21.4 states “The *Contractor* provides information which shows how each item description on the Price List relates to the operations on each plan which he submits for acceptance”. Hence when compiling the *price list*, the tendering contractor needs to develop his first clause 21.2 plan in such a way that operations shown on it can be priced in the *price list* and result in a satisfactory cash flow in terms of clause 11.2(17).

# Preparing the *price list*

Before preparing the *price list*, both the *Employer* and tendering contractors should read the TSC3 Guidance Notes pages 14 and 15. In an Option A contract, either Party may have entered items into the *price list* either as a process of offer and acceptance (tendering) or by negotiation depending on the nature of the *service* to be provided. Alternatively 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 the *price list* to be prepared and priced by him.

It is assumed that in preparing or finalising the *price list* the *Contractor:*

* Has taken account of the guidance given in the TSC3 Guidance Notes relevant to Option A;
* Understands the function of the Price List and how work is priced and paid for;
* Is aware of the need to link operations shown in his plan to items shown in the Price List;
* Has listed and priced items in the *price list* which are inclusive of everything necessary and incidental to Providing the Service in accordance with the Service 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 item within the Prices or rates of other listed items in order to fulfil the obligation to complete the *service* for the tendered total of the Prices.
* Understands there is no adjustment to items priced as lump sums if the amount, or quantity, of work within that item later turns out to be different to that which the *Contractor* estimated at time of tender. The only basis for a change to the (lump sum) Prices is as a result of a compensation event.

## Format of the *price list*

(From the example given in an Appendix within the TSC3 Guidance Notes)

Entries in the first four columns in the *price list* in section C2.2 are made either by the *Employer* or the tendering contractor.

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

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

If the *Contractor* is to be paid a Price for an item proportional to the length of time for which a service is provided, a unit of time is stated in the Unit column and the expected length of time (as a quantity of the stated units of time) is stated in the Expected Quantity column.

C2.2 the *price list*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item** | **Description** |  | **Unit** | **Quantity - 5 Years** | **Rate** |
|  | **Section 1** |  |  |  |  |
|  | **Preliminaries and Generals** |  |  |  |  |
|  |  |  |  |  |  |
|  | **Preliminaries and Generals : Site Establishment** |  |  |  |  |
| 1 | Site Containers and Park homes |  | Item | 1 |  |
| 2 | Office Furniture |  | Sum | 1 |  |
| 3 | Laptop |  | Sum | 1 |  |
| 4 | Site De establishment |  | Item | 1 |  |
|  |  |  |  |  |  |
|  | **Preliminaries and Generals : Safety - Annually** |  |  |  |  |
| 1 | Safety file - Once off |  | Sum | 1 |  |
| 2 | Personal Protective Equipment - ***2 set per annum*** |  | Per person | 62 |  |
| 3 | Medicals - entry, interim & exit |  | Per person | 31 |  |
|  |  |  |  |  |  |
|  | **Preliminaries and Generals : Monthly** |  |  |  |  |
|  |  |  |  |  |  |
|  | **Communication** |  |  |  |  |
| 1 | Cell phone allowance - Management |  | Monthly | 1 |  |
| 2 | Cell phone allowance - Bargaining |  | Monthly | 5 |  |
|  |  |  |  |  |  |
|  | **Housekeeping Consumables** |  |  |  |  |
| 3 | Consumables - Housekeeping( incl. cleaning materials) |  | Monthly | 1 |  |
| 4 | Consumables - stationery |  | Monthly | 1 |  |
| 5 | Consumables – Sugar and Tea |  | Monthly | 1 |  |
|  |  |  |  |  |  |
|  | **Accommodation** |  |  |  |  |
| 6 | Provision for accommodation |  | Monthly | 1 |  |
|  |  |  |  |  |  |
|  | **Provision for transport - White plant** |  |  |  |  |
| 7 | Transport (16 seater bus) |  | Monthly | 2 |  |
| 8 | Transport (4 x 2 LDV Double cab ) |  | Monthly | 2 |  |
|  |  |  |  |  |  |
| **Item** | **Description** | **Unit** | **Quantity of personnel** | **Estimated Hours per month** | **Hourly Rate** |
|  | **Section 2** |  |  |  |  |
|  | **Labour- Normal Time** |  |  |  |  |
|  |  |  |  |  |  |
| 1 | Site Manager | hr | 1 | 173 |  |
| 2 | Supervisor | hr | 2 | 173 |  |
| 3 | Specialist Consultant - ***as and when required*** | hr | 1 | 34 |  |
| 4 | Technician | hr | 2 | 173 |  |
| 5 | Planner | hr | 1 | 173 |  |
| 6 | Artisans/Electricians | hr | 2 | 173 |  |
| 7 | Semi skilled | hr | 8 | 173 |  |
| 8 | Utilityman | hr | 8 | 173 |  |
| 9 | Quality Officer/SAQCC Commissioner | hr | 1 | 173 |  |
| 10 | Safety Officer | hr | 1 | 173 |  |
| 11 | Administrator | hr | 1 | 173 |  |
| 12 | Storeman | hr | 1 | 173 |  |
| 13 | Cleaner | hr | 2 | 173 |  |
|  |  |  |  |  |  |
|  | **Overtime** |  |  |  |  |
|  | **Overtime @1.5 factor** |  |  |  |  |
|  |  |  |  |  |  |
| 1 | Supervisor | hr | 2 | 54 |  |
| 2 | Technician | hr | 2 | 54 |  |
| 3 | Artisans/Electricians | hr | 2 | 54 |  |
| 4 | Semi skilled | hr | 8 | 54 |  |
| 5 | Utilityman | hr | 8 | 54 |  |
| 6 | Safety Officer | hr | 1 | 54 |  |
| 7 | Storeman | hr | 1 | 54 |  |
|  |  |  |  |  |  |
|  | **Overtime - Sundays including holidays** |  |  |  |  |
|  | **Overtime @ 2 factor** |  |  |  |  |
|  |  |  |  |  |  |
| 8 | Supervisor | hr | 2 | 17 |  |
| 9 | Technician | hr | 2 | 17 |  |
| 10 | Artisans/Electricians | hr | 2 | 17 |  |
| 11 | Semi skilled | hr | 8 | 17 |  |
| 12 | Utilityman | hr | 8 | 17 |  |
| 13 | Safety Officer | hr | 1 | 17 |  |
| 14 | Storeman | hr | 1 | 17 |  |

Part 3: Scope of Work

|  |  |  |
| --- | --- | --- |
| **Document reference** | **Title** | **No of pages** |
|  | This cover page | 1 |
| C3.1 | *Employer*’s Service Information |  |
| C3.2 | *Contractor*’s Service Information  (insert at award stage or delete if not applicable) |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  | Total number of pages |  |

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**1. INTRODUCTION**

Medupi Power Station CBMS (network) uses the state of the art Enterprise Business Integrator to monitor and control the field instrumentation of buildings. CBMS and EBI will be interchangeable in this document. The EBI has combined modules linked together. The modules being Building Manager, Energy Manager, Life Safety Manager, Security Manager and Digital Video Manager. Together they offer safety of personnel, surveillance and security, video monitoring and analysis and green building monitoring and management.

**2. SUPPORTING CLAUSES**

**2.1 SCOPE**

The scope of this strategy is limited to the systems on the Medupi Consolidated Building Management

System. The scope is limited to the following specific equipment on the;

• FDS

• ACS

• CCTV

• PAS

• HVAC

• Elevator monitoring

• Perimeter protection

• Energy management

The boundaries of the plant are the field devices of the systems (smoke and heat detectors, cameras and card reads) to the network servers and workstations. The scope does not include domestic electric circuits, civil structures and fire fighting equipment.

**2.1.1 Purpose**

The objective of the Consolidated Building Management System (CBMS) is to provide centralised monitoring and selective control of buildings and process areas. This is done by integrating various BMS functional elements such as fire detection, heating ventilation and air conditioning (HVAC), access control/ CCTV, elevator monitoring and perimeter protection systems.

The purpose of this document is to establish an optimised maintenance strategy based on the analysis of the components of the various systems of the CBMS. Planned Maintenance and Testing is performed to ensure sustainable and optimal plant performance at the lowest cost. The defined strategy and plans include all testing and inspection requirements to obtain reliable information for accurate assessment of plant condition, which in turn will be used for decisions on the future life cycle management strategy and continual improvement.

**2.1.2 Applicability**

This document shall apply to the Medupi Power Station Consolidated Buildings Management System. Change this statement to suit the applicability of the document.

**2.2 NORMATIVE/INFORMATIVE REFERENCES**

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

**2.2.1 Normative**

[1] ISO 9001 Quality Management Systems

[2] EST 32-372 Information Security - Physical and Environmental Security

[3] 32-351 Information Security - Network Security Standard

[4] GGR 0992 Plant Safety Regulations

[5] 36-776 Environmental Conditions for Process Control Equipment Used at Power Stations

[6] NWS 1672 Public Address/Sound Distribution Systems

[7] 85-1995 Occupational Health and Safety Act (OHASA)

[8] GNR1053 Lift Escalator and passenger conveyor regulations

[9] 237-0409 Medupi Reliability Basis Optimization Procedure – Rev 1

**2.2.2 Informative**

[10] 36-452 Classification Guideline. [11] 200-39993 CBMS BOQ

[12] 32-894 Eskom Server Room and Data Centre Standard

[13] PGZ 45-25 Failure Mode Effects (and Criticality) Analysis (FME (C) A) Guideline

**2.3 DEFINITIONS**

|  |  |
| --- | --- |
| **Definition** | **Description** |
| Condition Based  Maintenance | Predictive maintenance carried out because of findings from analysis of parameters measured under a condition-monitoring regime, or from recommendations from reliability analysis. |
| Condition Monitoring | Non-intrusive monitoring carried out to determine the physical condition of asset / plant and equipment. |
| Corrective Maintenance | The process of restoring asset / plant and equipment which have failed or deteriorated to a state which renders it unable to meet the acceptance criteria required for its particular application. |
| In-service Inspection | All inspection and testing conducted on plant and equipment at regular intervals and prescribed by regulatory and statutory codes or other types of  specification throughout its service life. |
| Inspection | Activities, which by means of examination, observation or measurement, determine the conformance of material, parts, components etc., to predetermined specifications and quality requirements. |
| Lifecycle Management  Plan | This is the plan that details the financial and technical requirements with respect to all planned projects over the life of the plant. This plan covers  Capital, R&E, and Routine Maintenance and Planned Maintenance costs. |
| Maintenance | A combination of all technical, administrative and managerial actions during the lifecycle of an item intended to retain it in, or restore it to, a condition in which it can perform its required function. |
| Maintenance  Philosophy | The principle approach decided upon for performing maintenance, such as pro-active or re-active maintenance. |

|  |  |
| --- | --- |
| **Definition** | **Description** |
| Maintenance Plan | A plan that details the maintenance that needs to be done on a specific asset  / plant item or component and the frequency and quality requirements for that maintenance. |
| Maintenance Schedule | The timing of the Maintenance Plan information stipulating when in the calendar year, work needs to be done. |
| Maintenance Strategy | The type of maintenance selected for specific asset / plant and equipment, such as time or condition based maintenance, corrective or preventative  maintenance. |
| Preventive  Maintenance | Planned time or schedule based maintenance carried out with the explicit objective of preventing functional failures and is directed towards maintaining the physical condition of the asset / plant or equipment. It includes scheduled overhauls and scheduled replacement of worn out parts or failure prone components. |
| Reliability Centred  Maintenance | RCM represents a disciplined decision logic approach that focuses on the consequences of failure to develop the most cost-effective lifetime  maintenance programme. The decision logic question is sequenced to those  parts of the asset / plant that are maintenance significant. Significant components failure modes are evaluated to identify appropriate  maintenance tasks and their costs. |
| Technical Plan | The technical plan will be the first five years of the Lifecycle Manage Plan  (Life of Plant Plan). |
| Testing | All activities required determining the actual performance or condition of an item. |

**2.4 CLASSIFICATION**

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

**2.5 ABBREVIATIONS**

|  |  |
| --- | --- |
| **Abbreviation** | **Description** |
| BACnet | Building Automation and Control Network |
| BMS | Building Management System |
| BOP | Balance of Plant |
| BOO | Bill of Quantities |
| C&I | Control and Instrumentation |
| CBMS | Consolidated Building Management System |
| CCTV | Closed Circuit Television |
| co | Carbon Monoxide |
| DCS | Distributed Control System |
| FMECA | Failure Mode Effect and Criticality Analysis |
| Hazloc | Hazardous Location |
| HMI | Human Machine Interface |
| HVAC | Heating Ventilation and Air Conditioning |
| IAC | Integrated Access Control |
| IM | Information Management |
| 1/0 | Input/ Output |
| IP | Internet Protocol |
| IT | Information Technology |
| PTZ | Pan Tilt Zoom |
| RAM | Reliability Availability and Maintainability |
| SLAN | Station Local Area Network |
| UPS | Uninterrupted Power Supply |
| URS | User Requirements Specification |

**2.6 ROLES AND RESPONSIBILITIES**

• **C&I:** Responsible for control instrumentation on the plant, C&I is solely responsible for the

CBMS.

• **Electrical Maintenance:** Responsible for electrical maintenance on plant.

• **Operating:** Responsible for the general operating and inspections of plant.

• **Engineering:** Responsible for good upkeep of system including long term plant health.

• **Performance and Testing:** Responsible for performance measurement and tests on plant and equipment.

**2.7 PROCESS FOR MONITORING**

The document will be kept at Document Centre and the revisions controlled thereof.

**2.8 RELATED/SUPPORTING DOCUMENTS**

The document will be kept at Document Centre and the revisions controlled thereof.

**3. MAINTENANCE EXECUTION STRATEGY**

**3.1 ASSET OVERVIEW**

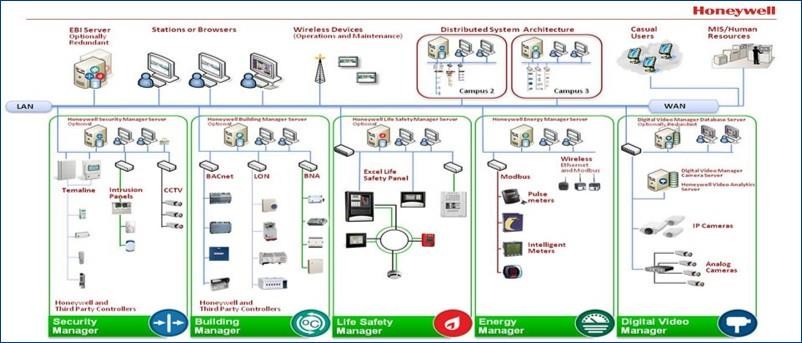
The CBMS consolidates the BMS, ACS, CCTV and other systems that are necessary for the buildings status monitoring. A ring network is used to link all these components into one management system. The management software comprises of all the modules that are inputs from the field and offers a central platform for system monitoring, management, surveillance and external interfacing.

**3.1.1 Consolidated Building Management System**

**3.1.1.1 Consolidate Building Management System**

a) The CBMS will offer a common monitoring platform for the FDS, ACS, CCTV, HVAC, Elevator monitoring, Perimeter protection and Flood monitoring. The decision required to be executed in case of emergency are coordinated by the CBMS.

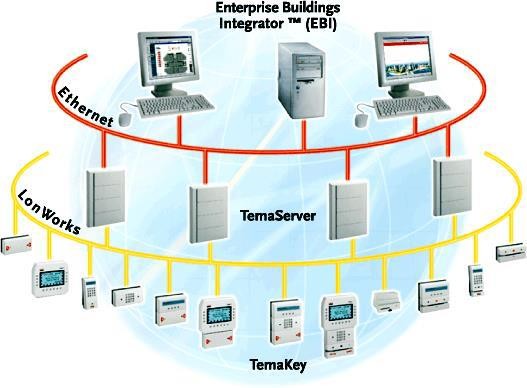
b) Enterprise Buildings Integrator (EBI) is a highly configurable integrated building management system providing an efficient and reliable way of ensuring the security, safety of people and the effective operation of buildings and facilities. It integrates with Open System standards, existing enterprise systems, and with Internet and intranet applications. EBI allows remote or partially automated monitoring and control of your facility. It also has modules for controlling and configuring BMS components.



**Figure 1: CBMS Hardware Architecture**

**3.1.2 Access Control System**

Access control provides a security point. It grants the individual access to the process or nonprocess areas according to their access rights stored in the database. ACS Field Controllers is a Honeywell Temaline controller that is fully supported by the Honeywell EBI R410.2 SMS Software. All ACS field equipment such as card reader, and access controlled traffic barrier (turnstiles, doors, Boom Barriers, Gates), and door/gate monitoring are connected to the ACS Field Controllers. The controller then connects to the TS2 which processes the input card and determines access rights. All the activities are archived including entry requests and alarms generated. The ACS can work as a standalone system if the CBMS network is not available. It will locally archive all the faults and activity events when the main network is not available. The network solution used in the implementation of this system allows easy expandability of the system in the future.



**Figure 2: Access Control System**

**3.1.3 CCTV**

It is an integral part of the BMS. CCTV system offers video surveillance, real time monitoring and recording of events. It consists of a Database Server and a Camera Server. The components connected to the servers are:

• Fixed Outdoor Network Cameras with IR illuminators for monitoring the perimeter area,

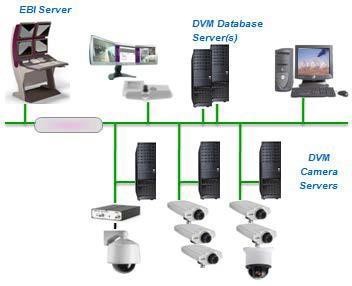
• Fixed Outdoor Network Dome Cameras,

• DVM Database & Camera Servers,

• DVM software & license,

• DVM operator workstations.

DVM allows the operator and system to view and respond to alarms, Schedule equipment operation. Views, manipulates, and analyse data acquired from various controllers. View custom displays, cardholder information, or photo images and create Photo-ID cards. It integrates all aspects of the building together to allow Enterprise View of security and an integrated response. It provides sophisticated alarm and event management to assist operators handling incidents.



**Figure 3: CCTV**

**3.1.4 Building Management System Interfaces**

The CBMS interfaces with other systems to provide total integrated control of the buildings. It uses a CP/IPC controller as a BMS input interface to connect these components to the CBMS. These components are HVAC monitoring, Perimeter protection, Elevator monitoring and Energy management. HVAC monitoring ensures that the status of the rooms' temperature and humidity is kept within set point. If not, the CBMS will issue a command to adjust it.

Elevator monitoring will monitor the status of the elevators. The level, open and close status, weights its carrying and up or down movement.

Energy management controls the amount of energy used and water consumed in the buildings.

Perimeter protection will monitor unwanted activity along the perimeter fence. Upon activation, it will initiate a camera recording and lighting to the specific area.

Personnel Address (PA) system will provide audible warnings that are clearly understood, and can be heard by everyone in a zone in alarm.

**3.1.5 Maintenance Philosophy and Limitations**

The FDS maintenance can be done while the unit is operational, therefore does not require an outage. A proper risk assessment is to be done if there won’t be a temporary solution for detecting fires. The acceptable instrument life is about 15 years. This means that the FDS must be inspected and monitored throughout this period to facilitate proper maintenance of this system. The system includes intelligent field devices having self-diagnostics capabilities. This plus online monitoring gives an added ability to maintain the system at optimum efficiency by responding to faults before they become serious and affect the operation. The rest of the equipment on the FDS will be replaced as and when they fail following the FMECA plan conducted for the purpose of this document and in conjunction with the Inspection, Testing and Maintenance of Fire Detection Systems Standard document number 240-56737654.

The environment plays a critical role too in the effectiveness of the monitoring. Dusty environments pose a risk on the field instrument sensors. Therefore, physical periodic inspection and testing of these field instruments is part of the strategy.

**3.1.6 Plant Performance**

Design availability of the system of 99% will be expected since the system is new and responsible for protection of personnel safety and equipment.

**3.1.7 Operating Philosophy**

Refer to the document listed below:

Fire Detection System Operating and Control Philosophy: 240-78755320.

**3.1.8 Criticality of Asset**

Criticality of each component is covered under the FMA spread-sheet in appendix A. It is defined as:

|  |  |
| --- | --- |
| **Functional Importance Category** | **Potential Consequences (Risk)** |
| Critical | Safety, Health or Environmental |
| Statutory Impact |
| Production Loss (>5% loss of period > 8hrs) |
| Hidden (redundancy, protective device) |
| Non-Critical | Significant Costs |
| Secondary Damage |
| RTF | No significant effects beyond repair of the failure itself. A RTF component is one for which the consequences of failure are acceptable without any preventive maintenance being performed and there is no simple |

**3.1.9 Environmental Impact**

The Environmental Impacts associated with the FDS are identified during the design phase. This will include the use of instruments that have harmful radiations, in the case of Medupi those were not used. Smoke suffocation due to fire that was undetected fire development in closed areas.

**3.1.10 Safety Impacts**

The FDS is mainly installed to satisfy safety; plant and personnel. It is therefore its function to ensure that personnel are warned early if there is a safety event, in this case fire related event and protect the plant and processes by activating fire extinguishing systems.

The impact of a non-functional FDS can be very serious and costly too. Care need to be taken when maintaining this plant. Staff must be properly trained in maintaining this plant and understanding the effects of keeping the plant operational.

Health, safety hazards and risks associated with an installed loop need to be understood and the system left in its original state for it to keep the plant and personnel safe.

**3.1.11 Risk Assessment**

Risks associated with the system are identified prior to any maintenance work. This including studies done when designing the system in order to effectively maintain the system.

**3.1.12 Assumptions**

All the required testing equipment, the skills needed to analyse the status of the equipment, spares for replacing damaged field instrumentation and relevant task lists will be available to maintain the FDS and keep it operating optimally throughout its life cycle.

**3.1.13 Future Plant / Design Modifications and Requirements**

The plant design allows for easy extension of additional plants for monitoring. Future work will not require any physical change of the system but only additional software modules. Unit 6, BOP, Admin Building

and Access Control Building are the only plant areas with the FDS installed. All the subsequent Units are yet to follow and the FFP. This will not require modifications.

**3.1.14 Remnant Life**

The system is still in construction and commissioning phases, the expected life is still as per design and

C&I Strategic report specification.

**3.1.15 Lifecycle Management Plan (LCMP) / Life of Plant Plan (LOPP)**

The LOPP of the system is as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Description** | **WBS No.** | **Total Value** | **Start date of the project** | **Completion date of the project** |
| Upgrade Plant Building Management System | P1381801  C.GME0045 |  | 2029/04/01 | 2059/03/31 |

**3.1.16 Technical Plan**

No project on the Technical Plan for the CBMS as it is still part of New Build strategy.

**3.2 MAINTENANCE STRATEGY DETERMINATION PROCESS**

The RBO process is a step-by-step approach to develop and optimise the plant Reliability Basis, by incorporating plant specific knowledge, maintenance and failure history and industry best practice, to finally achieve an effective Plant System Strategy.

The optimisation process further includes the understanding of how equipment fails the development of defence mechanisms to counteract these failures and the application of technology to proactively predict potential failures.

A balance has to be found between the amount of maintenance performed and the resulting reliability of the equipment.

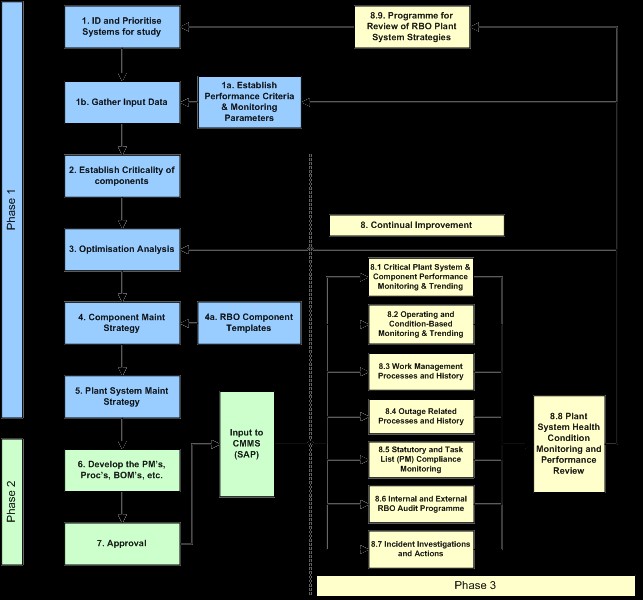
The Reliability Basis Optimisation is done by:

1. Examining each piece of equipment with a view of how it can be expected to fail,

2. Determining what maintenance tasks should be done regularly to prevent such a failure from occurring,

3. Determining the optimum interval for each such failure defence task.

Figure 4 shows the RBO process pictorially and below is described a detailed step by step explanation of the process.



**Figure 4: Flow Diagram for Reliability Basis Optimisation**

**Step 1: Identify Plant Systems Including boundaries to be analysed**

The boundaries of the system should be specific (e.g., the system ends at outlet flange of the de- aerator gate valve with functional location 00 XXXXXX). This level of detail is required as it prevents grey areas by making it clear where the next system starts thereby avoiding components being left out of analysis.

**Gather Input data, Establish Performance Criteria and Monitoring Parameters**

A walk-down of the system to be analysed should be conducted prior to analysis. This should aim to verify that components on the physical plant and components on the plant drawings correspond.

The following data is also collected in preparation for analysis.

1. Plant hardware breakdown structure (functional locations or other)

2. Plant system drawings (flow diagrams, P&IDs, etc.)

3. List of components to be analysed (to be populated in spreadsheet)

4. Current Maintenance Strategies for each component. (PMs from SAP)

5. Maintenance and Operating Procedures

6. Previous analyses e.g. RBO, RCM, FMECA, etc.

7. RBO analysis from identical plants in other stations (for benchmarking)

8. Capital/Modification Plans in progress or completed

9. OEM documents and/or Contracted Out Plant

10. Maintenance History from CMMS

11. RBO Templates for Best Practice Maintenance Strategies (GGCS)

12. Components desired capabilities (minimum operating parameters or acceptable levels)

13. Component parameters to be monitored (e.g. temperature, pressure, vibration, etc.)

**Step 2: Determine and document the Criticality or Functional Importance Evaluation (FIE) of plant system components**

Maintenance should be focused on preserving critical System, Structure and Component functions. Thus, in order to achieve this, it is important to identify which Systems, Structures and Components support critical functions. Some components may not support critical functions, but can have serious consequences if they fail in a certain manner (e.g. barring gearbox coupling engages while mill is in service), and this must be considered.

On the spread-sheet populated with all the systems components, all components should be evaluated to determine in what ways they can fail to fulfil their functions. This is termed the functional failure evaluation. Once the functional failures have been identified for each component, the component should be assessed for functional importance, in accordance with the set criteria in Table 3.1. The functional importance is then recorded in the spread-sheet.

As the success of the resulting Maintenance Strategy relies on accurate component categorisation, it is important to ensure that staff with the appropriate experience review the FIE. A panel of experienced staff from Operating, Maintenance and Engineering should be used to perform this review.

**Critical**

Critical components are those where the consequences of failure are serious and where the aim must be to defend against all plausible failures.

**Non-critical**

Non-critical components are still important components, but are those where we can tolerate a failure.

**Run-to-Failure (RTF)**

• Components are Run-to-Failure where there are no effects beyond repair of the actual failure itself.

• For components that are categorised as RTF, the decision must be ratified using the checklist in Appendix B. All components identified as RTF, must be validated and the reasons documented within the spread-sheet.

**Step 3: Optimisation Analysis**

This analysis entails:

1. Scrub (search) existing Task Lists and tasks to identify duplication,

2. Search for similar System Models from other Power Stations,

3. Search for relevant Head Office RBO Templates (GGCS)

**Step 4: Component Maintenance Strategy**

Analysis then commences on the individual components or parts where necessary

**RBO Templates (Generation Generic Component Strategies)**

For each Critical and Non-critical component, identify the applicable RBO template (GGCS) from the library available from Generation AMD. Consider the following:

1. Basic design (Is the component of similar design in that the component will fail in the same

manner as those covered by the RBO template)

2. Functional Importance (Critical, Non-critical)

3. Operating Environment (Harsh or mild).

4. Duty cycle (high or low)

Should there be a technical reason to deviate from the recommendations of the GGCS, this reason should be documented so that the thought logic can be followed by the personnel who will review the document in future.

In the absence of RBO TEMPLATE (GGCS) perform a failure mode analysis.

**Component Failure Mode Analysis (FMA)**

Where no applicable RBO TEMPLATE (GGCS) is available, perform a FMA on the component. Identify and list against each component, all plausible failure modes (FMs) that will lead to functional failure of the component. For each failure mode, identify and list all possible failure causes. After which a

suitable mitigation task and frequency (interval) has to be decided upon.

**TASK SELECTION**

For each failure mode and cause combination, identify the most applicable and effective tasks to defend against the failure. Preventive maintenance tasks should be selected in the following order of

priority:

**Condition Monitoring Tasks**

Task aimed at detecting the onset of failure, in order to prevent a functional failure.

1. There must be a measurable parameter whose change over time can be correlated to failure onset.

2. The failure development period should be long enough to allow appropriate action to be taken.

3. The task should be non-intrusive.

**Time Directed Tasks**

Task aimed directly at failure prevention or retardation.

1. The task is carried out at the present interval without any further input and is designed to prevent or retard failure.

2. The task usually entails some form of intrusion into the equipment.

**Failure Finding Tasks**

Task aimed at discovering a hidden failure condition before an operational demand.

**a)** Task is performed to detect whether something has already failed, in order that action can be taken to prevent the multiple failure.

**TASK INTERVAL SELECTION**

Based on the task type, select a suitable task periodicity.

1. For Condition Monitoring tasks, the periodicity should be based on the failure development period. (Period between the point at which the potential failure condition can be detected and the point at which the functional failure would occur).

2. For Time Directed tasks, the periodicity is based on the age at which the component shows a rapid increase in the conditional probability of failure. This age is estimated based on maintenance history and international experience (EPRI Templates).

3. For Failure Finding tasks, the periodicity should be based on the risk of multiple failures.

The task interval is based on an assessment of the acceptable level of risk associated with the failure. Should there be a lack of available reliability data; specialist opinion and international experience are also used to determine a suitable task interval.

**Record Component Maintenance Strategy**

1. The RBO Team decides on an appropriate Component Maintenance Strategy (using RBO TEMPLATE (GGCS) or FMA method), and documents it with appropriate task descriptions and

frequencies.

2. The RBO Team documents the decision process for future reference.

3. The RBO Team identifies PMs, WPs, SMPs, SOPs, BOMs and other documents for development, review, or deletion.

The results of this process are recorded in a spreadsheet with suitable columns as per appendix A of this document.

**Step 5: Compile and approve the Plant System Maintenance Strategy**

The System Engineer compiles and documents a draft Plant System Maintenance Strategy document

which prescribes the “when” to do “what” based on the combination of individual Component

Maintenance Strategies. The System engineer is responsible for the contents of this document as well as for keeping it updated.

The Plant System Strategy not only contains maintenance related issues, but also includes the following strategies related to that particular plant system:

1. Operating Strategy (related to the operation, change-over and/or testing of streams, redundant

and standby equipment)

2. Outage Strategy (related to unit outages as well as non-unit outages, at what frequency will the equipment be taken out, pre-outage interventions required, etc.)

3. Maintenance Strategy will comprise of the individual Component Maintenance Strategies, which become the essential building blocks of the Reliability Basis. (component breakdown, failure

modes and what to be done when)

4. Spares Strategy (related specifically to capital or strategic spares)

5. Proposed Modifications (planned and based on the Analysis study)

6. Any other areas for research, modification or investigation to improve the condition monitoring and predictive maintenance efforts.

Once the Plant System Strategy has been drafted by the System Engineer, this document is circulated for review and approval, as follows:

1. Internal team review (by members of the analysis participating members, maintenance

functions, etc.)

2. External Power Station review (this is normally only needed if the power station believes that external specialists off-site can add value to the content of the document)

3. Approval by the Engineering Manager.

4. Distribute the Plant System Strategy within the Power Station and to AMD at Head Office.

**Step 6: Implementation of the Plant System Strategy (Phase 2)**

This phase involves the development of each one of the tasks identified in the Maintenance Strategy. This development will take place in the Works Management/ Maintenance functions and involves the detailed step by step process of doing the inspection or work.

All task lists are to be reviewed by the System Engineer prior to approval by the relevant function, to assure that all related aspects of the Maintenance Strategy have been incorporated.

1. Compilation of PMs and SMPs (inclusive of BOMs and work packages): The PM schedule and procedure format of the particular power station is used as a standard.

2. Removal of redundant PM’s and re-packaging of tasks: During the optimisation process, certain tasks will be made redundant, replaced by condition monitoring tasks and/or have their frequencies changed and therefore groupings of tasks may have to be re- packaged.

**Step 7: Approval of PMs and SMPs**

These documents are to be reviewed and approved by the relevant Department individuals after a review by the System Engineer, whose role is to assure that all related aspects of the Maintenance

Strategy have been incorporated.

1. Uploading into SAP

All documents developed are to be uploaded into the CMMS (SAP) and all these documents can be viewed by any person from that site or even another site.

2. Switching on the CMMS (SAP) PM’s

When appropriate, all PMs are to be switched on and these then become active from here on.

The normal CMMS (SAP) controls of Work Management/ Maintenance execution then apply from hereon.

**Step 8: Continual Improvement a) Strategy Document Reviews**

System Engineers are required to update their strategies whenever a change of task list is required in their plants. As a minimum, the strategy document shall be reviewed at least once a year.

Even if there are changes during the year, the yearly review should still be conducted to ensure that

analysis is done in order to identify components that are being over maintained and to ensure that failure history is being analysed.

The documentation system should be such that all previous analysis remains available for reference

hence a revision number should apply to all updated documents.

The new revision document should highlight (preferably in the first pages), what changes have been made within that document. It is suggested that is say the yearly review is rev 3, the minor revisions

during the course of that year be rev 3,1; rev 3,2 etc. and the revision will only move up to rev 4 during

the yearly review of the following year.

For purposes of the annual review, the System Engineer should download history from SAP for the previous years and compare this against the listed strategy to determine if the task is still relevant, is being performed too frequently or too little and/or if a new strategy is required. The annual RBO Review Programme will be developed by each site.

The annual review should verify the following aspects:

1. All changes (physical functional location, component manufacturer, operating parameters, feed material, etc.) or modifications done have been included in the Plant System Strategies,

2. Drawing numbers used are referenced in the strategy document,

3. Spares required especially for RTF components should be listed,

4. For each task identified in the Plant System Strategy, a Task List shall exist in SAP,

5. The Plant System Strategy shall reflect the SAP task list number (maintenance item) per component task,

6. Each SAP task list is active and generating work orders at the defined frequencies,

7. The maintenance history specified by the System Engineer in the strategy document is being captured by the maintenance personnel and analysed by the System Engineer. If additional history is required, this should be updated on the strategy document,

8. Resource requirements (manpower, spares, tools, scaffolding, time, lifting equipment, etc.) have been clearly identified for each Task List,

9. Task List instructions are clearly listed (no one-liners allowed),

10. Plant System Strategy Tasks are optimal in terms of plant system reliability, failure data and cost,

11. Shortcomings and Corrective Actions required are identified.

This review shall be documented to show this review has been carried out and formally communicated to the Engineering Manager for approval.

**b) External Audits**

In order to assure that all components have been considered, have strategies and that the strategies are in SAP, AMD will initiate an audit process. As it is not possible to audit every single component,

these audits will take the form of sample audits and shall be conducted every 3 years.

**c) Auditing for Plant System component listing completeness**

The Eskom plant is broken down into 26 systems as per GGG 0806 (Generic Plant Breakdown) for the purposes of RBO. AMD will conduct sample audits by selecting random components and the Station

should provide evidence of the component having been analysed in a strategy document. Should this component not be located in a strategy document, the assumption will exist that it was not covered.

Drawing numbers used should be referenced in all strategy documents.

**d) Auditing to assure all component strategies are in SAP**

For each component that is not a run-to-failure, the Station should be able to demonstrate that a task list exists for the component in the CMMS. This may be by way of associating a maintenance task

number to a component on the spreadsheet column “documents required”. A random check will also be

done in SAP to ensure that strategies that have been made redundant are switched off. Points will be allocated as appropriate.

**3.3 Maintenance Strategy (Specific Equipment and Component Maintenance Strategy)**

Refer to appendix B.

**4. ACCEPTANCE**

This document has been seen and accepted by:

|  |  |
| --- | --- |
| **Name** | **Designation** |
| Nicolaas du Toit | Fire Risk Manager |
| Victor Ndzala | HVAC System Engineer |
| Mufarisi Manyuha | Fire Protection System Engineer |
| Langa Zuma | Auxiliary Engineering Manager |
| Lucky Mmadihlaba | Snr Advisor Engineering S |
| Albert Malapile | Chief Engineer Prof Engineering |
| Vusi Mosime | Engineer Prof Engineering |
| Joel Manamela | Snr Advisor Engineering S |
| Andrew Lekganyane | Engineer Prof Engineering |
| Lindani Cele | Engineer Prof Engineering |
| Moran Khoza | Engineer Prof Engineering |
| Letago Manyelo | Engineer Prof Engineering |

**5. REVISIONS**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Rev.** | **Compiler** | **Remarks** |
| May 2024 | 5 | NN Nemulalate | Periodic Document  Review. Minor format changes. |
| November 2019 | 4 | EF Van Dyk | Periodic Document Review. Minor format changes. |
| October 2017 | 3 | TL Mzila | Remove Section 3.1.3  Public Address System |
| October 2015 | 2 | TL Mzila | Format change Yearly  Review |
| July 2013 | 1 | TL Mzila | First Issue |

**6. DEVELOPMENT TEAM**

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

• Nthabi Mashigo

**7. ACKNOWLEDGEMENTS**

• Nthabi Mashigo

**Appendix A – Maintenance Strategy Template**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | | | | | |
| **Asset Class:** |  | | | | | | | | | | | | | |
| **Asset Sub Class:** |  | | | | | | | | | | | | | |
| **Asset Sub Class Family:** |  | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | |
| **Options** | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **Key** | 1M | One monthly | | |
| **Functional Importance** | Critical | X | X | X | X |  |  |  |  | 2M | Once every two months | | |
| Non Critical |  |  |  |  | X | X | X | X | 6M | Once Every six months | | |
| **Duty Cycle** | High | X |  | X |  | X |  | X |  | 1Y | Once Every year | | |
| Low |  | X |  | X |  | X |  | X | 2Y | Once every two years | | |
| **Environment** | Harsh | X | X |  |  | X | X |  |  | 3Y | Once every three years | | |
| Mild |  |  | X | X |  |  | X | X | 4Y | Once every four years | | |
|  | | | | | | | | | | 5Y | Once every five years | | |
| 6Y | Once every six years | | |
| 10Y | Once every ten years | | |
| AR | As required | | |
|  | | | | | | | | | | | | | | |
| **PM Tasks** | **Failure Mode**  **Line No** | **Periodicity** | | | | | | | | **Activities** | | **Quality Criteria** | **Hold**  **Point** | **Witness**  **Point** |
| **Preventive Maintenance:** |  |  |  |  |  |  |  |  |  |  | |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  | |  |  |  |
| **Condition Based Maintenance:** |  |  |  |  |  |  |  |  |  |  | |  |  |  |
| **Corrective Maintenance:** |  |  |  |  |  |  |  |  |  |  | |  |  |  |
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**Appendix B – MAINTENANCE STRATEGY FOR CONSOLIDATED BUILDING MANAGEMENT SYSTEM**

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| **Equipment** | **Sub-Equipment**  **/Component**  **Group** | **Function al Location (KKS/** | **Functional Description** | **Asset Class** | **Asset Type** | **Functional Importanc e**  **(C/NC/R** | **Functional Failure** | **Parts that can Fail** | **Failure**  **Mode** | **Failure Mode (Specify if**  **Other)** | **Task** | **Task Description** | **Task**  **Type** | **Freque ncy** | **Unit Run or Outage** | **Work Centre** |
| **ACS** | | | | | | | | | | | | | | | | |
| Controller | Controller | CYU | Tema Server TS2 | C\_I\_Controller | Other | C - SFTY | Loss of Control or  Communication | Electronics, CPU, Cabling | Other | CPU Freeze, Malfunciton, Damage. | Replace | N/A | RTF | RTF | R | C&I Maintenance |
| Door  Controller | Door Controller |  | TemaDoor Controller TS-AC01 | C\_I\_Controller | Other | C - SFTY | Used for controlling door status. | Electronics, Cabling and Magnets. | Other | Electronics Failure, Magnet Damage | Visual Inspection |  | PM | 1Y | R | C&I Maintenance |
| Power Supply | Power Supply |  | Power Supply Module TP U01 | C\_I\_Power\_S  upply | Other | C - SFTY | Loss of Power  Supply Source | Electronics, Cabling. | Other | Electronics Failure, Overheat. | Replace | N/A | RTF | RTF | R | C&I Maintenance |
| IO Device | IO Mangement  Device |  | Wiegand Multi IO Management  Device TK\_S014-A08 | Other | Other | C - SFTY | Loss of IO Mangement | Electronics, Cabling, CPU. | Other | CPU Freeze, Malfunciton, Damage. | Replace | N/A | RTF | RTF | R | C&I Maintenance |
| Door Lock | Electro Magnetic  Door Lock |  | Elector magnetic Locks S  series CDVI | Other | Other | C - SFTY | Loss of Maglock door control. | Electronics, Electromagnet, Cabling. | Other | Electromagnet damage, Malfunction. | Replace | N/A | RTF | RTF | R | C&I Maintenance |
| Relay Module | Relay |  | Relay Interface Modules 8-10-  16A 49 series. | Relay | Other | C - SFTY | Loss of Input power and output circuit interface | Electronics, Relays | Other | Electronic Relay module failure. | Replace | N/A | RTF | RTF | R | C&I Maintenance |
| Biometric  Reader | Biometric Reader |  | Biometric Reader Terminal  MA500 and 500+ Series | Other | Other | C - SFTY | Loss of Biometric identification | Electronics, Sensor, Keypad, LCD, Cabling. | Other | Electronics failure, Keypad stuck, Damaged terminal, sensor not reading. | Visual Inspection | Visually Inspect and  Clean sensor. | PM | 1Y | R | C&I Maintenance |
| Biometric  Reader | Biometric Reader |  | Biometric Reader Outdoor  Terminal - OMA520D | Other | Other | C - SFTY | Loss of Biometric identification | Electronics, Sensor, Keypad, LCD, Cabling. | Other | Electronics failure, Keypad stuck, Damaged terminal, sensor not reading. | Visual Inspection | Visually Inspect and  Clean sensor. | PM | 1Y | R | C&I Maintenance |
| Biometric  Reader | Biometric Reader |  | Biometric Reader Small Terminal MORPHOACCESS Series. | Other | Other | C - SFTY | Loss of Biometric identification | Electronics, Sensor, Keypad, LCD, Cabling. | Other | Electronics failure, Keypad stuck, Damaged terminal, sensor not reading. | Visual Inspection | Visually Inspect and  Clean sensor. | PM | 1Y | R | C&I Maintenance |
| X-Ray | X-Ray |  | X-Ray Baggage inspection machine - XJ5335 | Other | Other | C - SFTY | Loss of X-Ray scanning | Terinal Machine, X\_Ray Light, Scanner, Cabling | Other | Motor Failure, Scanner damage,Electornics failure, Light damage. | Visual Inspection | Visually Inspect and  Clean machine. | PM | 1Y | R | C&I Maintenance |
| Input Module | Input Module |  | IO Management Device - TK C21P-A01 | Other | Other | C - SFTY | Loss of IO Mangement | Electronics, Cabling, CPU. | Other | CPU Freeze, Malfunciton, Damage. | Replace | N/A | RTF | RTF | R | C&I Maintenance |
| Card reader | Card Reader |  | iClass High Frequency Reader  RS1D | Other | Other | C - SFTY | Loss of Card  Reading Cabability | Electronics and sensor. | Other | Electronics Failure, Cable damaged. | Visual Inspection | Visually Inspect and  Clean sensor. | PM | 1Y | R | C&I Maintenance |
| Break Glass | Break Glass |  | Emergency Break Glass Unit  MCP4A-G000SG-K013-11 | Other | Other | C - SFTY | Loss of emergency escape activation. | Electronics, Glass, Cabling, Micro switch. | Other | Electronics Failure, Cover Unit damage, Sensor Damage. | Visual Inspection | Visually Inspect and  Clean sensor. | PM | 1Y | R | C&I Maintenance |
| Card reader | Card Reader |  | Proximity Card Reader  OmniProx | Other | Other | C - SFTY | Loss of Card  Reading Cabability | Electronics and sensor. | Other | Electronics Failure, Cable damaged. | Visual Inspection | Visually Inspect and  Clean sensor. | PM | 1Y | R | C&I Maintenance |



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| **Equipment** | **Sub-Equipment**  **/Component**  **Group** | **Function al Location (KKS/** | **Functional Description** | **Asset Class** | **Asset Type** | **Functional Importanc e**  **(C/NC/R** | **Functional Failure** | **Parts that can Fail** | **Failure**  **Mode** | **Failure Mode (Specify if**  **Other)** | **Task** | **Task Description** | **Task**  **Type** | **Freque ncy** | **Unit Run or Outage** | **Work Centre** |
| **CCTV** | | | | | | | | | | | | | | | | |
| Network  Camera | Network Camera |  | Network Camera Series AXIS Q16 | Other | Other | NC | Loss of Image Processing and Surveilance | Lens, Electronics, Zoom motor, Firmware version,damage, Network connection. | Other | Surveilance Failure | Visual Inspection | Visually Inspect and Clean glas protecting the camera. | PM | 1Y | R | C&I Maintenance |
| Camera | Pan tilt zoom camera |  | Digital High speed network Dome System ACUIX IP PTZ Dome | Other | Other | NC | Loss of Image Processing and Surveilance | Lens, Electronics, Zoom motor, Firmware version,damage, Network connection. | Other | Surveilance Failure | Visual Inspection | Visually Inspect and Clean glas protecting the camera. | PM | 1Y | R | C&I Maintenance |
| Camera | Network Camera |  | Pan Tilt Motor YP3040 | Other | Other | NC | Loss of Image Processing and Surveilance | Lens, Electronics, Zoom motor, Firmware version,damage, Network connection. | Other | Surveilance Failure | Visual Inspection | Visually Inspect and Clean glas protecting the camera. | PM | 1Y | R | C&I Maintenance |
| Camera | Network Camera |  | Thermal Network Camera  AXIS Q1922/-E | Other | Other | NC | Loss of Image Processing and Surveilance | Lens, Electronics, Zoom motor, Firmware version,damage, Network connection. | Other | Surveilance Failure | Visual Inspection | Visually Inspect and Clean glas protecting the camera. | PM | 1Y | R | C&I Maintenance |
| Camera | Network Camera |  | Network Camera Series AXIS P3353 | Other | Other | NC | Loss of Image Processing and Surveilance | Lens, Electronics, Zoom motor, Firmware version,damage, Network connection. | Other | Surveilance Failure | Visual Inspection | Visually Inspect and Clean glas protecting the camera. | PM | 1Y | R | C&I Maintenance |
| Network  Controller | Network  Controller |  | Network Controller - Comfort  Point CP-IPC | Other | Other | NC | Loss of interface and  Control | Lelectronic Module, CPU, Cabling | Other | Module Failure, Communication Failure. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Server | Server |  | Dell Power Vault MD1200 | Other | Other | NC | Loss of video storage | Electronics, CPU | Other | Server failure | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Thermal  Camera | Thermal Camera |  | Thermal Network Camera  AXIS Q1921/-E | Other | Other | NC | Los of night image processing and surveilance | Lens, Electronics, Zoom motor, Firmware version,damage, Network connection. | Other | Cable break, lens blocked, surveillance failure. | Visual Inspection | Visually Inspect and Clean glas protecting the camera. | PM | 1Y | R | C&I Maintenance |
| Software | Software |  | Digital Video Manager R400 | Other | Other | NC | Lss of camera control and video editing. | Software modules. | Other | Software malfunction. | RTF | N/A | RTF | RTF | R | C&I Maintenance |



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| **Equipment** | **Sub-Equipment**  **/Component**  **Group** | **Function al Location (KKS/** | **Functional Description** | **Asset Class** | **Asset Type** | **Functional Importanc e**  **(C/NC/R** | **Functional Failure** | **Parts that can Fail** | **Failure**  **Mode** | **Failure Mode (Specify if**  **Other)** | **Task** | **Task Description** | **Task**  **Type** | **Freque ncy** | **Unit Run or Outage** | **Work Centre** |
| **CBMS** | | | | | | | | | | | | | | | | |
| Controller | Controller |  | Controller CP/IPC | C\_I\_Controller | Other | C - SFTY | Loss of interface and control | Electronic module. | Other | Electronic Module, CPU, Cabling. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Sensor | Sensor |  | Flood Detection line Type fd | Sensor | Other | C - SFTY | Loss of flood detection. | Line sensor, Electronics, Cabling. | Other | Line sensor break, Cable loose, Electronic failure. | Functional Check, Vissual Inspection. | Perform a functional check on the Flood detection sensor as well as a visual inspection on the sensor. | PM | 6M | R | C&I Maintenance |
| Sensor | Sensor |  | Flood Detection Point Type | Sensor | Other | C - SFTY | Loss of flood detection. | Line sensor, Electronics, Cabling. | Other | Line sensor break, Cable loose, Electronic failure. | Functional Check, Vissual Inspection. | Perform a functional check on the Flood detection sensor as well as a visual inspection on the sensor. | PM | 6M | R | C&I Maintenance |
| Detectors | Detectors |  | Perimeter Protection detectors | Sensor | Other | C - SFTY | Loss of perimeter monitroing. | Sensor, cabling | Other | No intruder detetion, sensor failure. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Module | Module |  | Distributed Control system. | Other | Other | C - SFTY | Loss of BMS link to the DCS. | Interface module, Cabling. | Other | Broken wire, electronic module failure. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| UPS | Power Supply |  | In interrupted power supply  (Schneider). | Other | Other | C - SFTY | Loss of backup power supply. | Electronics, Cables, Sensors, Fans, Modules | Other | No supply voltge, cooling fan failure, DC/AC Converter failure, Electronic module fialure. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Server | Server |  | GPS Server | Other | Other | C - SFTY | Loss of GPS Clock signal. | Computer server, Electornics, Enclosure | Other | Electronics failure, CPU Failure, Cable loose/break, kepad failure, CD failure. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Server | Server |  | Camera Server | Other | Other | C - SFTY | Loss of video storage | Computer server, Electornics, Enclosure | Other | Electronics failure, CPU Failure, Cable loose/break, kepad failure, CD failure. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Server | Server |  | DVM Database Server | Other | Other | C - SFTY | Loss of video storage | Computer server, Electornics, Enclosure | Other | Electronics failure, CPU Failure, Cable loose/break, kepad failure, CD failure. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Server | Server |  | EBI Server | Other | Other | C - SFTY | Loss of video storage | Computer server, Electornics, Enclosure | Other | Electronics failure, CPU Failure, Cable loose/break, kepad failure, CD failure. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Network  Switch | Switch |  | Network Switch | Other | Other | C - SFTY | Loss of interface and  Control | Electronic module, CPU, Buttons, Fuses | Other | Electronic module failure, CPU Failure, Cable break. | RTF | N/A | RTF | RTF | R | C&I Maintenance |

Equiprrent I Sut><qLipment Function functionalO escription Asset Class Asset Type Functional Functional Fadure IPartstl'8tcanFail failure Failure Mode (Specify if Task Task Description Talk Freque Unit Won< Centre

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| Cubicle | Cubide | 43U Equipment Rack 19'" SOOmm Deep v.ih tont glass doorZMOD-43Ul6N | Other | Other | C -SFTY | Loss ofequiJment component enclosure. | Control panel, Glass  door. | Other |
| Controller | Controler | Syslem W anager SX-2000SM | Other | Other | C -SFTY | Lossofsystem  cotroland | Eledronics, CPU, Cablng, Fuses, | Other |
|  |  |  |  |  |  | communication. | Buttons. |  |

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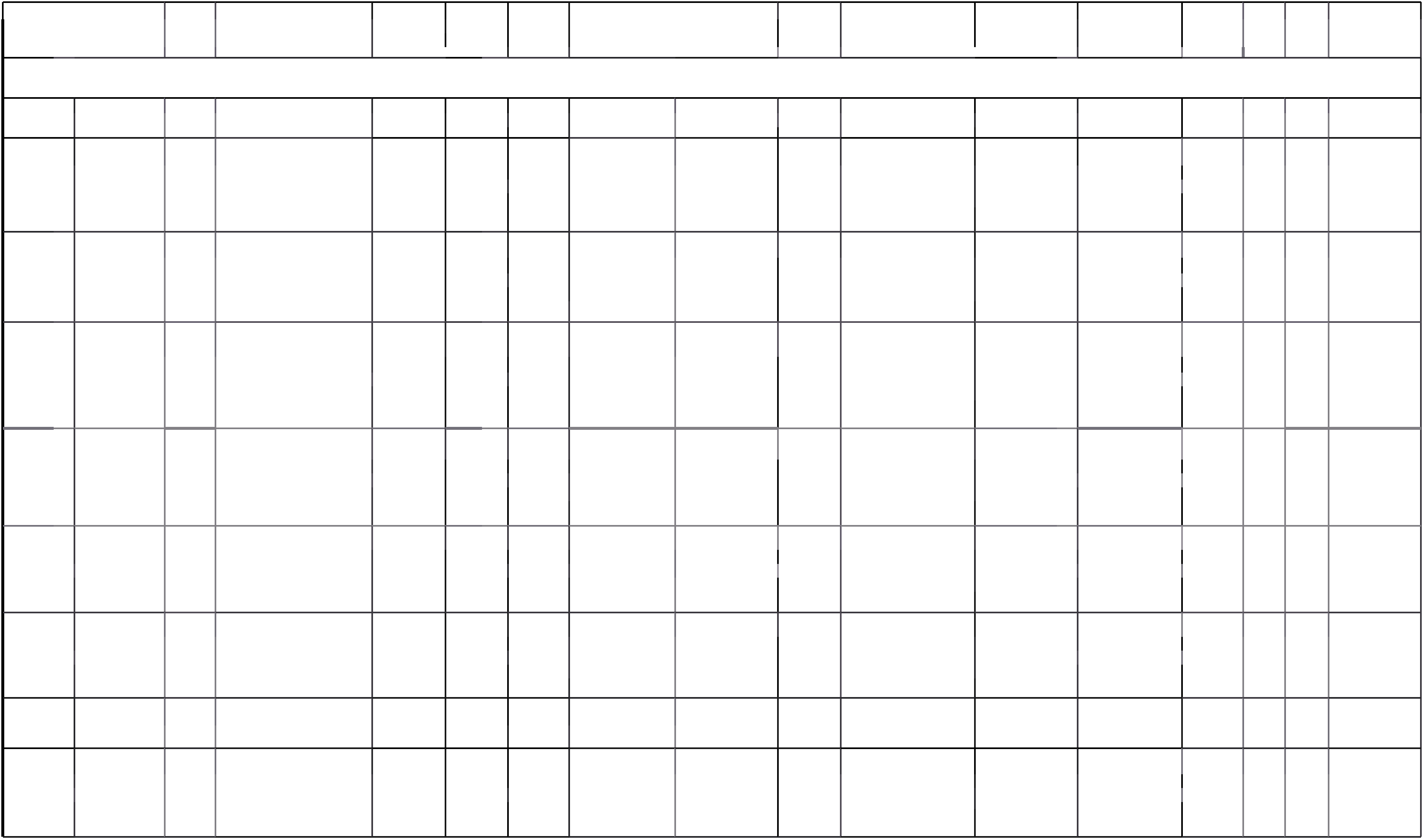
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| the equipment |  |  |  |  |

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Buttons..

Pov.er Amplier Input uni VP- Loss ofaudio .signals Electomlcs. CPU, E ledronic m octule, CPU, Functional Test, Amplifier Input Amplifterklput 200\DC Other Other C -SFTY to Ille am plier. Cablng. fuses. Key Other Cable break. Cleaning

knob, Buttons.

Emergency Pov.er SupplyVX-

Lossof pov.er

Electomics, CPU. E ledronic module, CPU, Functional Test,

Pov.er Supply Power Supply 20000SER Other Other C -SFTY supply to Ille Cablng, fuses. Other Cable break. Cleaning

system.

Cubicle Cubicle Power Supply frame VX- Other Other C -SFTY Lossof pov.er Frame, Support Other Support fi'ame dam age. RTF NIA RTF RTF R C&I Maintenance

2000PF supply support.

Electronic module, CPU,

Pov.er Supply Power Supply Dual Pov.er Supply Module VX- Other Other C -SFTY Lossofstandby Electomics, CPU, Other cable break, Kepad Functional Test,

|  |  |  |  |  |
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| Perform a t.Jnctional |  | | | |
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| the equipment |  |  |  |  |

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| **Equipment** | **Sub-Equipment**  **/Component**  **Group** | **Function al Location (KKS/** | **Functional Description** | **Asset Class** | **Asset Type** | **Functional Importanc e**  **(C/NC/R** | **Functional Failure** | **Parts that can Fail** | **Failure**  **Mode** | **Failure Mode (Specify if**  **Other)** | **Task** | **Task Description** | **Task**  **Type** | **Freque ncy** | **Unit Run or Outage** | **Work Centre** |
| **PAS** | | | | | | | | | | | | | | | | |
| Microphone | Microphone |  | Remote Microphone RM-  200SA | Other | Other | C - SFTY | loss of live audio input. | Microphone, ELEctronics, Buttons | Other | Microphone damage, Cable break, Malfunction | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Microphone  Interface | Microphone  Interface |  | Remote Microphone Interface  Module SX-200RM | Other | Other | C - SFTY | loss of zone selection. | Keypad, CPU, Electronics. | Other | Electronic module, CPU, Cable break, Keypad Stuck/Sticking. | Functional Test, Cleaning | Perform a functional  check as well as a visual inspection and perform cleaning on  the equipment. | PM | 1Y | R | C&I Maintenance |
| Microphone | Microphone |  | Remote microphone extension  RM0219S | Other | Other | C - SFTY | Loss of live audion input. | Microphone, ELEctronics, Buttons | Other | Microphone damage, Cable break, Malfunction | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Microphone | Microphone |  | Fireman's Microphone RM-  200SF | Other | Other | C - SFTY | Loss of emergency audio input. | Microphone, ELEctronics, Buttons | Other | Microphone damage, Cable break, Malfunction | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Network  Switch | Network Switch |  | 6 Copper/2 Fibre Switch EDS-  508-MM-SC | Other | Other | C - SFTY | oss of network fibre switching. | Cabling, CPU, Electronics. | Other | Switch damage, Malfunction. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Computer | Computer |  | Service Terminal. Windows software & Flat Screen Monitor | Other | Other | C - SFTY | Loss of system monitoring, control, configuration. | CPU, Screen, Keyboard, Mouse, Software | Other | Screeen freeze, damage, Keyboard stuck, CPU Freeze, electronics, software | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| Cubicle | Cubicle |  | 20U Equipment Rack 19"  600mm Deep with fron glass door ZMOD-20U/60 | Other | Other | C - SFTY | Loss of instrument containment and protection. | Doors, Panels, Glass | Other | Glass broken, door unlocking, expoed components. | RTF | N/A | RTF | RTF | R | C&I Maintenance |
| DC Batteries | DC Batteries |  | 12V 65 A/H Battery  BATT2 (65 A/H) | Other | Other | C - SFTY | Loss of backup power to the system. | DC Batteries, Terminals. | Other | Battery leaking, damage, ageing | RTF | N/A | RTF | RTF | R | C&I Maintenance |

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*. [↑](#footnote-ref-1)
2. Available from Engineering Contract Strategies Tel 011 803 3008 Fax 086 539 1902 [www.ecs.co.za](http://www.ecs.co.za) [↑](#footnote-ref-2)
3. Available from Engineering Contract Strategies Tel 011 803 3008 Fax 086 5391902 or [www.ecs.co.za](http://www.ecs.co.za) [↑](#footnote-ref-3)