NEC3 Term Service Contract (TSC3)

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

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

for Main and BFPT Condenser high pressure water jet cleaning and chemical cleaning for a 5 year contract at Tutuka Power Station on an as and when required "Basis"

Contents:

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

PART C1: AGREEMENTS & CONTRACT DATA

Contents:

C1.1 Form of Offer & Acceptance

Offer

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

Main and BFPT Condenser high pressure water jet cleaning and chemical cleaning for a 5 year contract at Tutuka Power Station on an as and when required "Basis"

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

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

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

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

Signature(s) .....

Name(s) .....

Capacity .....

For the tenderer:

.....
(Insert name and address of organisation)

Name & signature of witness .....

Date .....

Tenderer's CIDB registration number: .....

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

Acceptance

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

The terms of the contract, are contained in:

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

(Insert name and address of organisation)

Name & signature of witness .....

Date .....

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

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

No.	Subject	Details
1	N/A	N/A

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*

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

Clause	Statement	Data
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option:	
		A: Priced contract with 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
		X20: Key performance indicators
		Z: *Additional conditions of contract*
	of the NEC3 Term Service Contract April 2013[2] (TSC3)	
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):	**[●]**
	Address	**[●]**
	Tel	**[●]**
	Fax	**[●]**
	e-mail	**[●]**

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

11.2(2)	The Affected Property is	**Tutuka Power Station**
11.2(13)	The *service* is	The internal surfaces of main and BFPT condenser tubes are to be cleaned by means of High Pressure Water Jetting and Chemical cleaning on an as and when required 'basis'.
11.2(14)	The following matters will be included in the Risk Register	As stipulated in the Site information section of this contract (**Appendix C** on the last page of this document)
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	24 Hours
2	**The *Contractor*'s main responsibilities**	**Stated in each Task Order**
21.1	The *Contractor* submits a first plan for acceptance within	As per Task Order, agreed between *Service Manager* and *Contractor*
3	**Time**	
30.1	The *starting date* is.	
30.1	The *service period* is	60 Months
4	**Testing and defects**	**The *defects date* (warranty period) of each task order is Fifty-two (52) weeks after completion of each Task Order** **Notwithstanding the above, the *defects date* for equipment or plant shall be twelve (12) months from the date of cleaning completion. *Contractor* shall repair or replace any part found to be defective prior to the *defects date* on conditions that (i) the Employer must prove that such defect is the sole responsibility of the Contractor and (ii) the initial *defects date* for the Task Order of the plant concerned remains unchanged and shall not be extended from the date of repair or replacement. The defect correction period shall be determined on a case by case basis in respect of each Task Order. The *Employer* shall, as soon as practicable after becoming aware of a defect that it believes it's a defect that is covered by the *Contractor's* warranty, but not later than the Contractor defect date, provide the contractor with a written notice, stating the nature of the defect. *Contractor* shall only be liable for defects which are his sole responsibility, such as mis-advice by a technical advisor or defective parts. Costs which the *Contract* shall be liable for shall be limited to the costs of repairs or replacements but should not be exceeded to the Task Order**

		value. The *Contractor* shall not be responsible for any consequential damages, costs or losses of any kind.
5	**Payment**	
50.1	The *assessment interval* is	On Completion of each task
51.1	The *currency of this contract* is the	**South African Rand**
51.2	The period within which payments are made is	**4 weeks.**
51.4	The *interest rate* is	**the publicly quoted prime rate of interest (calculated on a 365 day year) charged 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**	**Works/Task that are not included in the Service Information (scope), Appendix or Annexures.**
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	**Refer to Risk Register on an appendix C Insurance as stipulated on Z12 clause.**
9	**Termination**	**NEC core clauses 9 shall be applied for termination.**
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	N/A
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). If the Parties do not agree on an Adjudicator the Adjudicator will be appointed by the Arbitration Foundation of Southern Africa (AFSA).** Will be appointed when a dispute arises.
	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) 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**	
X1.1	The *base date* for indices is	The month prior the enquiry closing
	The proportions used to calculate the Price Adjustment Factor are:	**proportion** / **linked to index for** / **Index prepared by** **0.** / **[●]** / **[●]** **0.** / **[●]** / **[●]** **0.** / **[●]** / **[●]**

		0.	**[●]**	**[●]**
		0.	**[●]**	**[●]**
		15%	**non-adjustable**	
		100%		

X2	**Changes in the law**	**Of the Republic of South Africa**
X17	**Low service damages**	
X17.1	The *service level table* is in	Appendix A on the second last page of this document
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 described**
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	3 months after completion of each task
X19	**Task Order**	

X19.5	The *Contractor* submits a Task Order programme to the *Service Manager* within	Within the same day of receiving the Task Order
X20	**Key Performance Indicators (not used when Option X12 applies)**	
X20.1	The *incentive schedule* for Key Performance Indicators is in	**Appendix B** on the last page of this document. No incentives will be paid out for Key performance indicators
X20.2	A report of performance against each Key Performance Indicator is provided at intervals of	The performance of the *Contractor* will be assessed yearly to ensure transparency and good performance is sustained
Z	**The *additional conditions of contract* are**	**Z1 to Z11 always apply.**

Z1 Cession delegation and assignment

Z1.1 The *Contractor* does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the *Employer.*

Z1.2 Notwithstanding the above, the *Employer* may on written notice to the *Contractor* cede and delegate its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the Electricity Supply Industry.

Z2 Joint ventures

Z2.1 If the *Contractor* constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations then these persons or organisations are deemed to be jointly and severally liable to the *Employer* for the performance of this contract.

Z2.2 Unless already notified to the *Employer*, the persons or organisations notify the *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	The replacement cost where not covered by the

Materials	*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 lir 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 44 of 1999, save to the extent that any liabilities are incurred due to the unlawful intent of the *Contractor* or any other person or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.

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 44 of 1999, or any replacement section dealing with the same subject matter.

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

Z14 Asbestos

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

AAIA means approved asbestos inspection authority.

ACM means asbestos containing materials.

AL means action level, i.e. a level of 50% of the OEL, i.e. 0.1 regulated asbestos fibres per ml of air measured over a 4 hour period. The value at which proactive actions is required in order to control asbestos exposure to prevent exceeding the OEL.

Ambient Air means breathable air in area of work with specific reference to breathing zone, which is defined to be a virtual area within a radius of approximately 30cm from the nose inlet.

Compliance Monitoring means compliance sampling used to assess whether or not the personal exposure of workers to regulated asbestos fibres is in compliance with the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.

OEL means occupational exposure limit.

Parallel Measurements means measurements performed in parallel, yet separately, to existing measurements

to verify validity of results.

Safe Levels means airborne asbestos exposure levels conforming to the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.

Standard means the *Employer*'s Asbestos Standard 32-303: Requirements for Safe Processing, Handling, Storing, Disposal and Phase-out of Asbestos and Asbestos Containing Material, Equipment and Articles.

SANAS means the South African National Accreditation System.

TWA means the average exposure, within a given workplace, to airborne asbestos fibres, normalised to the baseline of a 4 hour continuous period, also applicable to short term exposures, i.e. 10-minute TWA.

Z14.1 The *Employer* ensures that the Ambient Air in the area where the *Contractor* will Provide the Services conforms to the acceptable prescribed South African standard for asbestos, as per the regulations published in GNR 155 of 10 February 2002, under the Occupational Health and Safety Act, 1993 (Act 85 of 1993) ("Asbestos Regulations"). The OEL for asbestos is 0.2 regulated asbestos fibres per millilitre of air as a 4-hour TWA, averaged over any continuous period of four hours, and the short term exposure limit of 0.6 regulated asbestos fibres per millilitre of air as a 10-minute TWA, averaged over any 10 minutes, measured in accordance with HSG248 and monitored according to HSG173 and OESSM.

Z14.2 Upon written request by the *Contractor*, the *Employer* certifies that these conditions prevail. All measurements and reporting are effected by an independent, competent, and certified occupational hygiene inspection body, i.e. a SANAS accredited and Department of Employment and Labour approved AAIA. The *Contractor* may perform Parallel Measurements and related control measures at the *Contractor*'s expense. For the purposes of compliance the results generated from Parallel Measurements are evaluated only against South African statutory limits as detailed in clause Z14.1. Control measures conform to the requirements stipulated in the AAIA-approved asbestos work plan.

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

Z14.4 In the event that any asbestos is identified while Providing the Services, a risk assessment is conducted and if so required, with reference to possible exposure to an airborne concentration of above the AL for asbestos, immediate control measures are implemented and relevant air monitoring conducted in order to declare the area safe.

Z14.5 The *Contractor*'s personnel are entitled to stop working and leave the contaminated area forthwith until such time that the area of concern is declared safe by either Compliance Monitoring or an AAIA approved control measure intervention, for example, per the emergency asbestos work plan, if applicable.

Z14.6 The *Contractor* continues to Provide the Services, without additional control measures presented, on presentation of Safe Levels. The contractually agreed dates to Provide the Services, including the Completion Date, are adjusted accordingly. The contractually agreed dates are extended by the notification periods required by regulations 3 and 21 of the Asbestos Regulations, 2001.

Z14.7 Any removal and disposal of asbestos, asbestos containing materials and waste, is done by a registered asbestos contractor, instructed by the *Employer* at the *Employer*'s expense, and conducted in line with South African legislation.

C1.2 Contract Data

Part two - Data provided by the *Contractor*

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

Clause	Statement	Data
10.1	The *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**

PART 2: PRICING DATA

TSC3 Option A

Document reference	Title
C2.1	Pricing assumptions: Option A
C2.2	The *price list*

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*

Maintenance

MAIN CONDENSER HIGH PRESSURE WATER JET CLEANING

Item nr	Description	Unit	Expected Quantity	Rate	Price
1	HPWJ Operator per Hour	Hr.			
2	Assistant per Hour	Hr.			
3	Technician per hour	Hr.			
4	Supervisor per Hour	Hr.			
5	HPWJ Operator N / overtime	Hr.			
6	HPWJ Operator Sunday / PH overtime	Hr.			
7	Assistant per Hour N / overtime	Hr.			
8	Assistant per Hour Sunday / PH overtime	Hr.			
9	Technician per hour N / overtime	Hr.			
10	Technician per hour Sunday / PH overtime	Hr.			
11	Supervisor per Hour N / overtime	Hr.			
12	Supervisor per Hour Sunday / PH overtime	Hr.			
13	HPWJ Pump per Day (With Diesel)	P/Day			
14	Travelling Km per day (Standerton – Tutuka –Standerton)	Km			
15	Safety file once off	EA			
16	Accommodation (Assistance and operators) per day	P/Day			
17	Accommodation(Technician and Supervisor) per day	P/Day			
18	site establishment fixed once off P&G	EA			
19	Site De – establishment fixed once off P&G	EA			
20	Coating Repairs	M			

Note:

- **Site – establishment is a once off payment and will only be paid on the maintenance side and a full cost breakdown must be provided**
- Accommodation will only be paid for employees that reside outside the radius of 40Km from the Station (Tutuka)
- Rates only required

BFPT CONDENSER HIGH PRESSURE WATER JET CLEANING

Item nr	Description	Unit	Expected Quantity	Rate	Price
1	Cleaning of BFPT condenser tubes	EA			
2	High pressure pump hire up to 1 000 bar	P/Day			
3	High pressure pump hire up to 200 bar x 2 pumps	P/Day			

Note:

- **Travelling, accommodation and other costs should be included in the Cleaning of BFPT condenser tubes rates**
- Rates only required

The total of the Prices

Outages

MAIN CONDENSER HIGH PRESSURE WATER JET CLEANING

Item nr	Description	Unit	Expected Quantity	Rate	Price
1	HPWJ Operator per Hour	Hr.			
2	Assistant per Hour	Hr.			
3	Technician per hour	Hr.			
4	Supervisor per Hour	Hr.			
5	HPWJ Operator N / overtime	Hr.			
6	HPWJ Operator Sunday / PH overtime	Hr.			
7	Assistant per Hour N / overtime	Hr.			
8	Assistant per Hour Sunday / PH overtime	Hr.			
9	Technician per hour N / overtime	Hr.			
10	Technician per hour Sunday / PH overtime	Hr.			
11	Supervisor per Hour N / overtime	Hr.			

12	Supervisor per Hour Sunday / PH overtime	Hr.			
13	HPWJ Pump per Day (With Diesel)	P/Day			
14	Travelling Km per day (Standerton – Tutuka –Standerton)	Km			
15	Safety per year	EA			
16	Accommodation (Assistance and operators) per day	P/Day			
17	Accommodation(Technician and Supervisor) per day	P/Day			
18	Coating Repairs	M^3			

Note:

- **Site – establishment is a once off payment and will only be paid on the maintenance side and a full cost breakdown must be provided**
- Accommodation will only be paid for employees that reside outside the radius of 40Km from the Station (Tutuka)
- Rates only required

BFPT CONDENSER HIGH PRESSURE WATER JET CLEANING

Item nr	Description	Unit	Expected Quantity	Rate	Price
1	Cleaning of BFPT condenser tubes	EA			
2	High pressure pump hire up to 1 000 bar	P/Day			
3	High pressure pump hire up to 200 bar x 2 pumps	P/Day			

Note:

- **Travelling, accommodation and other costs should be included in the Cleaning of BFPT condenser tubes rates**
- Rates only required

The total of the Prices

CHEMICAL CLEANING

Item nr	Description	Unit	Expected Quantity	Rate	Price
1	Site Establishment (per outage)	EA			
2	Health and Safety Requirements (Induction, PPE, Safety File, Medicals, etc) (per year)	Yearly			
3	Accommodation (per outage)	EA			
4	Transport (per outage)	EA			
5	High Pressure Pump rental X4 & Administration fee (per outage)	EA			
6	Site De-Establishment (per outage)	EA			
7	Supervisor(x1)	Hr.			
8	Machine Operators(x2)	Hr.			
9	Assistance(2x)	Hr.			
10	Quality Inspector(x1)	Hr.			
11	Hazchem and 30T truck	EA			
12	30 T trailer	EA			
	CHEMICALS				
1	Hydrochloric Acid(32%)	Kg			
2	Phosphoric Acid(80%)	Kg			
3	Ammonium Bifloride	Kg			
4	Tri-Sodium Phosphate	Kg			
5	Lime	Kg			
6	Corrosion inhibitor	Kg			
7	Ferric Chloride	Kg			

Note:

- **Rates only required**

The total of the Prices

PART 3: SCOPE OF WORK

Document reference	Title
	This cover page
C3.1	*Employer*'s Service Information
C3.2	*Contractor*'s Service Information

C3.1: EMPLOYER'S SERVICE INFORMATION

Contents

1 Description of the *service*

1.1 Executive overview

For High Pressure Water Jetting

To propose and approve a contracting scope of work for a Service Contract for Main and BFPT Condenser high pressure water jet cleaning at Tutuka Power Station during normal maintenance and Outages .

1.2 *Employer*'s requirements for the High Pressure Water Jetting *service*

1.2.1 Background

With the recent increase in ambient temperatures, all units at Tutuka have been experiencing vacuum load losses. Condenser scaling and general fouling of tubes is considered a significant factor in these vacuum load losses and inability to run the BFPT, with the scaling being worst on the condensers outlets. With a short outage opportunity that is insufficient for acid flushing, high pressure water jetting of the main condenser tubes is an option that will partially alleviate this problem. A pressure of approximately 1000 bar is required for this application as it is expected to suffice in removing scale.

1.2.2 Technical information

1.2.2.1 Main condenser

The technical details of the main condenser are as follows:

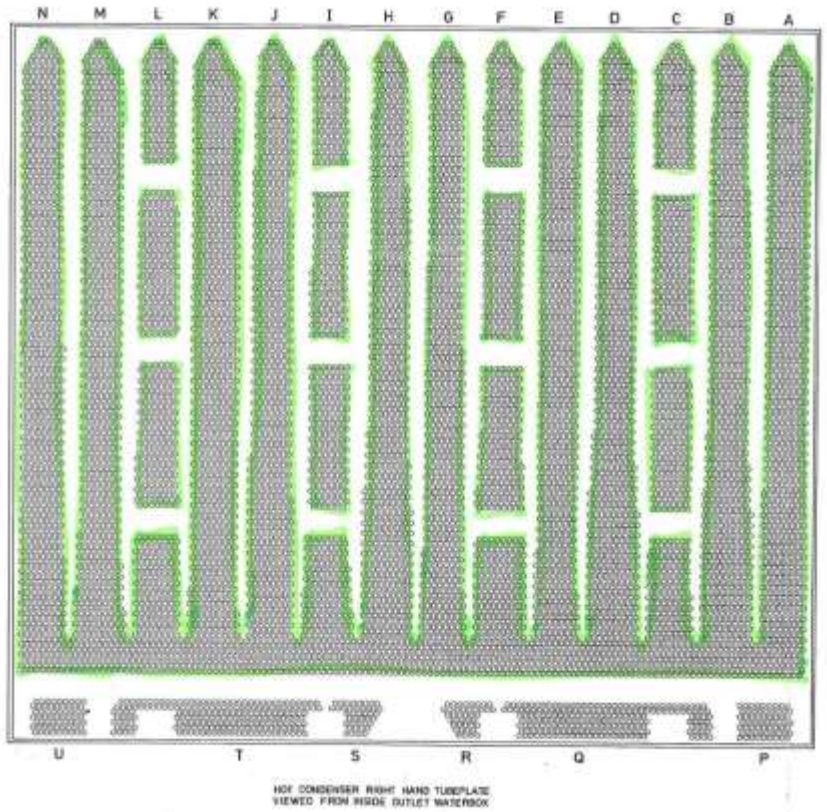

Figure 1: Tutuka typical tube sheet layout, as viewed from one of the water boxes

Tutuka Power Station condensers consist of a total of four sections, namely two high pressure (forming the "hot condenser") and two low pressure sections (forming the "cold condenser"). Each section is of the single pass cooling water arrangement. There are two sections per water pass, one low and one high pressure as shown in Figure 2 below. The condensers have Titanium tubes in the condensing zones as well as in the air-cooling zones. To date, five of the condensers have also been re-tubed with titanium tubes, with the exception of Unit 5. Units 1, 2, 3, 4 and 6 have been re-tubed thus the coating is not applicable to those condensers. Additional design data is summarised in Table 1.

The water boxes will not be removed from the tube sheet for the cleaning process. The *Contractor* will therefore access the tube ends from within the confined space of the water box. Therefore all equipment needs to enter via the water box access manholes. (800 mm).

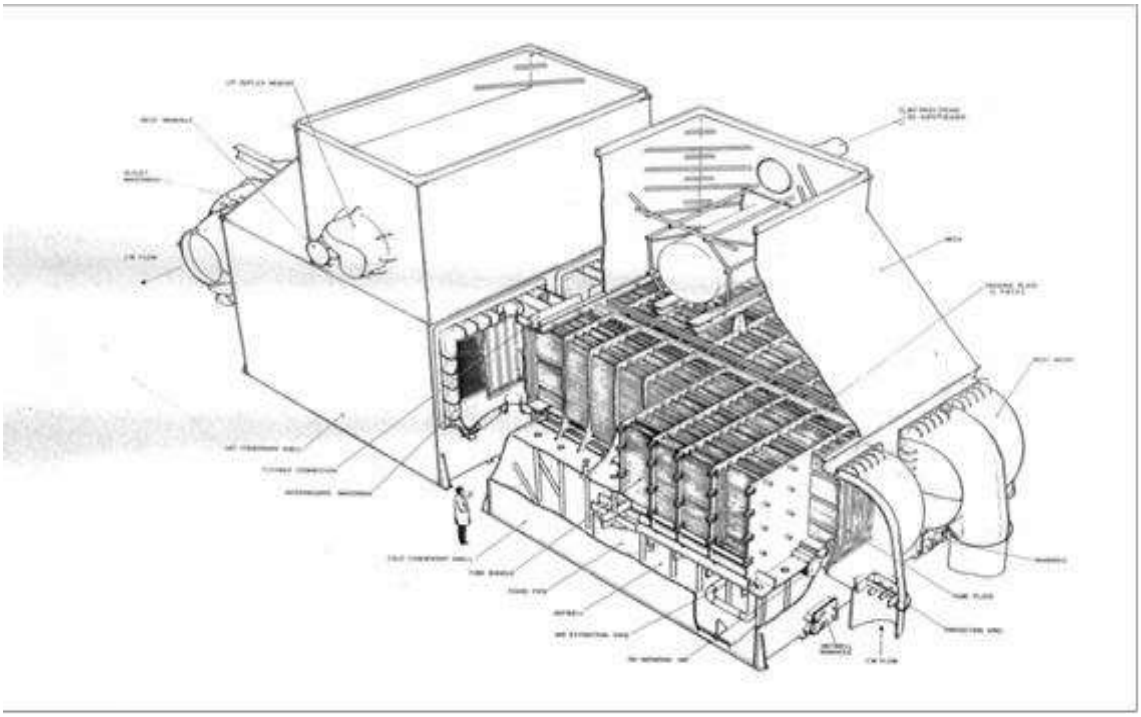

Figure 2: General Main condenser layout

Table 1: Table Summarizing the Main Condenser Technical Data

Manufacture	Hamon Sobelco
Tube Material	**Re-tubed :**Titanium in main condensing and air extraction zones
Number of Tubes: Cold Condensers Hot Condensers	 22 552 23 730

Condenser Height:	
Overall	10 300 mm
Neck	5 450 mm
Shell	4 580 mm
Condenser Length:	
Overall (between water box centers) Cold	24 600 mm
Condensers	12 000 mm
Hot Condensers	12 600 mm

Tube Length	
Cold Condensers	9992 mm
Hot Condensers	10.922 mm
Tube Outside Diameter	**Re-Tubed:** • General sections: 19mm OD with a 0.5mm wall. • Peripheral section of tube fingers: 19mm OD with a 0.7mm wall
Total Tube Volume	103 m^3
Steam Side Shell	Carbon steel BS1501-151-grade 43 A
Water box Material	Carbon steel lined with rubber BS1501-151- grade 43 A
Water box Volume	113.3 m^3 (estimated total for all six water boxes, including the ducts up to the isolating valves)
Tube Sheets	Material BS 1501-161-360, 27mm thick to with a 5mm cladding to BS 1501-304 (L)
Cooling Water Details:	
Inlet / Outlet Pipe Bore Diameter Cooling	1 600 mm
Water Flow	11.277m^3/sec
Supply Temperature	19°C

Shell Volumes (steam side):	
Cold Condensers	640 m^3
Hot Condensers	680 m^3

1.2.2.2 BFPT condenser

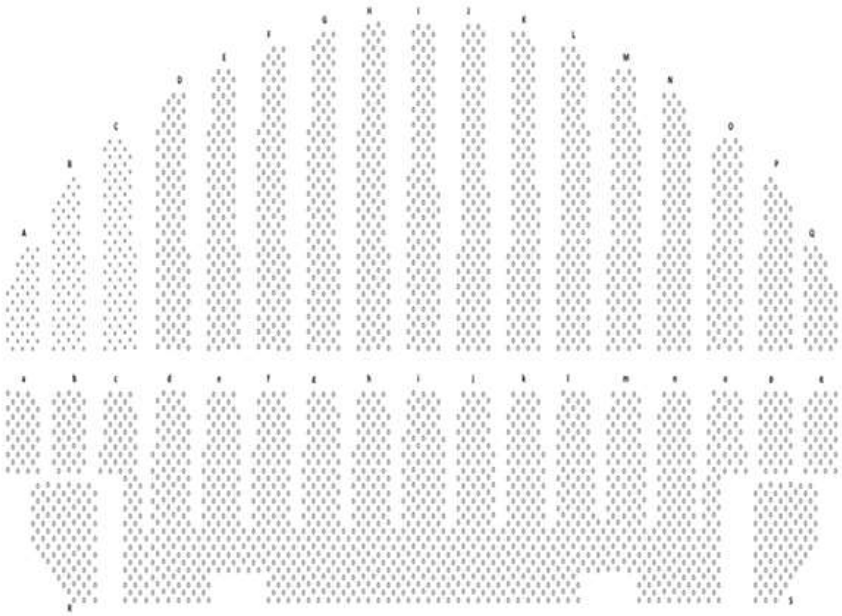

Figure 3: Tutuka BFPT tube sheet layout, as viewed the intermediate water box.

Tutuka Power Station BFPT condensers have an inlet water box and an outlet water box on the North side, with an intermediate water box on the South side. The cooling water enters the condenser through the inlet water box, flowing south through the bottom tubes, before entering the intermediate water box and then flowing north through the top tubes back to the outlet water box. Each condenser has admiralty brass tubes in the condensing zones and CuNi tubes in the air-cooling zones.

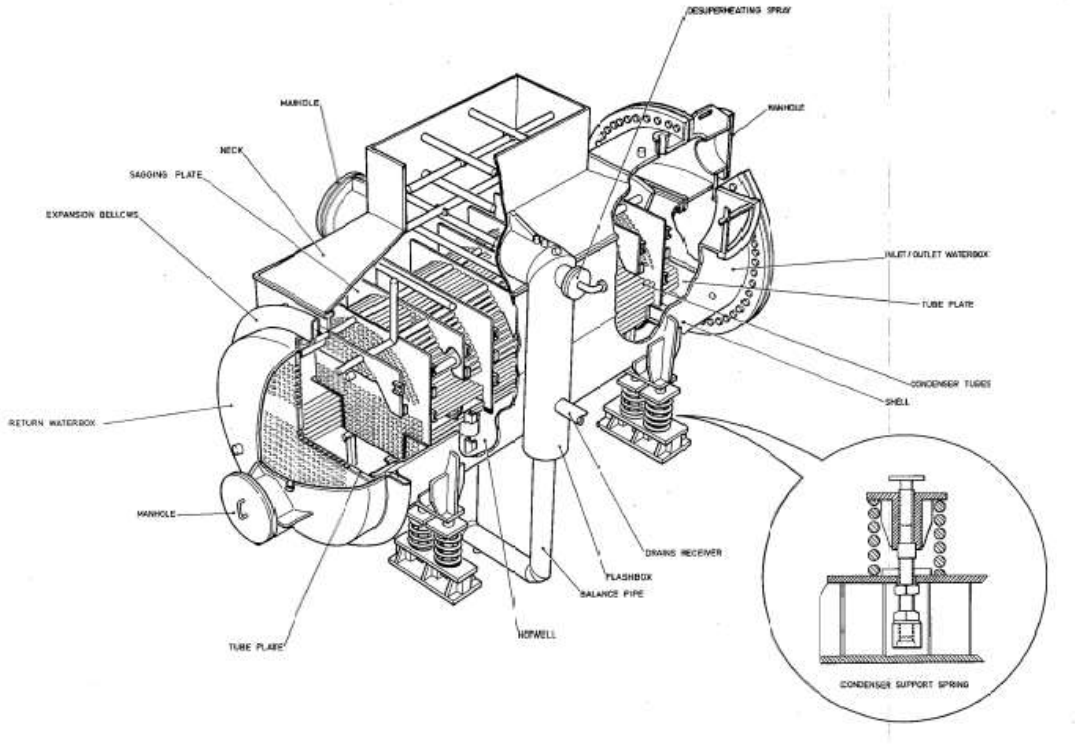

Figure 4: General layout of BFPT condenser

Table 2: Table Summarising BFPT Condenser Technical Data

Manufacturer	Hamon Sobelco
Tube Material	Admiralty Brass and CuNi 9010 in the air extraction zone
Number of Tubes:	3460
Tube Length	6.2 m
Tube Outside Diameter	19 mm nominal with a 1 mm wall thickness
Total Tube Volume	14 m^3
Steam Side Shell	Carbon steel BS1501-151
Waterboxes Material	Carbon steel lined with rubber BS1501-151
Tube Sheets	27mm thick to BS 1501-161-360 with a 5mm cladding to BS 1501-304 (L)
Tube Material: Main Water Cooling Zones Air-Cooling Zones	 Admiralty brass Copper nickel
Cooling Water Details: **Inlet / Outlet Pipe Bore Diameter** **Cooling Water Flow** **Supply Temperature**	 **700 mm** **0.826 m^3/sec** **22 °C**
Shell Volume (Steam side):	35 m^3

1.2.2.3 *Employer* Supply

Site access to main and BFPT condensers.

Potable quality water at a pressure of about 7 bar to be used for HP cleaning. Note that pressure may reduce to 3.5 bar

Termination point is about 50 m away from water boxes at most (to access intermediate water boxes); *Contractor* to confirm exact distance.

Electricity for lights, termination point is about 50 m away from water boxes at most (to access intermediate water boxes).

Scaffolding; consideration should be given to constructing the scaffolding in such a manner as to avoid or as far as possible ensure unrestricted access to all tubes.

Isolation and Permit to Work.

Provide a few sections of fouled condenser tube which the *Contractor* can use to optimise the cleaning procedure in terms of cleaning pressure, flow, cleaning nozzle design, and nozzle travel speed. The *Contractor* shall then demonstrate to the *Employer* that the sample tubes are completely clean to the metal substrate or coating with no traces of corrosion product or other scales and deposits before commencing cleaning of the remaining tubes..

Opening of manhole covers on all water boxes. The *Contractor* to provide and install barricading to the non- working end water boxes to ensure no unauthorised access.

Ventilation fans on water boxes may be provided on request if the *Employer* has it available. As a precaution, the *Contractor* should assume that the *Employer* will be unable to provide fans.

1.2.2.4 Contractor Scope of Work

The internal surfaces of the main and BFPT condenser are to be cleaned by means of High Pressure Water Jetting. Due to the time constraints to conduct full scope on both the main cold and hot condenser the *Contractor* is requested to give options as follows:

Option 1 – cleaning the whole main condenser tubes (full scope)

Option 2 – cleaning half of the main condenser tubes (50% scope)

Option 3 – Cleaning of the whole BFPT condenser (full scope)

The cleaning will be conducted from 200 up to 1000 bar pressure. The equipment must meet the 1000 bar requirements stated in this document. Note that based on the test results, the final cleaning pressure will be agreed upon between the *Employer* and *Contractor.*

Important note

HP cleaning of the tubes in certain areas may require a second or even a third pass of HPWJ thus the end goal of the *Contractor* is to get the condenser clean and free of scale and not do a single pass through each tube. This will be confirmed during inspection.

1.2.2.5 High-Level Scope of Work

Scope of Work	**Responsible Person**
Isolation and Permit to Work on condenser.	*Employer*
Scaffolding is available on request.	*Employer*
Removal of water box manholes.	*Employer*
Initial condenser inspection	*Contractor & Employer*
Removal of foreign matter and cleaning of water boxes.	*Contractor*
Rodding of blocked tubes.	*Contractor*
High pressure cleaning of all tubes at 600 bar (second or even third passes in the problem area as required).	*Contractor*
Flood/bubble test and plugging of leaking tubes (procedure will be provided – 15ENG TURB-8008).	*Employer*
Endoscope inspection to check for cleanliness	*Contractor* (*Employer* to witness)
Pulling of selected condenser tube samples for quality purposes (minimum of 2 tubes). Tube samples must only be taken upon the request of the employer.	*Contractor (Request from Employer)*
Water boxes cleaning	*Contractor*

Recording of all plugged tubes (new and pre-existing) on tube maps.	*Employer*
Water box and tube sheet inspection to check for coating damage.	*Contractor* & *Employer*
Final inspection and handover (water boxes, steam spaces and surrounding site).	*Contractor* and *Employer*

1.2.2.6 *Contractor* Experience

Only *Contractors* experienced and specialised in the use of High Pressure Water Jetting (700- 1700 bar) equipment will be considered. The *Contractor* shall provide a verifiable reference of at least 3 similar jobs done in the past 7 years.

1.2.2.7 Safety Requirements

The safety of the *Contractor* personnel is of extreme importance. **The following are the minimum safety requirements that the HPWJ operators shall comply to:**

Operators shall wear CE (European Economic Area Conformity Marking) certified water jetting suits, and face shields rated for the working pressure stated in section 3.4.

All foot and leg protection equipment to be appropriately rated for the working pressure stated in section 3.4.

The *Contractor* shall work in accordance with a safety procedure/instruction aligned to industry recognised HPWJ practices and standards to protect personnel using HPWJ equipment.

HPWJ operators shall be trained and certified by an independent industry recognised HPWJ authority. No operator will be allowed to use HPWJ lances on site without the required certification.

All HPWJ hoses and associated equipment and tooling, i.e. nozzles, fittings, foot valve, used on site shall have valid pressure test certificates. The test pressure shall be a minimum of 1 400 bar.

All hose end connections to be fitted with the appropriate “hose checks” to prevent injury by restraining the hose in the event of an end fitting failure.

The HPWJ pump discharge shall be fitted with a calibrated pressure gauge and safety relief valve or rupture diaphragm.

Any manholes which are open for ventilation purposes shall be properly barricaded by the *Contractor* to eliminate unauthorised human entry while cleaning is in progress.

Barriers and Warning notices must be in place before any work commences

Specific requirements related to Eskom’s “Life Saving Rules” that would be applicable to this activity.

Flexible lance safety grips and associated hose stop device shall be used at all times to ensure operators are not exposed to water jets when moving the lance from one tube to the next.

1.2.2.8 Minimum equipment requirements

For tubes with an internal diameter of 19.5 mm up to 25 mm, the minimum nozzle flow rate shall be 50 litre/min at 1 000 bar working pressure.

Rotating tube cleaning nozzles with multiple water jets shall be used. The cleaning nozzles shall be obtained from a recognised HPWJ equipment supplier and technical datasheets, providing technical information for a range of nozzle sizes, shall be available for the all types of nozzles used on site.

A technical data sheet shall be provided for the HPWJ pumps. The HPWJ pump shall maintain a minimum continuous working pressure of 1 000 bar at a flow rate of 50 litre/minute. This requirement assumes one pump will supply one cleaning nozzle. If a single pump is to supply more than one nozzle simultaneously, the pump shall maintain a minimum continuous working pressure of 1 000 bar and a minimum volume flow of 50 (litre/min) per each of the cleaning nozzles attached simultaneously to the pump.

At least two types of cleaning nozzles shall be available, one for unplugging tubes and the other type specifically designed to remove deposits on the tube walls. The cleaning nozzle datasheets supplied as per section 4.5 with the tender shall detail the design features of the cleaning nozzles for unplugging tubes and removing deposits from the tube walls.

The nozzles shall travel the full length of all the tubes

HPWJ flexible hose from the foot valve to the tube cleaning nozzle shall have a minimum internal diameter of 5 mm. The maximum hose length is the condenser tube length plus an additional 7 m. The foot valve shall be positioned in the water box.

The flexible hose from the pump outlet to the foot valve shall have a minimum internal diameter of 10 mm.

Provision of a reasonable set/number of spare equipment and tooling particularly nozzles, hoses, couplings, all wear and tear parts such as seals etc. These spares shall be available on site. In the event of HPWJ Pump breakdown then repair or suitable replacement shall be affected within 2 hours. The latter shall only apply to eventualities involving unexpected major breakdown of HPWJ Pumps.

Provision of a suitable guide tube device to ensure no damage to the tube sheet coating or tube ends.

Endoscope/Fiberscope to be supplied by the *Contractor* to be used for post cleaning inspection. The fibre scope shall have a reach length of at least 6 m with a digital display.

1.2.2.9 Commissioning Tests and Optimizing

Before any work is performed on the main and BFPT condenser the *Contractor* shall demonstrate the following to the *Employer:*

Provide all required certificates (equipment pressure tests, pressure gauge calibration, personnel training) as stipulated in section 3.2 above.

The *Employer* shall verify that the equipment on site complies in all respects to the technical data sheets provided with the tender as well as that the number of pumps, hoses, foot valves, cleaning nozzles, etc. on site corresponds with the quantities provided with the tender. If discrepancies are found an immediate commercial penalty of 20% of total contract value shall apply.

The *Contractor* shall demonstrate to the *Employer* that the HPWJ pump can supply a volume flow rate of 50 litre/min with the pump being operated at rated speed (container/stopwatch method). Note that this test do not have to be done at a working pressure of 1 000 bar. This test assumes one pump will supply one cleaning nozzle. If a single pump is to supply more than one nozzle simultaneously the pump shall maintain a minimum volume flow of 50 litre/min per each of the cleaning nozzles attached simultaneously to the pump.

The *Contracto*r shall demonstrate that the HPWJ pump/cleaning nozzle(s) combination maintains a working pressure of at least 1000 bar. The nozzle(s) used for this test shall have a flow rate of at least 50 litre/min at 1000 bar working pressure.

The *Employer* shall provide the *Contractor* with sections of scaled titanium or Brass epoxy coated tubes, to be removed from the same condenser by the *Contractor*, as directed by the *Employer*. The *Contractor* shall demonstrate to the *Employer* that these tube sections can be cleaned in a single nozzle pass with a reasonable improvement to cleanliness and without significant damage to the coating of the tubes. The specified pressure may have to be adjusted based on these results.

1.2.2.10 Specific HPWJ Requirements

Due to time constraints and since the main condenser is currently in operation it is not possible to prequalify *Contractors* and specifics related to the cleaning methodology. It is therefore a requirement that the *Contractors* equipment which is brought on site comply with the minimum requirements described in section 0

Due to limited outage time the *Contractor* shall work in at least two water boxes simultaneously. Preference will be given to *Contractors* using automated lance feeding equipment, to enhance efficiency & consistence, with an indexing front guide tube and stopper with variable speed control.

Note in the occasion where HPWJ cleaning below 400 Bar is used then slower lance feeding will be required in order to effectively remove the scale formation.

1.2.2.11 Additional Requirements

Photos of the tube wall by means of the endoscope must be taken pre- and post-cleaning. The photos must be taken for each pass (e.g. Hot A-pass, Hot B-pass, Cold A-Pass, Cold B-pass BFPT inlet and BFPT outlet).

The *Contractor* shall supply and install suitable protection or cover on the cooling water inlet duct to eliminate any of the debris removed from the condenser tube falling down the CW inlet duct.

Under no circumstances will the tube sheet coating or tube ends be damaged by the HP cleaning. The *Contractor* shall establish a system or method to ensure impinging water jets from the nozzle are not directly focused towards the tube sheet or onto the outside diameter of the exposed tube ends.

The *Contractor* shall compile a method statement and Quality Control Plan (QCP) and submit to the *Employe*r for approval before the main condenser cleaning may commence. The *Employe*r shall have the opportunity to add witness or hold points on the QCP.

All tubes which are blocked or obstructed and which cannot be unblocked by HPWJ shall be marked on the tube sheet drawing and submitted to the *Employer*.

The *Contractor* shall keep a daily logbook with the number of tubes cleaned; working pressures, etc. are logged.

The *Contractor* shall clean the water boxes after cleaning the tubes. All foreign materials and debris shall be removed from the water boxes and CW duct inlet and outlet. Note that this includes the area surrounding the water box inlet manhole where some scale has been flushed out

1.2.2.12 Man-Power Plan

Main condenser
HP cleaning shall be done on a 24 hours basis meaning day and night shift teams will be required for this service (two shifts).

- 8 x HPWJ operators per shift
- 2 x assistants per shift
- 1 x Technician per shift
- 1 x Supervisor per shift

BFPT condenser
HP cleaning shall be done on a 24 hours basis meaning day and night shift teams will be required for this service (two shifts).

- 2 x HPWJ operators per shift
- 1 x assistants per shift
- 1 x Supervisor per shift

1.2.2.13 Duration Requirements

The following durations are applicable for single run of cleaning condenser tubes.

Main condenser
- Duration based on 24 hour work coverage ≤ 6 days or less will be seen as acceptable.
- Duration based on 24 hour work coverage >6days is not acceptable.

BFPT condenser
- Duration based on 24 hour work coverage ≤ 1 days or less will be seen as acceptable.
- Duration based on 24 hour work coverage >1days is not acceptable.

The duration of the cleaning will be tracked and assessed against the time given during tender. If the *Contractor* does not complete work on the agreed time then commercial penalty of 5% of the total assessment value for that specific task order shall apply.

1.2.3 Executive overview For Chemical Cleaning

1.2.3.1 TECHNICAL DATA

Height	
Overall	10300 mm
Neck	5450 mm
Shell	4850 mm
Length	
Overall (between water box centres)	24600 mm
Cold condenser	12000 mm
Hot condenser	12600 mm
Tube length	
Cold condenser	9995 mm
Hot condenser	10925 mm
Tube outer diameter	19 mm

Tube wall thickness	0.711 mm (peripheral) and 0.504 mm (the rest of the tubes)
Tube volume	103 m^3
Number of tubes	
Cold condenser	22552
Hot condenser	23730
Condensing surface	
Cold condenser	13360 m^3
Hot condenser	15375 m^3
Tube test pressure	0.3 MPa (g)
Tube design pressure	0.25 MPa (g)
Tube temperature	40°C
Weight of tubes	
Cold condenser	108200 Kg
Hot condenser	124500 Kg
Cooling water system details	
Inlet/outlet pipe bore diameter	1600 mm
Cooling water flow	11.277 m^3/s
Supply temperature	19°C
Temperature increase across	
Hot Condenser	8.75°C
Cold condenser	8.75°C
Number of passes	
Cold condenser	1
Hot condenser	1
Water velocity in tubes	
Cold condenser	2.2 m/s
Hot condenser	2.1 m/s
Steam flow	168.73 Kg/s
By-pass steam flow (maximum)	280 Kg/s

Shell volume (Steam space)	
Cold condenser	640 m^3
Hot condenser	680 m^3
Shell test pressure	0.3 MPa (g)
Material	
Tube material	Grade 2 Titanium
Tube sheets	Gr 23A cladded with Stainless steel AISI 304
Corrosion protection	
Water boxes/Tube sheet	Coated

2.2.3.2 General Requirements

1. All the work mentioned in this scope of work is the responsibility of the *Contractor* except where specifically noted otherwise.
2. The *Employer* shall isolate the condenser from the main cooling water system and drain the system.
3. The *Contractor* shall install spading on the CW inlet and outlet water boxes to prevent acid in the CW ducting and valves as well as the tube cleaning system strainers.
4. The *Contractor* to inspect the condenser water boxes and tubes. Remove any loose debris and unblock any tubes blocked with on-line cleaning balls or other debris. Remaining restricted tubes which cannot be cleared by rodding (by means of appropriate/suitable flexible cable/rod) shall be plugged prior to proceeding with chemical cleaning. The requirement is that tubing be “unblocked” to allow passage of the cleaning solution through the entire length of the tube. The practice of using HP water cleaning, of the entire condenser, for the purpose of rodding tubing shall not be allowed as it will affect the duration of the work negatively. If the *Contractor* decided to unblock some of the tubes by using HP cleaning it shall form part of the project schedule and costing should be included in the total price for chemical cleaning.
5. The risk of blockage on water box piping systems such as vent or drain lines and the consequence in terms of pressure build-up in the water box during the chemical clean shall be carefully evaluated and appropriately mitigated.
6. The *Contractor* to take note that this work shall either happen during opportunity maintenance or outages. In the case where the work is taking place during the outages the *Contractor* shall attend daily outage meetings to be aware of other activities happening on the plant.
7. It is the responsibility of the *Contractor* to familiarize him/herself with the layout of the plant and the area of where the condenser is relative to the turbine hall.

8. If compressed air is required, the *Contractor* shall provide dedicated diesel compressors. The diesel compressors are not permitted in the turbine hall therefore the *Contractor* shall consider the length to the location where the compressors will be placed.

1.2.3.3 Coating Requirements

1. Refer to Appendix A: Tube sheet coating and Appendix B: Condenser water box coating for details on the coating specification.
2. Before chemical cleaning can commence the condenser tube sheets as well as the water boxes and stay bars need to be coated to protect the stainless steel against the corrosive effects of the acid that will be used.
3. The *Contractor* together with Eskom Engineer shall inspect the condition of corrosion protective coatings on the water box, tube sheet and other surfaces such as stay bars/rods. To assess the condition of existing coating it may be required to wash the surfaces with potable water to remove mud or dirt covering the surfaces. All coating defects shall be repaired prior to chemical cleaning. Based on an inspection, Eskom will decide whether to completely recoat the water box / tube sheet OR perform patch repairs.
4. Where patch repair of the water boxes or repairing localised areas of the tube sheets care shall be taken to ensure adequate protection of any surfaces and parts of components or systems not requiring blast cleaning and coating and effort shall be taken to prevent grit, water and any other dirt entering the tubes and inlet / outlet of cooling water isolating valve.
5. Coating shall be performed as instructed by Eskom and with the coating systems as specified in Appendix A and B. The *Contractor* shall include coating price per m^2 and in addition the complete recoating of entire tube sheets (8) and water boxes (80m^2) as part of tender price.
6. In the case of weld repairs on water boxes or tube sheets the *Employer* shall arrange that the repairs are completed before coating is applied.
7. The intermediate water boxes on Tutuka consist of stainless steel stay bars with drain holes/ weeping hole at the bottom of the stay bar. These stay bars shall be coated and the drain holes will be temporary plugged to stop any of the chemical entering the stay bar.
8. The *Contractor* is required to perform coating repairs due to any mechanical damage after chemical cleaning.

1.2.4 Employer's requirements for the Chemical Cleaning *service*

1.2.4.1 Chemical Cleaning Scope of Work

1. Fit any necessary temporary connections and blank spades as required by the chemical *Contractor* to allow for proper circulation of the cleaning solvent through all the condenser tubes. The *Contractor* shall consider his particular pumping capabilities to ensure immersion and circulating flow of cleaning solvent through ALL tubes. The Method statement shall consider venting of air pockets and build-up of gasses.
2. Where applicable, the *Employer* shall fit the condenser support jacks as required.

3. Fill the steam side of the condenser with demineralised quality water to just above the uppermost condenser tubes for the purpose of a high level test to identify tube leaks. The water level shall be maintained for 24 hours before conducting a thorough inspection to identify any tube leaks. All tubes with leaks to be suitably plugged. Filling of the steam side with demineralised quality water is also required during the chemical cleaning process to ensure dilution of any acid that may escape into the steam side of the condenser due to leaking tubes and ensure that the risk of damage to equipment is minimized.
4. Fill the cooling water side of the condenser with potable or raw water using the *Contractor*'s chemical cleaning pump station and establish circulation without exceeding the maximum permissible design pressure of the water boxes. The circulation flow must be sufficient to flow through all the tubes but shall not exceed 0.3 m/s through individual tubes (the pressure shall not exceed 2.5 bar under any circumstances). Pump/s shall produce a maximum pressure of 2.5 bar at 0 m^3/h flow OR the equipment will contain electrical protections (based on water box pressure) that will cut the power source to the pump/s should the water box pressure exceed 2.5 bar or pump discharge side shall be fitted with a mechanical safety relief valve that is sized to allow for the maximum output flow of the pump and set to a value not exceeding 2.5 bar. This shall be detailed in a procedure and accepted by the system engineer before the work commence.
5. The use of compressed air to assist in draining the condenser is prohibited. The correct operation of the above mentioned protection equipment shall be confirmed prior to the chemical cleaning operation. In all cases the water box pressure shall be recorded by means of an electronic recorder with a recording frequency of not less than once every 30 seconds. Pressure monitoring shall appear on the QCP and shall be monitored prior to cleaning up to when the condenser is drained. The *Contractor* shall designate a suitable employee to monitor this intervention accordingly and record this in the QCP documentation.
6. Circulate the potable or raw water for 1 - 2 hours and check for leaks on the system/temporary piping before injecting acid. Once satisfied that there are no leaks that would force premature termination of the chemical clean stop circulation and drain off an amount of water equivalent to the amount of acid to be added to achieve the desired acid concentration.
7. Commence circulation and begin acid injection strictly as per the compositions/concentrations as detailed below. The acid solution is required to be inhibited with the correct concentration of appropriate inhibitor. Only inhibitors that have previously been tested and approved by Eskom for the specific material selection shall be used. If new/untested inhibitors are proposed then these shall be tested for effectiveness by Eskom before any use. A “steel wool” test shall be conducted hourly to ensure the effectiveness of the inhibitor is satisfactory. The test involves dropping a ball of steel wool into a sample of the cleaning solution and to monitor any bubble formation and/or physical rise of the ball to the surface. In the case of the later more inhibitor shall be added to the solution circulating in the condenser and the “steel wool” test repeated. The acid concentration shall not at any time exceed 7.5% by mass. Continue circulation and ensure adequate gas release.
8. As a guide the cleaning solvent such as 5-6% Hydrochloric acid (HCl) with adding 0.2% of ferric chloride to protect the titanium can be used to clean Tutuka condensers. This cleaning solution is

only suitable for removal of calcium carbonate deposits/scales as in Tutuka instance (Refer to document [6]).

9. The *Contractor* shall recommend the chemical cleaning solvent to be used for cleaning the condenser, this chemical cleaning solvent shall be approved by Eskom before it can be used for cleaning the condenser.
10. The cleaning proceeds on the basis of circulation, usually for approximately 6 hours, although this could vary depending on the nature of the scale/deposit to be removed.
    The cleaning process is terminated on the basis of chemical analysis, which indicates stability of the residual acid strength of the bulk solution and no further increase in the concentration of the scale/deposit species in the bulk solution as monitored on at least a 30 minute interval. N.B. :Chemical analysis appropriate to the constituents in the type of scale being dissolved, as well as residual acid strength, shall be performed by the Eskom Laboratory at a frequency of not less than once every 30 minutes.
    - The free residual acidity of the cleaning solution must not be allowed to decrease to below 2.0 % by mass at any time.
    - Chemical analysis for the dissolved species comprising the primary alloying constituents of condenser tube material shall be performed at a frequency not less than once every 60 minutes to monitor corrosion protection by the inhibitor.
    - Analysis of the pH of the demineralised water in the steam space to check for acid in-leakage.
11. Stop circulation and drain the spent solvent to the designated area, usually the ash sump of the appropriate unit, however in case for Tutuka power station the spent solvent will be transported by the contract to Ash disposal (which is 3km from the station) using vacuum tanks. For this reason the *Contractor* shall make provision for vacuum tanks and include the cost in the tender price list. N.B.: All mineral acids must be neutralised with lime at the discharge point.
12. Commence filling and flushing cooling water side of the condenser with potable water or raw water quality until the residual conductivity is less than 100 µS/cm above the potable water conductivity.
13. Circulate this water and add sufficient soda ash or tri-sodium phosphate to elevate the pH of this solution to 9.0 (± 0.2). Circulate for a further 60 minutes to neutralise any residual acid, then drain.
14. The *Contractor* shall remove all temporary connections after chemical cleaning.
15. Repeat this process (Steps 1 – 14) for any condenser paths that could not be connected into the cleaning path in series.
16. As soon as possible after the chemical clean i.e. not at the end of a long duration outage the remaining sludge in the tubes shall be removed by HP water washing. In most cases Low Pressure washing will be required after chemical cleaning to remove sludge from the tubing. Pressures of >350 Bar should be avoided in the case of full length coated tubing. Experience has indicated that higher pressures could remove tube coating. The equipment used during HP water washing is part of this contract and the *Contractor* need to provide all the equipment for this activity. Because this scope shall be implemented during outages the *Employer* cannot guarantee electrical power at all times therefore the *Contractor* shall provide alternative options such as diesel driven high pressure machines as part of this contract.

17. After HP water washing an endoscope shall be provided by the *Contractor* that will be used to ensure that all the scaling was removed.
18. Perform a high level test and plug any tubes that have developed leaks during the cleaning process.
19. Drain the steam side of the condenser. Should any acid in-leakage have occurred during the operation, flush the steam space with demineralised water dosed with ammonia to elevate the pH to 9.1 (± 0.2).
20. Drain the steam side. If fluorescein was used for the high level test, flush (Step 19) until concentrations of Na < 10ppb.
21. At the appropriate time the *Employer* shall remove the condenser jack supports.
22. Inspect the water box coating and tube sheet and report any signs of damage and deterioration of coating. Repair any damage to coatings.
23. As soon as possible, apply normal cooling water flow by charging and operating the cooling water system. Where applicable put the on-line ball cleaning system in service.

1.2.4.2 Blank flange supply

1. This scope shall include the supply of blank flanges/Spades (4 off) to install during the chemical cleaning. These flanges shall however remain the property of the *Employer* after the contract expires.
2. It will be the responsibility of the *Contractor* to install these blank flanges.
3. The blank flange shall have 2 lifting lugs/attachments for lifting the spade into position. These shall not be thicker that the flange thickness. See figure below.

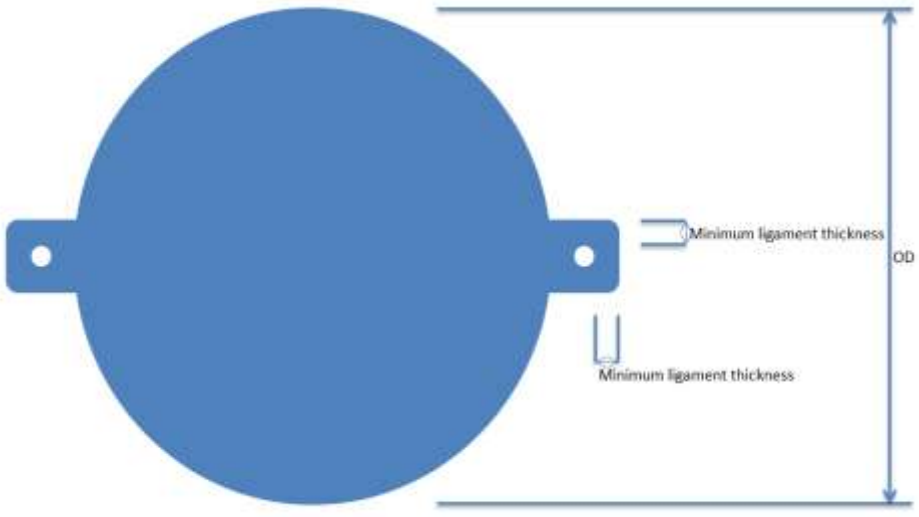

Figure 1: Typical Blank flange

4. Flange details

    a. OD = 1770 mm

b. Thickness = 12 mm

c. Material = SA-516 Gr 70

d. Minimum ligament thickness = 20 mm

5. The blank flanges shall fit inside the PCD of the mating flanges
6. Mating flange details

a. 1600 NB BS 4504 PN 10

b. Bolt circle = 1820 mm

c. M45 bolts

7. If welding is required on the flanges all welding to be done according to *240-106628253 Standard for Welding Requirements on Eskom Plant Rev 2.* Volumetric NDT shall be done on all the welds.
8. One side of the flange shall be completely covered with a 3 mm rubber gasket to protect against the acid during the cleaning process.

1.2.4.3 Roles and responsibilities

1. The *Employer* shall obtain isolation by closing the T1 and T2 (CW isolation valves).
2. Opening of the manway covers and the installation of the CW spades/blanks shall be the responsibility of the *Contractor*.
3. Gas testing shall be performed by the *Employer* once requested by the RP (Responsible Person obtaining the permit to work)
4. The *Contractor* shall supply a resource 3 months before the work starts to obtain the necessary training to become an RP. Please refer to the NEC contract data for more information.
5. The *Contractor* will be responsible for the permits taken on the condenser. This includes the confined space permit.
6. The *Contractor* shall only start with coating surface preparation once the CW spades have been installed. Sandblasting grit shall not be allowed to be blown out of the waterboxes during the grit blasting activity. All the grit will be collected after blasting and disposed of. Grit inside the tubes shall be removed to allow for sufficient flow during the cleaning process.
7. Scaffolding required shall be the responsibility of the *Employer* and the requirements shall be discussed during project kick-off meeting.
8. Supply of vacuum tankers and transportation of acid waste to designated disposal area (ash disposal) shall be responsibility of the *Contractor*.
9. High level flood test inspection, plugging of the leaking tubes and updating of condenser tube map shall be *Contractor*'s responsibility.

1.2.4.4 EQUIPMENT / TOOLS Lists

The *Contractor* will complete the tables below to indicate the equipment as a tool list that will be used during the chemical cleaning activities.

Table 1: Tool list for chemical cleaning

Quantity provided by the *Contractor* per MTC condenser	**Tool/Equipment Description**	**Description**	**Units**
	Pumps		Head, m
			Flow m^3/h
	Mixing tank		m^3
	Flexible hoses for conveying of chemical solutions		Number off
			Diameter, mm
	Valves related to isolation of chemical solution		Number off
			Diameter (DN)

Table 2: Tool list for high pressure cleaning

Quantity provided by the *Contractor* per MTC condenser	**Tool/ Equipment Description**	**Description**	**Units**
	HP pumps		bar
			m^3/h
	HP flexible hoses		Number off
			Internal Diameter, mm
			Length, m
	HP nozzles		Make
			Diameter, mm

	Foot Valves		Number off Size

1.2.4.5. Documentation

The *Contractor* shall supply the following information after contract award and before any work is done.

1. A method statement detailing the chemical cleaning process shall be approved by the *Employer* before any work commence.
2. A method statement detailing the water box and tube sheet coating shall be approved by the *Employer* before any work commence.
3. All QCP for both the Coating and cleaning shall be preapproved by the *Employer* before any work start. Hold points for engineering will be added after each major activity. *Contractor* QC will have hold points for each activity on the QCP.

The *Contractor* shall supply the following information after the work has been completed.

1. A tube map indicating all tube plugs will be submitted after the final high level test is concluded.
2. Calculation of mass of scale removed per CW pass.

Appendix A: Tube sheet coating

Tube sheet coatings are applied to tube sheets and tube sheet-to-tube joints that have been damaged by corrosion. The tube sheets can be coated to prevent any further corrosion taking place. Coatings can fail because of misapplication, physical damage in service or due to scaffolding damage during inspections, cracking due to flexing or movement of the tube sheet during operation. The coating can also be severely damaged due to inadequate protection of the coating during high-pressure water cleaning. If damage occurs to the coating, the area may be subject to selective galvanic attack with potentially catastrophic results. Coating is also done on tube sheet faces after retube to eliminate the galvanic effect between dissimilar tube sheet materials and tube materials and will also prevent dezincification of brass tube sheets.

The Project Engineer shall issue the relevant Eskom Protective Coating Specification with the enquiry document. These documents include 240-101712128: Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings as well as the project specific Corrosion Protection Specification as attached below.

Table 3: GAM/MAT/21/076 Corrosion Protection Specification for Tutuka Power Station – Condenser Tube sheet

Table to be considered as Annexure D of 240-101712128: "Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings"	
Component/s	Condenser Tube sheets

Internal Immersed (Material/Substrate)	Tube sheets: Austenitic Stainless steel cladding or Muntz metal with galvanically incompatible tubing i.e. titanium.
Internal Immersed (Environment)	• Operating Temperature: 25°C – 65°C • Flow rates of up to 2 metres per second. • pH: 8 to 8.6 • Medium: Raw or Cooling Water (CW) • Conductivity (K) < 4000 µS • Chloride < 400 $mg.kg^{-1}$ as Cl • Sodium < 500 $mg.kg^{-1}$ as Na • Sulphate < 1000 $mg.kg^{-1}$ • Calcium Carbonate Precipitate Potential (CCPP) 80 to 160$mg.kg^{-1}$ as $CaCO_3$
Generic System	(Optional) Two component Solvent Free Amine Cured Epoxy Primer or as specified by coating manufacturer. Two component solvent free amine cured epoxy coating 2 coats. Coating dry film thicknesses in this specification shall be adhere to.
Step 1 <u>High Pressure Water Washing</u>	All tube sheet and protruding tube surfaces shall be high pressure water washed to remove salt and other loose contaminants. Washing may need to be repeated in accordance with requirements of 240-101712128 in order to cater for possible soluble salts. Greases, lubricants etc. shall be removed during washing by including the use of a suitable degreaser/detergent. Ensure thorough rinsing with clean potable water followed by complete drying, in particular the interface of tubes and tube sheets, as far as practically possible.
Step 2 <u>Plugging of Condenser Tubes</u>:	In order to avoid damage as well as contamination of the internal surfaces of the condenser tubes, the tubes shall be temporarily plugged by a means that will provide adequate protection to unwanted abrasive blasting of the tube internal inlet surfaces.

Step 3 Surface Preparation:	Remove all traces of corrosion product, scale and other foreign matter by abrasive blast cleaning to Grade Sa 3 - a bright metal colour. Surface profile as specified by coating manufacturer. Abrasive material to be selected such that the surfaces are suitably profiled to ensure a good bond between coating and base metal. Remove all temporary plugs prior to final dust removal. In terms of final surface preparation and cleanliness refer to "General Requirement" below specifically for time duration between dust removal and application of the primer or first coat.
Step 4 Plugging of Condenser Tubes:	In order to avoid inadvertent introduction of paint to the internal surfaces of the condenser tubes, the tubes shall be temporarily plugged by a means that allows easy removal once the coating has been applied. It is extremely important that the material used for protecting the internal surfaces of the tubes from paint ingress be removed prior to curing of the coating to avoid the temporary plug permanently being stuck in the tube/s. Any build-up of paint inside the tubes will have to be removed prior to final acceptance of the work.
Step 5 Application of Primer (Optional)	Apply by brush, one coat – Two component Solvent Free Amine Cured Epoxy Primer. Dry film thickness **50 to 75 microns**
Step 6 Plugging of Condenser Tubes:	Remove all temporary plugs before complete curing of the primer. Once the primer coat has cured sufficiently as per manufacturer's recommendation install a new set of temporary plugs for the next coating step.
Step 7 Application of First Coat:	After allowing sufficient time for the primer coat to cure, the manufacturer's recommendations shall be strictly adhered to in this regard, apply by brush, one coat – Two Component Solvent Free Amine Cured Epoxy Coating. Dry film thickness **250 to 300 microns**
Step 8 Plugging of Condenser Tubes:	Remove all temporary plugs before complete curing of the coating in Step 7 above. Once the coating in Step 7 above has cured sufficiently install a new set of temporary plugs for the next coating step.

Step 9 Application of Second Coat:	After allowing sufficient time for the coating in Step 7 to cure, the manufacturer's recommendations shall be strictly adhered to in this regard, apply by brush, one coat – Two Component Solvent Free Amine Cured Epoxy Coating. The second coat shall be of a different colour than the first coat for easy identification. Dry film thickness **250 to 300 microns** Total dry film thickness of the coating system: **from 500 to 600 microns**
Step 10 Plugging of Condenser Tubes:	Remove all temporary plugs before complete curing of the coating in Step 9 above.
Step 11 Sealing of Tube sheet/Water box Interface Areas:	A combination of a viscous and permanently elastic mastic system (tape/bandage and paste form) may be used for sealing of the tube sheet / water box interface. The requirement is that the product does not cure or dry out - is permanently flexible and surface tolerant and easy to apply (no special skills needed).
Step 12 Coating Inspection:	Since the close arrangement of the tubes precludes any holiday detection testing of the surfaces, all surfaces (especially at the tube/tube sheet interface) shall be thoroughly visually inspected to identify any areas where the coating is discontinuous or unclosed. At the end of the curing period the full cure of the applied coating shall be verified by the applicator and/or coating manufacturer. Any faults located shall be marked up and repaired to Eskom's satisfaction.
Final DFT's as estimated/correlated with "Wet Film" comb monitoring.	Two Component Solvent Free Amine Cured Epoxy Coating 2 coats @ 300 micron per coat Total dry film thickness of the coating system: **from 550 to 675 micron (with the use of a primer).** Total dry film thickness of the coating system: **from 500 to 600 micron (without the use of a primer).**
With respect to aspects not mentioned in the above coating specification table (e.g. mixing ratios, pot life, straining, thinning, induction times, over-coating and curing times), the manufacturer's	

recommendations shall be strictly adhered to.

This specification sheet is applicable to the application of protective coating to the entire tube sheet (Figure 1) surface with specific emphasis of ensuring continuous coating of the interface surfaces between the tube sheet and onto the protruding section of tubing.

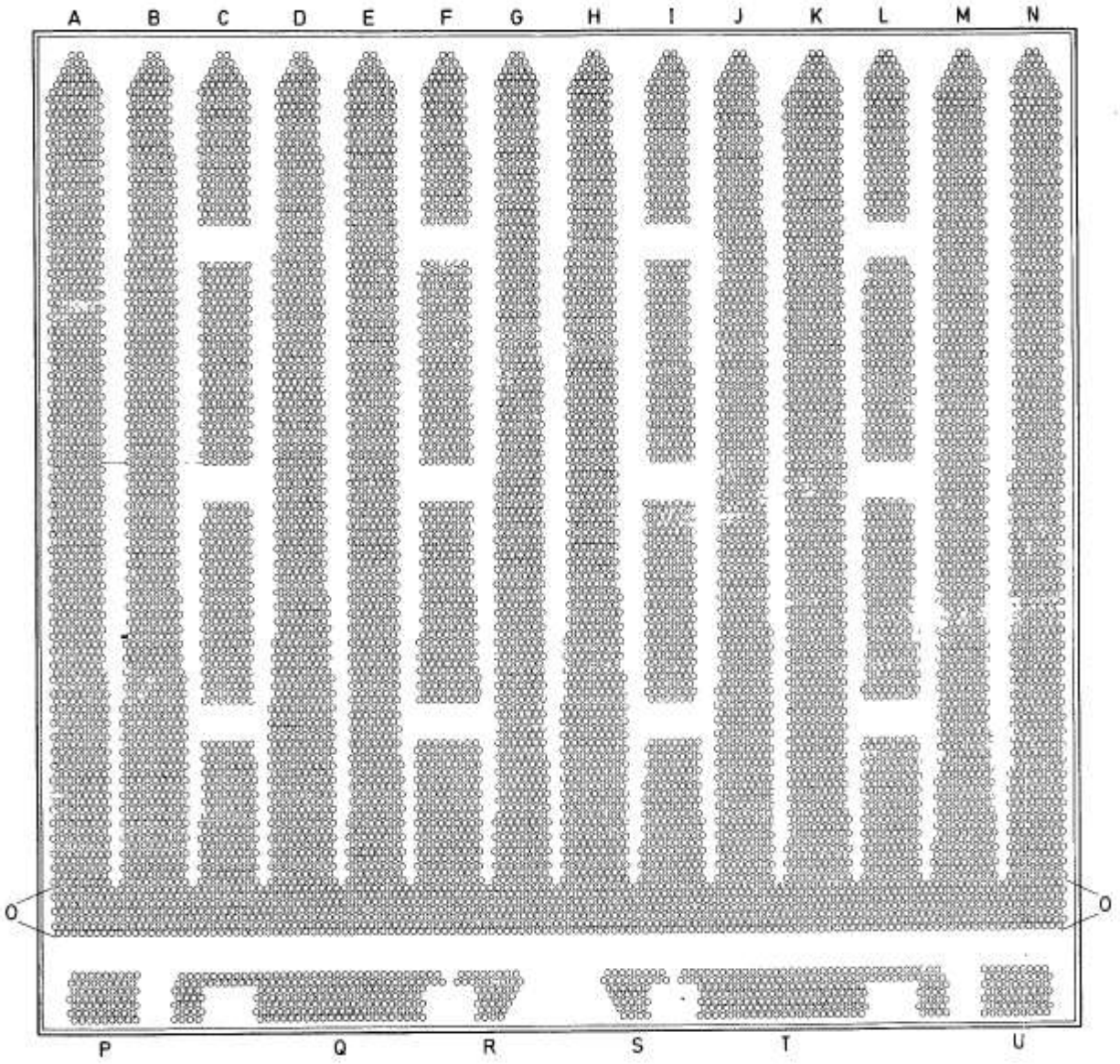

Figure 1: Tutuka Main Condenser Tube plate/Tube sheet viewed from outlet water box

Specific Project Requirements

1. A detailed visual inspection shall be carried out by the Eskom engineer and contractor to identify tube ends that may require re-flaring, mark-up of tube sheet surfaces areas that need to be repaired/reinstated OR completely coated/recoated.
2. Care should be taken when re-flaring the damaged condenser tubes as incorrect flaring can lead to cracking of tubes. Prior to any work the Contractor shall successfully demonstrate the ability to re-flare

condenser tubes.

3. Eskom will instruct the applicator whether to perform repairs on the affected areas or complete recoating.
4. At all times care shall be taken to ensure adequate protection of any surfaces and parts of components or systems not requiring blast cleaning and coating (as an example valve seats/trim, pump inlets, condenser/heat exchanger tubes) and every effort shall be taken to prevent grit, water and other dirt entering drain systems, tank/vessel inlet/outlet piping or settling on isolating valves seats, shafts etc.
5. All materials, i.e. paint, solvents and cleaning agents for a specific paint system shall be supplied by the same manufacturer. The solvents used shall be those recommended and manufactured by the paint manufacturer. Where the recommended 'solvent' and 'clean-up thinners' for a material differs, the 'clean-up' solvent must not be added to the paint for dilution purposes.
6. The method of surface preparation shall be by conventional sweep blasting and coating application by brush.
7. In cases where the existing lining/coating is significantly deteriorated or completely removed and the substrate badly corroded then the substrate shall be tested for chloride contamination, according to ISO 8502-6.
8. For soluble salts, testing shall be performed by the Bresle soluble salt test method. If not within acceptable limits (as per the manufacturer requirement but not exceeding 100mg/m^2), the surfaces shall be washed/decontaminated by High Pressure (HP) water washing using fresh/clean water (with a conductivity reading of maximum 100 µS/cm) at a minimum pressure of 300 bar. A salt decontamination chemical additive with demonstrated capability of removing salts may be used in conjunction with HP cleaning.
9. Soluble salts testing shall be repeated on representative test patches which shall be blast cleaned to Grade Sa 3 (ISO 8501-1). If acceptable then proceed with blasting and application steps – if not then repeat HP washing until the salt contamination has been removed to within acceptable limits.
10. Prior to any surface preparation all surfaces that are, or are likely to be contaminated with oil or grease as a result of the tube flaring process shall be solvent cleaned with a suitable water-soluble biodegradable alkaline cleaner/detergent or with appropriate organic solvents.
11. Cleaning may be performed by using rags for small areas, or a spray gun for large areas. The detergent/solvent-cleaned surfaces shall then be thoroughly washed down with fresh/clean water ensuring that the oil-water emulsion formed is completely removed from the metal.
12. Degreased and water washed surfaces shall be checked for residual oil and grease using the atomized water spray test as per ASTM F21 and further degreasing shall be carried out if residual oil or grease is found to be present.
13. A black light test shall be used to check for oil contamination. Zero oil and grease contamination is the acceptable limit. Washing with fresh/clean water containing a suitable degreasing agent of partially painted components shall take place between coats, if surfaces are found to be contaminated.
14. Surface preparation by abrasive blasting shall be performed by means of conventional hand held blasting equipment capable of removing mill scale, old coating, rust and suitably preparing the substrate to the

required cleanliness of Grade Sa 3.

15. Removal of dust and debris shall be performed by vacuuming. The process shall be repeated until the required level of dust and debris removal is achieved.
16. The level of cleanliness required shall be less than “dust quality rating” 2 when tested in accordance with ISO 8502-3.

General Requirements:

1. The contractor/applicator shall be wholly responsible for the surface preparation and coating application. The coated surfaces shall meet the DFT as required by this specification sheet and aspects thereof in referenced documents.
2. Power and hand tool cleaning is only applicable to very localized touch ups or patch repairs.
3. Hand-tool cleaning for isolated/localized areas may be utilized provided the required standard of finish is achieved. For all immersion applications final mechanical cleaning shall be by bristle blaster in order to create a required surface profile.
4. Cleaning by means of hand or power-tools, i.e. wire brushes, chipping hammers, scrapers, grinders, sanders, needle descalers, bristle blasters etc. may only be used where accepted by the Eskom engineer and where the position and condition of the substrate metal is such that efficient cleaning can be achieved.
5. Different grades and types of blasting media exist. It is important that the correct abrasive be used in combination with a specific coating system to achieve the specified surface profile. The required blast profile height should be carefully considered. The applicator shall select an appropriate abrasive type and mesh size to attain the specified surface profile.
6. Only inert mineral grit or steel grit abrasives shall be used. Steel grit is preferred in sensitive plant areas in order to ensure no contamination of plant processes due to excessive dust. Sand or silica based abrasives shall not be used. Abrasive material for blast cleaning shall be used in line with local environmental regulations.
7. The abrasive shall be used in accordance to the manufacturer’s specifications and shall be clean, sound, hard particles free from foreign substances such as dirt, oil, grease, toxic substances, organic matter and water soluble salts.
8. It is important that good quality abrasives are used in order to minimize the amount of waste grit and dust generated and contamination of the surfaces. The use of re-cycled blasting media for the final blast is strictly prohibited.
9. All abrasive media shall be stored in an area that is completely dry, covered and protected from weather.
10. For complete coating removal the requirement for surface preparation of all metallic surfaces for immersion is strictly Grade Sa 3 (ISO 8501-1), in which case the surfaces shall be blast cleaned to a bright metallic finish where all traces of rust, mill scale and other foreign matter are removed.
11. All compressed air for blasting activities shall be free from entrained moisture and oil. All traps shall be in a functional condition. The compressed air shall be tested at regular intervals using clean white clothes to assess cleanliness and dryness. This requirement shall be included in the QCP.

12. After surface preparation, all dust, grit blasting media or any other deleterious matter shall be removed from the surfaces by vacuuming. The process shall be repeated until the required level of dust and debris removal is achieved. It is imperative that all surface dirt and contaminants (such as oil, grease, rust or other deposits) are completely removed before coating or the adhesion of the coating shall be impaired.
13. Immediately before coating, blast cleaned steel shall not exhibit more than “dust quantity rating” 2 when tested in accordance with ISO 8502-3.
14. The contractor/applicator shall ensure that during surface preparation and coating activities the relative humidity for water boxes in-situ (confined spaces) is less than 60% RH. Ambient temperatures shall be between 5°C and 30°C or as per the manufacturer recommendations, whichever is the more stringent. The maximum/minimum substrate temperature at the time of coating application shall be strictly in accordance with the product data sheet. Environmental parameters shall be measured and recorded at least 4 times per shift. All measurements shall be recorded at the tube sheet surface.
15. Dew point requirements shall be as per the Product Datasheet or 240-101712128.
16. For all inspections of all surface preparation and coating activities the surfaces shall be clean allowing unhindered visual access to the surface. The applicator shall provide sufficient and adequate lighting (Cool White) to enable inspections. Cell phone lighting is not acceptable.
17. In order to avoid recontamination and flash rusting of the surfaces, the primer or first coat shall be applied within 8 hours after final surface preparation of the steel surfaces. Under no circumstances shall the blast be permitted to stand overnight.
18. Many modern organic coatings can be applied without the use of a primer. However, should a primer coat be required for holding of the blast, or otherwise, the applicator shall indicate/describe the reasoning for the need of such a primer i.e. as a holding primer or as a means of enhancing adhesion of the system?
    Details shall be provided in the Method Statement for the type of primer, generic resin, solvent borne or free, maximum DFT and compatibility with subsequent coats. The detailed Method Statement shall be submitted and reviewed by Eskom for acceptance/rejection prior to any work. Ultimately, the applicator shall be responsible for any risk that could arise or be attributed to this choice.

19. It is not possible to measure DFT’s due to the area/surface/tube protrusion. The coating applicator shall be equipped with a “wet comb” and frequently monitor the wet film thickness to ensure DFT requirements in the table above in this specification sheet are achieved.
20. Multiple coats shall be applied as per the table at the top of this specification sheet. Single coat systems are not permissible.
21. The colour of each coat shall be different from the previous coat.
22. Where the coating has completely cured or allowed to age before finishing, before application of a subsequent coat the surface shall be prepared by light abrasion, scrubbing with potable water using a bristle brush and drying before over-coating.
23. Application of subsequent coats shall be in accordance with the specified system. The required over-coating intervals as mentioned in the latest Product Data Sheet shall be observed and adhered to.
24. The coating shall be evenly applied to form a smooth, continuous, unbroken layer free from misses, sags,

runs, tears and other defects that could affect the integrity of the coating.

25. After completion of the coating activities sufficient curing time of the coating system shall be given prior to immersion as per the requirements of the Product Data Sheet. Accelerated curing is not permitted. All coated surfaces shall be adequately ventilated until full cure has been achieved. At the end of the curing period and before immersion the full cure of the applied coating shall be verified by the applicator and/or coating manufacturer.

Safety Requirements and Considerations:

1. During the applications of all coatings/lining, care shall be taken to ensure adequate ventilation and lighting, to allow for good visibility and proper curing of the coatings and to avoid / minimize health and safety risks.
2. A confined spaces (CSs) may be defined as an enclosed, restricted, or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate and/or an oxygen-deficient atmosphere may occur, and/or in which a dangerous liquid or dangerous concentration of gas, vapour, dust or fumes may be present. It includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, chute, bunker, silo, gearbox, tank, receiver, drum or any similar construction, equipment, machinery or object.
3. Flammable Atmospheres: Gases, vapours and dusts can become trapped in CSs and create flammable or explosive atmospheres, and include combustibles e.g. Hydrogen, Acetylene, Paint and thinning/cleaning solvents, etc.
4. Walking / Working Surfaces and Visibility: Poor lighting may add to hazards caused by an irregular, sloped, or constricted working surface.
5. Special care needs to be taken when working with all organic coatings. Prior to the use of any coating material, the Material Safety Data Sheets shall be obtained from the relevant coating manufacturer. The applicator shall be familiar with the contents of these safety data sheets and ensure that the necessary safety precautions are taken in order to comply with local and national safety and health requirements such as the OHS Act.
6. Any solid waste materials or liquids stripped or generated during the coating operations shall be discarded in accordance with the requirements of the appropriate national and/or local authorities or the requirements of Eskom.
7. The applicator shall ensure compliance with all statutory regulations, municipal by-laws, etc. concerning pollution and the health and safety of personnel and/or members of the public who may be affected by the work. The applicator shall provide the personnel with the appropriate required PPE.
8. The applicator shall provide for all necessary safety precautions and risk assessments.
9. The applicator shall advise Eskom of all hazardous materials to be brought on site.
10. All painting materials on site shall be stored in designated areas in storage facilities that meet the storage requirements of the paint manufacturer and the safety requirements of the specific site. The contractor shall be responsible for the provision of appropriate storage/shipping containers as required. These containers shall include the appropriate refrigeration/conditioning systems for temperature control. This

requirement shall be dependent on where the container will be located (indoors/outdoors), typical ambient temperature for the particular season of the year and the maximum storage temperature limits as per the manufacturers recommendations.

11. The applicator's Safety File for the area to be worked it shall address all the hazardous activities of abrasive blast cleaning and coating. The applicator shall verify that the personnel carrying out these activities are suitably qualified.

12. The applicator shall ensure that the abrasive materials used conform to all National Health and Safety Standards.
13. Specifically with respect to CSs and based on the descriptions and definitions of safety risks as per the above points it is imperative that the contractor's/applicator's Method Statement shall describe in detail, the measures and mitigation steps for the risks and hazards as identified in this specification sheet. It is compulsory that these safety risks/mitigation measures and any others as identified by the contractor/applicator be included in the Method Statement. Prior to the commencement of any work the Method Statement shall be submitted for review, acceptance/rejection by the respective Tutuka Power Station Risk and Safety office/department.

Pre-job Method Statement and Quality Documentation review and acceptance:

1 The coating manufacturer/applicator shall supply individual product data sheets for all products, comprising the system which shall contain the following as a minimum:

- A description of the generic type of paint.
- Confirmation that the coating is suitable for the intended method of application.
- Recommended and non-recommended uses.
- Maximum recommended service temperature which shall be a minimum of 30% greater than the maximum temperatures as is indicated in the table at the top of this specification sheet. The coating rating shall consider the above temperatures as continuous service i.e. not intermittently.
- Chemical resistance limits.
- Surface preparation.
- Application conditions and details including but not limited to: application temperatures, dilutions, pot-life, application techniques and DFT for the particular application method, over-coating intervals, and curing times required before immersion.

2. Prior to the application of any of the corrosion protection systems, the Product Data Sheet/s shall be signed by the manufacturer and applicator. This is to ensure that the manufacturer is aware of this specification, the conditions under which it will be applied and to allow for technical back-up where required.

3. The signed Product Data Sheet/s shall be deemed to be a binding reference document (as part of the

QCP). It shall be specific to this project and any further/other subsequent revisions of the Product Data Sheet/s shall be submitted to Eskom for reacceptance clearly stating the variations/deviations. No further use/application of the related product, for this project, is permitted until acceptance is granted by Eskom.

4. A detailed Method Statement explaining all required steps as specified in this specification sheet shall be provided at the time of tender. The steps to be considered includes:

   - The methods, steps, sequence and equipment required for ventilation and dust mitigation.
   - Grease decontamination and washing.
   - Soluble salt decontamination.
   - The parameter setup for blasting and coating techniques i.e. sweep blasting and coating by brush, shall also be included in the Method Statement.
   - Methods for dust and debris removal, maintaining and ensuring cleanliness between coats shall be described.
   - The Method Statement shall detail the precise sequence and breakdown of work areas/activities in order to apply the system with due consideration of dust contamination onto adjacent surfaces still requiring additional coats.
   - The Method Statement shall also consider the most efficient methods and sequencing to avoid unnecessary delays between coats that may have an impact i.e. time required for removal of spent abrasive grit and dust/debris, delay due to material handling, time required to handle, rig and move the component etc.
   - All inspection interventions during and after completion of final coats shall be considered and included.
   - Specifically for confined spaces i.e. condenser water boxes, the Method Statement shall describe all measures and details for establishing and maintaining:

     ✓The environmental conditions as required by this specification.

     ✓The required ventilation for the prevention and/or management of fumes and dust build-up.
     The number of extraction fans; mounting diameters, sizes and mounting methods of fans to manholes; power rating of fans; positioning of fans and direction of intended air flow shall be described and detailed.

5. Given that the single most limiting aspect of working in CSs is access, the Method Statement shall describe and indicate how and where access will be established for (1) personnel, (2) general equipment – buckets, shovels, etc. (3) lighting equipment, (4) blast equipment, (5) grit removal and cleaning etc. in relation to and considering the manhole/access points already used for ventilation purposes.
6. The detailed Method Statement shall be submitted to Eskom for review and acceptance/rejection prior to the commencement of any work. Eskom reserves the right to request further revision, clarification or

additions in accordance with or as required by this specification sheet.

7. The applicator shall submit a detailed, project specific QCP. The QCP shall be based on the detailed Method Statement and shall contain all intervention points and relevant acceptance criteria as per the information as described in the Product Data Sheet/s and this specification sheet. Eskom reserves the right to request further revision, clarification or additions in accordance with or as required by this specification sheet.
8. Under no circumstances shall any work be performed until the QCP and Method Statement have been accepted by the Eskom engineer.
9. The coating manufacturer shall provide technical surveys during the execution of the project. The applicator shall commit to this requirement in the Method Statement.

Reference Documents:

Since the compilation of the Eskom Standards 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings there have been changes in terms of the referenced documents i.e. some documents have been withdrawn, replaced or superseded. The following list of references shall apply in addition to the requirements of 240-101712128. The latest revision of the referenced standards shall apply.

Where conflict exists between any of these documents the more stringent requirement shall apply.

1. 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings.
2. ASTM D4414: Standard practice for measurement of wet film DFT by notch gauges.
3. ASTM D4541: Standard Method for Pull-off Strength of Coatings using Portable Adhesion Testers.
4. ASTM D5162: Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates.
5. ASTM E376: Measuring Coating DFT by Magnetic Field or Eddy Current Electro-magnetic Test Methods.
6. ASTM F21: Standard Test Method for Hydrophobic Surface Films by the Atomizer Test.
7. BS EN ISO 16961: Petroleum, petrochemical and natural gas industries – Internal coating and coating of steel storage tanks.
8. ISO 2409: Paints and varnishes – Cross cut test.
9. ISO 4624: Paint and vanishes – Pull-off test for adhesion.
10. ISO 4628 – 1: Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 1: General introduction and designation system.
11. ISO 4628 – 3: Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and

size of defects, and of intensity of uniform changes in appearance – Part 3: Assessment of degree of rusting.

12. ISO 8501-1: Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.
13. ISO 8502-3: Preparation of steel substrates before application of paint and related products – Test for the assessment of surface cleanliness – Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).
14. ISO 8502-6: Preparation of steel substrates before application of paint and related products – Test for the assessment of surface cleanliness – Part 6: Extraction of soluble contaminants for analysis – The Bresle method.
15. ISO 8503-4: Preparation of steel substrates before application of paint and related products – Surface roughness characteristics of blast-cleaned steel substrates.

    Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile – Stylus instrument procedure. (May be used as an alternative to SANS 5772).
16. ISO 9001: Quality Management Systems - “is defined as the international standard that specifies requirements for a quality management system (QMS). Organizations use the standard to demonstrate the ability to consistently provide products and services that meet customer and regulatory requirements.
17. ISO 9223: Corrosion of metal and alloys – Corrosivity of atmospheres – Classification.
18. ISO 12944-3: Paint and varnishes – Corrosion protection of steel structures by protective paint systems. Part 3: Design considerations.
19. SANS 5770: Preparation of steel substrates before the application of paints and related products – Test for the assessment of cleanliness of blast-cleaned steel surface – Freedom from certain soluble salts.
20. SANS 5772: Preparation of steel substrates before the application of paints and related products – Surface roughness characteristics of blast-cleaned steel surfaces – Profile of blast-cleaned surfaces determined by a micrometer profile gauge (Can be used as alternative to ISO 8503-4).
21. SANS 10064: The preparation of steel surface for coating.
22. SIS 055900: Swedish Code of Practice - Pictorial surface preparation standard for painted steel surfaces. (Can be used as alternative to ISO 8501 – 1).

Appendix B: Condenser water box coating

Table 4: GAM/MAT/21/077 Corrosion Protection Specification for Tutuka Power Station – Condenser Water boxes

Table to be considered as Annexure D of 240-101712128: "Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings"	
Vessels	Main/BFPT Condenser Water boxes
Internal Immersed (Material/Substrate)	Steel/cast iron – previously epoxy coated
Internal Immersed (Environment)	• Operating Temperature: 25°C – 65°C • Flow rates of up to 2 metres per second. • pH: 8 to 8.6 • Medium: Raw or Cooling Water (CW) • Conductivity (K) < 4000 µS • Chloride < 400 $mg.kg^{-1}$ as Cl • Sodium < 500 $mg.kg^{-1}$ as Na • Sulphate < 1000 $mg.kg^{-1}$ • Calcium Carbonate Precipitate Potential (CCPP) 80 to 160$mg.kg^{-1}$ as $CaCO_3$
Internal Immersed (Surface Preparation and coating)	Abrasive blast clean to Grade Sa 3 (ISO 8501-1). The surface profile shall be as specified by the coating manufacturer but not less than 50 microns.
Generic System	Solvent Free Epoxy
First Coat	Apply one coat Two Component Solvent Free Amine Cured Epoxy coating from **350 - 450 micron.** Thinning in excess of 5% shall not be permitted
Stripe Coat	After allowing sufficient time (as recommended by coating manufacturer) for the first coat to cure, all accessible edges, weld seams, bolt holes and other crucial areas shall be given an additional stripe coat by brush.
Final Coat	After allowing sufficient time for the first coat and stripe coating to cure, the manufacturer's recommendations shall be adhered to in this regard, apply one coat Two Component Solvent Free Amine Cured Epoxy coating from **350 - 450 micron**. **Total System Minimum Dry Film Thickness (DFT) = 700 microns.**

With respect to aspects not mentioned in the above coating specification table (e.g. mixing ratios, pot life, straining, thinning, induction times, over-coating and curing times), the manufacturer's recommendations shall be strictly adhered to.

This specification is applicable for Tutuka Power Station Condenser Water boxes (Figure 1 below). It caters for coating of condenser water boxes which include repair of existing coatings and complete removal of old coating and recoating. The coating work will be performed in situ at Tutuka Power Station.

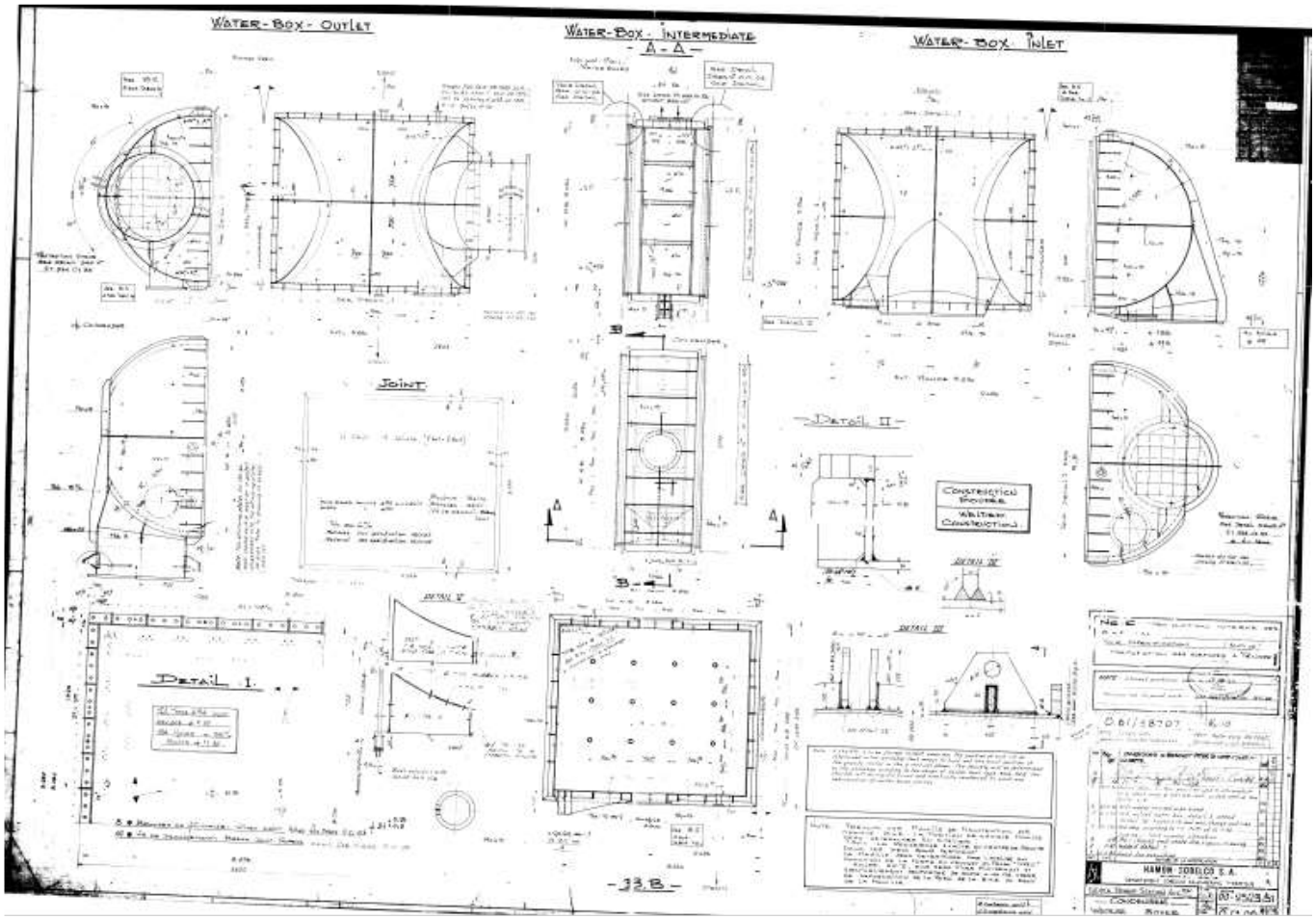

Figure 1: 061/38707 – Drawing of Tutuka Power Station Condenser Water boxes

Specific Project Requirements:

1. A detailed visual inspection shall be carried out by the Eskom engineer and the *Contractor* to identify and mark-up all areas that need to be repaired/reinstated OR completely coated/recoated. Based on the inspection (section 4.13 of 240-101712128 can assist in providing guidance) Eskom will instruct the contractor/applicator whether to perform patch repairs of the coating or complete recoating.
2. The *Contractor* / applicator shall take cognisance of the fact that after initial surface preparation as above, Eskom may require access for a further inspection and assessment to determine the need for possible mechanical repairs i.e. welding which will be done by Eskom. Unfortunately, this inspection can only be carried out once the surfaces have been blast cleaned in preparation for coating. The depth and morphology of corrosion damage, extent of component wall thickness loss and pitting needs to be considered. Where applicable, the following guide (obviously dependent on installed wall thickness) can be applied to all areas of extensive deep pitting:
   - All pits less than 2mm in depth and all edges and weld seams shall be stripe coated after application of the primer/first coat.
   - All pits in excess of 2mm and up to 5 mm in depth shall be filled using a compatible two component solvent free epoxy filler. The filler to be used shall be supplied by the same supplier as the rest of the coating system and confirmed to be compatible to the specified coating system.
   - All severely grooved/corroded welds shall be filled by welding (welding repairs will be done by Eskom). Perforations and defects, pitting etc. which are close to approaching the wall thickness shall be repaired by welding in steel plate. The plate shall be welded onto the internal/immersed surface.
3. At all times care shall be taken to ensure adequate protection of any surfaces and parts of components or systems not requiring blast cleaning and coating (as an example valve seats/trim, pump inlets, condenser/heat exchanger tubes) and every effort shall be taken to prevent grit, water and other dirt entering drain systems, tank/vessel inlet/outlet piping or settling on isolating valves seats, shafts etc.
   Equipment name plates and identification plates shall be protected from coatings. No coatings shall be applied over any surfaces where these will adversely affect the performance of the item or component.
4. All materials, i.e. paint, solvents and cleaning agents for a specific paint system shall be supplied by the same manufacturer. The solvents used shall be those recommended and manufactured by the paint manufacturer. Where the recommended 'solvent' and 'clean-up thinners' for a material differs, the 'clean-up' solvent must not be added to the paint for dilution purposes.
5. The method of surface preparation for the water box internal surfaces shall be by conventional hand held equipment.
6. Corrosion Protection shall only proceed once all mechanical activities i.e. cutting and welding have been completed and released in terms of the manufacturing/fabrication Quality Control Plan (QCP).
7. In cases of recoating water boxes where the existing lining/coating has significantly deteriorated and the substrate badly corroded then the substrate shall be tested for chloride contamination, according to ISO 8502-6.

8. Casting substrates which may be pitted and/or rough and porous are inherently susceptible to soluble salt contamination. Testing shall be performed prior to final surface preparation.
9. Soluble salt testing shall be performed by the Bresle soluble salt test method. If not within acceptable limits (as per the manufacturer requirement but not exceeding 100mg/m^2), the surfaces shall be washed / decontaminated by High Pressure (HP) water washing using fresh/clean water (with a conductivity reading of maximum 100 µS/cm) at a minimum pressure of 300 bar. A salt decontamination chemical additive with demonstrated capability of removing salts may be used in conjunction with HP cleaning.
10. Soluble salt testing shall be repeated on representative test patches which shall be blast cleaned to Grade Sa 3 (ISO 8501-1). If acceptable then proceed with blasting and coating application steps – if not then repeat HP washing until the salt contamination has been removed to within acceptable limits.
11. Surface preparation by abrasive blasting shall be performed by means of conventional hand held blasting equipment capable of removing mill scale, old coating, rust and suitably preparing the substrate to the required cleanliness of Grade Sa 3.
12. Removal of dust and debris shall be performed by vacuuming. The process shall be repeated until the required level of dust and debris removal is achieved.
13. The level of cleanliness required shall be less than “dust quality rating” 2 when tested in accordance with ISO 8502-3.
14. If coating is to be performed downstream of a draft either naturally or by fans then the upstream area shall be completely grit and dust free to prevent any possible carry-over of the dust/grit contamination onto the downstream wet/curing coating.

    With regards to specifically patch repairs, the compatibility between the existing aged coating and subsequent coating, as per the above table in this specification shall first be checked prior to proceeding with large scale repairs. A Methyl ethyl ketone (MEK) rub test shall be used to confirm no softening/dissolution of the existing coating. Thereafter the new/repair system shall first be applied to small test area. It no softening of the existing coating occurs, then full scale repair can proceed.

General Requirements:

1. The *Contractor* / applicator shall be wholly responsible for the surface preparation and coating application. The coated surfaces shall meet the DFT as required by this specification sheet and aspects thereof in referenced documents.
2. Rounded edges are required in order to be able to apply the protective coating uniformly and to attain adequate coating DFTs on sharp edges, refer to ISO 12944-3 should more detail be required. All sharp edges from the original fabrication shall be rounded or chamfered and burrs around holes and along other cut edges shall be removed. All edges to be rounded off with a grinder to a radius of 3mm or more.
3. Weld beads with a surface irregularity exceeding 3mm or with sharp crests having a radius less than 3mm shall be ground.
4. Power and hand tool cleaning is only applicable to very localised touch ups or patch repairs. Specific requirements for patch repairing a coating system are defined in section 4.8.6 of 240-101712128. Hand-tool cleaning for isolated/localised areas may be utilised provided the required standard of finish is achieved. For all immersion applications final mechanical cleaning shall be by bristle blaster in order to create a required surface

profile.

5. Cleaning by means of hand or power-tools, i.e. wire brushes, chipping hammers, scrapers, grinders, sanders, needle descalers, bristle blasters etc. may only be used where accepted by the Eskom engineer and where the position and condition of the substrate metal is such that efficient cleaning and surface profile can be achieved and where the protective coating system is designed for application to brushed or ground surfaces i.e. specifically formulated surface tolerant coatings.

6. All welds shall be free of slag, slag inclusions and pinholes. Adjacent areas shall be free of weld spatter, which shall be removed by grinding or scraping.
7. Oil and grease deposits shall be removed prior to cleaning. Special attention shall be paid to drillings, bolt holes, etc.
8. Burnishing of the surface shall not be permitted.
9. In all cases, after wire brushing or grinding, all traces of loose material shall be removed from the surface by compressed air or vacuum cleaning. Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating application.
10. Different grades and types of blasting media exist. It is important that the correct abrasive be used in combination with a specific coating system to achieve the specified surface profile. The required blast profile height should be carefully considered. The applicator shall select an appropriate abrasive type and mesh size to attain the specified surface profile.
11. Only inert mineral grit or steel grit abrasives shall be used. Steel grit is preferred in sensitive plant areas in order to ensure no contamination of plant processes due to excessive dust. Sand or silica based abrasives shall not be used. Abrasive material for blast cleaning shall be used in line with local environmental regulations.
12. The abrasive shall be used in accordance to the manufacturer's specifications and shall be clean, sound, hard particles free from foreign substances such as dirt, oil, grease, toxic substances, organic matter and water soluble salts.
13. It is important that good quality abrasives are used in order to minimize the amount of waste grit and dust generated and contamination of the surfaces.
14. The use of re-cycled blasting media for the final blast is strictly prohibited.
15. All abrasive media shall be stored in an area that is completely dry, covered and protected from weather.
16. The profile height of the blasted surfaces shall be within the range of the specified coating system but no less than 50 microns.
17. It is important that the blast profile does not exceed the specified DFT of the primer or first coat. Blast cleaning of severely corroded surfaces may result in high profiles i.e. > than 100 microns. In these cases, the primer or first coat shall be applied by brush/roller to ensure complete wet-out of the pitted/jagged surface. In addition a different primer or first coat may be required. However, agreement should be reached between the applicator and coating manufacturer as to the most suitable profile range, with due consideration of the application method, for a specific coating system.
18. The contractor/applicator shall consider and detail these potential scenarios or eventualities in the required Method Statement which shall be reviewed by Eskom for acceptance/rejection prior to any work. Ultimately, the applicator shall be responsible for any risk that could arise or be attributed to this choice.

19. The requirement for surface preparation of all metallic surfaces for immersion is strictly Grade Sa 3 (ISO 8501-1), in which case the surfaces shall be blast cleaned to white metal where all traces of rust, mill scale and other foreign matter are removed.
20. All compressed air for blasting activities shall be free from entrained moisture and oil. All traps shall be in a functional condition. The compressed air shall be tested at regular intervals using clean white clothes to assess cleanliness and dryness. This requirement shall be included in the QCP.
21. After surface preparation, all dust, grit blasting media or any other deleterious matter shall be removed from the surfaces by vacuuming. The process shall be repeated until the required level of dust and debris removal is achieved. It is imperative that all surface dirt and contaminants are completely removed before coating or the adhesion of the coating shall be impaired.
22. Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating. Unnecessary traffic prior to painting shall be avoided.
23. Immediately before coating, blast cleaned steel shall not exhibit more than “dust quantity rating” 2 when tested in accordance with ISO 8502-3.
24. The contractor/applicator shall ensure that during surface preparation and coating activities the relative humidity (RH) in open, undercover shop environments is less than 80% RH and for water boxes in-situ (confined spaces) is less than 60% RH. Ambient temperatures shall be between 5°C and 30°C or as per the manufacturer recommendations, whichever is the more stringent. The maximum/minimum substrate temperature at the time of coating application shall be strictly in accordance with the product data sheet. During stable weather conditions environmental parameters shall be measured and recorded at least 4 times per shift.
25. During periods of inclement or cold weather conditions the environmental parameters shall be measured and recorded hourly. In the event that the latest two readings of any of the parameters indicate a deteriorating trend which would likely exceed parameter/s limit then no final surface preparation or coating application shall be permitted. All measurements shall be recorded at the steel surface. Dew point requirements shall be as per the Product Datasheet or 240-101712128.
26. For all inspections of all surface preparation and coating activities the surfaces shall be clean allowing unhindered visual access to the surface. The contractor/applicator shall provide sufficient and adequate lighting (Cool White) to enable inspections. Cell phone lighting is not acceptable.
27. In order to avoid recontamination and flash rusting of the surfaces, the primer or first coat shall be applied within 8 hours after final surface preparation of the steel surfaces. Under no circumstances shall the blast be permitted to stand overnight.
28. Many modern organic coatings can be applied without the use of a primer. However, should a primer coat be required for holding of the blast, or otherwise, the applicator shall indicate/describe the reasoning for the need of such a primer i.e. as a holding primer or as a means of enhancing adhesion of the system? Details shall be provided in the Method Statement for the type of primer, generic resin, solvent borne or free, maximum DFT and compatibility with subsequent coats. The detailed Method Statement shall be submitted and reviewed by Eskom for acceptance/rejection prior to any work. Ultimately, the applicator shall be responsible for any risk that could arise or be attributed to this choice.
29. The coating applicator shall be equipped with a “wet comb” and frequently monitor the wet film thickness to prevent/reduce a wide spread of DFT’s.

30. After allowing sufficient time for the first coat to cure, all edges, weld seams, bolts and nuts, and other crucial areas shall be given an additional stripe coat, by brush application, with the same material as the following coat. Should the use of a primer be omitted, stripe coating shall be carried out between applications of the first coat and the subsequent coat.
31. Multiple coats shall be applied as per the table at the top of this specification sheet. Single coat systems are not permissible.
32. The colour of each coat shall be different from the previous coat. In the case where aesthetic requirements are secondary, repairs after final testing shall be carried out using a different colour. In other cases two finishing coats of the same colour may be applied to achieve complete colour uniformity.
33. Where the coating has completely cured or allowed to age before finishing, before application of a subsequent coat the surface shall be prepared by light sanding, scrubbing with potable water using a bristle brush and drying before over-coating.
34. Application of subsequent coats shall be in accordance with the specified system. The required over-coating intervals as mentioned in the latest Product Data Sheet shall be observed and adhered to.
35. The total DFT of the applied coating system shall comply with the recommended minimum and maximum DFT limits as recommended in the latest Product System Data Sheet and this specification.
36. The range of DFTs of each coat shall be as follows; 90% of random readings shall be equal to or greater than the minimum specified DFT. No individual reading shall be less than 80% of the specified DFT. In the case of solvent borne coatings no individual reading shall be greater than 150% of the manufacturer's maximum specified DFT. All deficient film DFTs shall be rectified prior to release.
37. The coating shall be evenly applied to form a smooth, continuous, unbroken layer free from misses, sags, runs, tears and other defects that could affect the integrity of the coating.
38. Unless otherwise instructed by the Eskom engineer for flange surfaces at least one coat of the coating system shall be brought around onto a third of the surface area of the flange face. In the case of flange faces (gramophone surface finish) with compressed fibre gaskets, blasting and coating is not permitted.
39. The applicator shall perform pinhole detection using appropriate "spark" testing equipment at a voltage setting as per the coating manufacturer's requirements. Wet sponge testing shall not be acceptable.
40. With the exception of access limitations or as instructed by the Eskom engineer all areas of coating damage shall be patch repaired in a different or contrasting colour and by brush application. The extent of the damage shall be carefully inspected to assess which coats in the system have been damaged and which surface preparation methods are most suitable and appropriate. The Eskom engineer shall accept/reject the applicator's recommended method of surface preparation i.e. mechanical power and hand tool cleaning. When more widespread repairs are required and when the damage extends to the steel substrate abrasive blast cleaning to Grade Sa 3 is required.
41. All coats in the system shall be re-instated. Areas to be primed shall be cleaned of dust, dirt, grease, salts or other deleterious matter and all edges of existing paint shall be feathered back to a hard edge. The patch primer used shall be in accordance with the requirements of the relevant coating system. The over-coating onto an existing coating by subsequent intermediate and finishing coats (where applicable) shall be stepped at 25 mm intervals to produce a feathered edge. Specifics of such instances shall be assessed on a case by case basis.

42. Provision shall also be made for the repair of handling damage to the coating after installation / assembly / erection / scaffolding removal. Spot repairs shall reinstate each of the previous coats and shall commence directly after the localised surface preparation.
43. All immersed surfaces shall be pinhole tested (only after completion of all handling/ installation / assembly / erection/scaffolding removal) to ensure the coating is pinhole free and if required additional repairs shall be performed and once cured then the repair areas shall be retested. The process to be repeated until a pinhole free coating is achieved.
44. After completion of the coating activities sufficient curing time of the coating system shall be given prior to immersion as per the requirements of the Product Data Sheet. Accelerated curing is not permitted. All coated surfaces shall be adequately ventilated until full cure has been achieved. At the end of the curing period and before immersion the full cure of the applied coating shall be verified by the applicator and/or coating manufacturer.

Safety Requirements and Considerations:

1. During the application of all coatings/lining, care shall be taken to ensure adequate ventilation and lighting, to allow for good visibility and proper curing of the coatings and to avoid/minimise health and safety risks.
2. A confined spaces (CSs) may be defined as an enclosed, restricted, or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate and/or an oxygen-deficient atmosphere may occur, and/or in which a dangerous liquid or dangerous concentration of gas, vapour, dust or fumes may be present. It includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, chute, bunker, silo, gearbox, tank, receiver, drum or any similar construction, equipment, machinery or object.
3. Flammable Atmospheres: Gases, vapours and dusts can become trapped in CSs and create flammable or explosive atmospheres, and include combustibles e.g. Hydrogen, Acetylene, Paint and thinning/cleaning solvents, etc.
4. Walking / Working Surfaces and Visibility: Poor lighting may add to hazards caused by an irregular, sloped, or constricted working surface.
5. Special care needs to be taken when working with all organic coatings. Prior to the use of any coating material, the Material Safety Data Sheets shall be obtained from the relevant coating manufacturer. The applicator shall be familiar with the contents of these safety data sheets and ensure that the necessary safety precautions are taken in order to comply with local and national safety and health requirements such as the OHS Act.
6. Any solid waste materials or liquids stripped or generated during the coating operations shall be discarded in accordance with the requirements of the appropriate national and/or local authorities or the requirements of Eskom.
7. The applicator shall ensure compliance with all statutory regulations, municipal by-laws, etc. concerning pollution and the health and safety of personnel and/or members of the public who may be affected by the work. The applicator shall provide the personnel with the appropriate required PPE.
8. The applicator shall provide for all necessary safety precautions and risk assessments.
9. The applicator shall advise Eskom of all hazardous materials to be brought on site.

10. All painting materials on site shall be stored in designated areas in storage facilities that meet the storage requirements of the paint manufacturer and the safety requirements of the specific site. The contractor shall be responsible for the provision of appropriate storage/shipping containers as required. These containers shall include the appropriate refrigeration/conditioning systems for temperature control. This requirement shall be dependent on where the container will be located (indoors/outdoors), typical ambient temperature for the particular season of the year and the maximum storage temperature limits as per the manufacturers recommendations.
11. The applicator's Safety File for the area to be worked it shall address all the hazardous activities of abrasive blast cleaning and coating. The applicator shall verify that the personnel carrying out these activities are suitably qualified.
12. The applicator shall ensure that the abrasive materials used conform to all National Health and Safety Standards.

Specifically with respect to CSs and based on the descriptions and definitions of safety risks as per the above points it is imperative that the contractor's/applicator's Method Statement shall describe in detail, the measures and mitigation steps for the risks and hazards as identified in this specification sheet. It is compulsory that these safety risks/mitigation measures and any others as identified by the contractor/applicator be included in the Method Statement. Prior to the commencement of any work the Method Statement shall be submitted for review, acceptance/rejection by the respective Tutuka Power Station Risk and Safety office/department.

Pre-job Method Statement and Quality Documentation review and acceptance:

1. The coating manufacturer/applicator shall supply individual product data sheets for all products, comprising the system which shall contain the following as a minimum:
   - A description of the generic type of paint.
   - Confirmation that the coating is suitable for the intended method of application.
   - Recommended and non-recommended uses.
   - Maximum recommended service temperature which shall be a minimum of 30% greater than the maximum temperatures as is indicated in the table at the top of this specification sheet. The coating rating shall consider the above temperatures as continuous service i.e. not intermittently.
   - Chemical resistance limits.
   - Surface preparation.
   - Application conditions and details including but not limited to: application temperatures, dilutions, pot-life, application techniques and DFT for the particular application method, over-coating intervals, and curing times required before immersion.

2. Prior to the application of any of the protection systems, the Product Data Sheet/s shall be signed by the manufacturer and applicator. This is to ensure that the manufacturer is aware of this specification, the conditions under which it will be applied and to allow for technical back-up where required.

3. The signed Product Data Sheet/s shall be deemed to be a binding reference document (as part of the QCP). It shall be specific to this project and any further/other subsequent revisions of the Product Data Sheet/s shall be submitted to Eskom for reacceptance clearly stating the variations/deviations. No further use/application of the related product, for this project, is permitted until acceptance is granted by Eskom.
4. A detailed Method Statement explaining all required steps as specified in this specification sheet shall be provided at the time of tender. The steps to be considered includes:
   - The methods, steps, sequence and equipment required for ventilation and dust mitigation.
   - Grease decontamination and washing.
   - Soluble salt decontamination.
   - The parameter setup for blasting and coating techniques i.e. sweep blasting and coating by brush/conventional airless spray, flow coating, pigging etc. shall also be included in the Method Statement.
   - Methods for dust and debris removal, maintaining and ensuring cleanliness between coats shall be described.
   - The Method Statement shall detail the precise sequence and breakdown of work areas/activities in order to apply the system with due consideration of dust contamination onto adjacent surfaces still requiring additional coats.
   - The Method Statement shall also consider the most efficient methods and sequencing to avoid unnecessary delays between coats that may have an impact i.e. time required for removal of spent abrasive grit and dust/debris, delay due to material handling, time required to handle, rig and move the component etc.
   - All inspection interventions during and after completion of final coats shall be considered and included.
   - Specifically for confined spaces i.e. condenser water boxes, the Method Statement shall describe all measures and steps for establishing and maintaining:
     - ✓ The environmental conditions as required by this specification.
     - ✓ The required ventilation for the prevention and/or management of fumes and dust build-up. The number of extraction fans; mounting diameters, sizes and mounting methods of fans to manholes; power rating of fans; positioning of fans and direction of intended air flow shall be described and detailed.
5. Given that the single most limiting aspect of working in CSs is access, the Method Statement shall describe and indicate how and where access will be established for (1) personnel, (2) general equipment – buckets, shovels, etc. (3) lighting equipment, (4) blast equipment, (5) grit removal and cleaning etc. in relation to and considering the manhole/access points already used for ventilation purposes.
6. The detailed Method Statement shall be submitted to Eskom for review and acceptance/rejection prior to the commencement of any work. Eskom reserves the right to request further revision, clarification or additions in accordance with or as required by this specification sheet.
7. The contractor/applicator shall submit a detailed, project specific QCP. The QCP shall be based on the detailed Method Statement and shall contain all intervention points and relevant acceptance criteria as per the information as described in the Product Data Sheet/s and this specification sheet. Eskom reserves the right to request further revision, clarification or additions in accordance with or as required by this specification sheet.

8. Under no circumstances shall any work be performed until the QCP and Method Statement have been accepted by the Eskom engineer.
9. The coating manufacturer shall provide technical surveys during the execution of the project. The contractor/applicator shall commit to this requirement in the Method Statement.

Reference Documents:

Since the compilation of the Eskom Standards 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings there have been changes in terms of the referenced documents i.e. some documents have been withdrawn, replaced or superseded. The following list of references shall apply in addition to the requirements of 240-101712128 standard. The latest revision of the referenced standards shall apply.

Where conflict exists between any of these documents the more stringent requirement shall apply.

1. 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings.
2. ASTM D4414: Standard practice for measurement of wet film DFT by notch gauges.
3. ASTM D4541: Standard Method for Pull-off Strength of Coatings using Portable Adhesion Testers.
4. ASTM D5162: Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates.
5. ASTM E376: Measuring Coating DFT by Magnetic Field or Eddy Current Electro-magnetic Test Methods.
6. ASTM F21: Standard Test Method for Hydrophobic Surface Films by the Atomizer Test.
7. BS EN ISO 16961: Petroleum, petrochemical and natural gas industries – Internal coating and coating of steel storage tanks.
8. ISO 2409: Paints and varnishes – Cross cut test.
9. ISO 4624: Paint and vanishes – Pull-off test for adhesion.
10. ISO 4628 – 1: Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 1: General introduction and designation system.
11. ISO 4628 – 3: Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 3: Assessment of degree of rusting.
12. ISO 8501-1: Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.
13. ISO 8502-3: Preparation of steel substrates before application of paint and related products – Test for the assessment of surface cleanliness – Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).
14. ISO 8502-6: Preparation of steel substrates before application of paint and related products – Test for the

assessment of surface cleanliness – Part 6: Extraction of soluble contaminants for analysis – The Bresle method.

15. ISO 8503-4: Preparation of steel substrates before application of paint and related products – Surface roughness characteristics of blast-cleaned steel substrates.

    Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile – Stylus instrument procedure. (May be used as an alternative to SANS 5772).
16. ISO 9001: Quality Management Systems - "is defined as the international standard that specifies requirements for a quality management system (QMS). Organizations use the standard to demonstrate the ability to consistently provide products and services that meet customer and regulatory requirements.
17. ISO 9223: Corrosion of metal and alloys – Corrosivity of atmospheres – Classification.
18. ISO 12944-3: Paint and varnishes – Corrosion protection of steel structures by protective paint systems. Part 3: Design considerations.
19. SANS / ISO 2808: Paints and Varnishes: Determination of film DFTs (Can be used as alternative to E376).
20. SANS 5770: Preparation of steel substrates before the application of paints and related products – Test for the assessment of cleanliness of blast-cleaned steel surface – Freedom from certain soluble salts.
21. SANS 5772: Preparation of steel substrates before the application of paints and related products – Surface roughness characteristics of blast-cleaned steel surfaces – Profile of blast-cleaned surfaces determined by a micrometer profile gauge (Can be used as alternative to ISO 8503-4).
22. SANS 10064: The preparation of steel surface for coating.
23. SIS 055900: Swedish Code of Practice - Pictorial surface preparation standard for painted steel surfaces. (Can be used as alternative to ISO 8501 – 1).

General

- All Low Voltage equipment will comply within the *Employer's* standards
- Audit on *Contractor* will be done on a frequent basis
- Quality control plan and Contract Quality plan Approval Process standard as per QM-58
- The *Employer's* transport procedures to be adhered to
- The *Contractor* must provide proof of experience and qualifications, medical certifications of all personnel.
- The *Service Manager* will verify that the work performed as per Assessment is in fact a true reflection of work performed. Support documentation will be required from the *Contractor*.
- All PPE to be provided by *Contractor* and must be SABS approved and for any weather / working conditions.
- Good housekeeping at all times. The *Contracto*r must clean and remove all debris after completing a task.
- When entering the site after hours and if the person is without an *Employers* identification card at the entrance register must be filled in at the Main entrances gates.
- All services must be done according to the *Employers* standards and procedures.
- All work to be done must be done under a permit to work that will be provided by the *Employer*.

- *Contractor* supervisors should be trained and authorized in Plant Safety Regulations within 6 months of contract award or as soon as the *Employer* can arrange the training.
- The *Employers* Live saving rules to be adhered to at all times.
- All activities on plant must be preceded by a plant risk assessment – Risk assessment as per The *Employers* standard, to be current at all times (Live Document).
- Daily time sheet must be kept up to date, reflecting all work performed on daily basis.
- Safety (Zero harm policy).
- The *Contractor* must at all times comply with the Construction regulations.
- All work to be done under the Construction Regulations.
- When changing personnel induction must be done.
- Only required specified approved amount of personnel to be allowed on site, pre-arrange with *Service Manager.*
- Letter of good standing must be valid at all times.
- Will comply with *Employer*s Quality Standards.
- *Contractor's* site to comply with *Employers* regulations and standards in terms of SHEQ and will be inspected by the *Employer.*
- *Contractor* to provide all necessary tools, equipment and test equipment to perform work According to the scope of work.
- The *Employer*'s condition of service to be adhered to.
- The *Contractor* is responsible for the site establishment and the maintenance thereof
- The *Contractor* is responsible for site de-establishment
- The *Contracto*r is responsible for repairing any breakdowns on its machinery
- The *Contractor* is responsible for submission of health and safety file prior to commencing of work
- The *Contractor* is responsible for the maintaining of the *Contractor* health and safety file
- The *Contractor* is responsible for the induction of his/her staff and personnel
- The *Contractor* is responsible for the accommodation and transportation of personnel, tools and equipment
- The *Contractor* is responsible for the provision of standby lifesaving equipment
- When making use of fixed ladders / Scaffolding all safety requirements to be adhere to.
- All the *Employer's* required training will be provided by the *Employer*
- *Contracto*r to provide its own fire extinguishers for his site office.
- Contract change management:
  - Where the *Contractor* does Name Changes, Mergers, Acquisitions, and Cessions the *Employer's* procedure must be followed. (Eskom Procurement and Supply Management Procedure)
  - In a case where one *Contractor* takes over from another *Contractor,* the Site *Service Manager* must be notified in writing immediately.
  - The *Contractor* does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the *Employer*.

1.3 Interpretation and terminology

The following abbreviations are used in this Service Information:

Abbreviation	**Meaning given to the abbreviation**
B-BBEE	Broad Based Black Economic Empowerment
C&I	Control and Instrumentation
CIDB	Construction Industry Development Board
COC	Certificate of Compliance

CPA	Cost Price Adjustment
EMD	Electrical Maintenance Department
H V	High Voltage (1000V and above)
ISO	International Organization for Standardization
L V	Low Voltage (< 1000 V)
LAR	Local Access Register
NCR	None Conformance Report
OHSACT	Occupational Health and Safety Act
ORHVS	Operating Regulations for High Voltage Systems
PIR	Performance Improvement Report
PPE	Personal Protective Equipment
PPPFA	Preferential Procurement Policy Framework Act
PSR	Plant Safety Regulations
QCP	Quality Control Plan
QMS	Quality Management Systems
RP	Responsible Person
SABS	South African Bureau of Standards
SACPCMP	South African Council for the Project and Construction Management Professions
SAMTRAC	Safety Management Training Course
SAP	System Application Product
SOW	Scope of work
YTD	Year to date
BFPT	Boiler Feed Pump Turbine

2 Management strategy and start up.

2.1 The *Contractor*'s plan for the *service*

- To be discussed before each task can be carried out between the *Contractor* and *Employer*
- Programme to be supplied on request on a signed hard copy as well as a soft copy, see Scope of Work
- The *Contractor* can start work after the Purchase Order and Task Order has been issued, unless given Instruction by the *Service Manager*

2.2 Management meetings

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

Title and purpose	Approximate time & interval	Location	Attendance by:
Risk register and compensation events	TBC	TBA	TBC
Overall contract progress and feedback	TBC	TBA	*Employer and Contractor*

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

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

- Attendance of meetings as required by *Service Manager* Such as
  - Tutuka Power Station *Contractor*s Safety Meeting (monthly) if on site
  - Departmental Safety Meetings (monthly) if on site
  - Section daily meetings if on site
  - Any meeting requested by the *Employer* or *Contractor*
  - All Assessment meetings
  - Meeting Minutes must be kept
  - Attendance register to be signed by all and kept in *Employer* File

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

HP cleaning main condenser shall be done on a 24 hours basis meaning day and night shift teams will be required for this service (two shifts)

Staff required to perform the activities within the main condenser high pressure water jetting is as follow:

- 8 x HPWJ operators per shift
- 2 x Assistants per shift
- 1 x Technician per shift
- 1 x Supervisor per shift

Staff required to perform the activities within the BFPT condenser high pressure water jetting is as follow:

- 2 x HPWJ operators
- 2 x Assistants
- 1 x Supervisor

Staff required to perform the activities within the Main condenser chemical cleaning is as follow:

- 1 X Quality Inspector
- 2 x Assistants
- 1 x Supervisor
- 2 x Machine operators

In addition to this, at least one coating (Paint) applicator will be required where coating repairs are necessary.

Qualifications (Note – the below mentioned will change from time to time based on the skills required per contract)

Minimum qualifications requirements of people employed by the *Contractor* are as follows:

- HPWJ and Machine operators, trained and certified – provide proof and CV
- Assistants (at least have passed grade 10, provide qualifications and CV)
- Technician (trade test and capable of performing maintenance and service of high pressure water jet machines – provide proof and CV)
- Supervisor (trained and certified to operate HPWJ machines and 3 years relevant supervisory experience – provide proof and CV)
- (Paint) applicator shall be qualified and certified by the SAQCC(corrosion protection) – general heavy duty coatings applicator (PA 1)
- Quality Inspector – To have an Diploma in Quality Control (Should be SAIW qualification) level 1 and 2 is an advantage , and provide proof of relevant 5 years minimum experience and CV

2.4 Provision of bonds and guarantees

- Not Applicable

2.5 Documentation control

- Each instruction, certificate, submission, proposal, record, acceptance, notification, reply and other communication which this contract requires is communicated in a form which can be read, copied and recorded.
- Writing is in the Language of this contract.
- All reports to be discussed, compiled and handed in to the *Employer's* Supervisor and *Service Manager* (to be announced by the *Employer*)
- All communications must be printed and filed in the *Service Managers* file

2.6 Invoicing and payment

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

The *Contractor* shall address the tax invoice to

- Name and address of the *Contractor* and the *Service Manager;*
- The contract number and title;
- *Contractor*'s VAT registration number;
- The *Employer*'s VAT registration number 4740101508;

- Description of service provided for each item invoiced based on the Price List;
- Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT;
- Purchase order number
- CPA calculation sheet
- CPA calculation sheet and the Invoice for CPA (with the GL Account Number and the Cost Center on the Invoice) to be send to the financial department as per the *Employer* Invoicing procedure / instruction
  Invoices and a Copy of the Assessment with a Service Entry number to be send to the financial Department as per the *Employer's* Invoicing procedure / instruction

2.7 Contract change management

- Changing the service information
- Access
- Provision by the *Employers*
- Stopping work
- Work of the *Employer* or others
- Reply to communication
- Changing a decision
- Withholding acceptance
- Delayed tests or inspections
- Change of affected property
- Materials, facilities etc. for tests
- *Employer's* risks
- Assumption about compensation events
- *Employer's* breach of contract

2.8 Records of Defined Cost to be kept by the *Contractor*

- Not Applicable

2.9 Insurance provided by the *Employer*

- Refer to Z clause on this contract.

2.10 Training workshops and technology transfer

- PSR training and Authorisation for Supervisor and then every two years reauthorisation
- All necessary Safety courses needed or required.
- All training required by the *Employer* will be on the *Employer's* account
- All *Contractor* supervisors to be authorized in terms of Plant Safety Regulations (PSR) for a Authorized supervisor within 6 months or on availability of the course after the contract has been awarded.
- All *Contractor* personnel to do Induction Training before entering site and commencing with work
- All *Contractor* employees must be trained to work in confined spaces.
- All *Contractor* employees must be trained in Hazard identification and Risk assessment

2.11 Design and supply of Equipment

- *Contractor* to provide all tools and equipment necessary to perform the required service and tools / equipment to be in good and safe condition to work with.
- All equipment and tools needs to be marked and a list off all tools with the identification number to be provided to the *Service Manager* when entering site.
- All lost equipment and tools to be declared to the *Service Manager* and full details of incident.

2.12 Things provided at the end of the *service period* for the *Employer*'s use

2.12.1 Equipment

As per clause 70.2

- returns to the *Employer*, equipment and surplus Plant and Materials provided or purchased by the *Employer*

2.12.2 Information and other things

- All Reports / Documents to be compiled, filed, discussed and handed over to the *Employe*r on an as and when required "basis" and at the end of the service.
- On Completion of contract the *Contractors* safety file will be hand over to the Service Manager and will be saved for 40 Years after completion / termination of the contract
- *Contractor* is Responsible to ensure that his Letter of Good standing is valid at all times as stipulated in the construction regulations point 7 (C) (iv) and she specifications 2.5.2 (iv) and 3.10 *Contractor* will not be allowed on site if his letter of good standing is not valid
- As per clause 70.2 to provides other things as stated in the Service Information

2.13 Management of work done by Task Order

- A Task Order is the instruction to commence work
- No work shall commence until Task order is issued and a Purchase Order number has been finalised and accepted and signed by both the *Employer* and *Contractor*
- Completion certificate to be issued after task on each Task Order is completed and Assessment certificate to be completed
- Task orders, Assessments with all supporting documentation and Completion Certificates will be used for work required
- All work will be issued via SAP Maintenance or as per Task order system

3 Health and safety, the environment and quality assurance

3.1 Health and safety risk management

The *Contractor* shall comply with the health and safety requirements contained in Annexure SHE Specification 14RISK SRM – 084 to this Service Information.

- All The *Employers* health and safety procedures and regulations to be adhered to by the *Contractor*
- A SHEQ file to be handed in at the SHEQ department for approval prior to wok commencement and kept up to date for the duration of the contract

SHEQ Policy

Eskom SHEQ Policy

The *Employe*r has made a commitment to conduct business with respect and care for people, the environment and assets and that no operating condition or urgency of service justifies exposing anyone to negative risks arising from the *Employer's* business.

Compliance with the *Employer's* SHEQ Policy and applicable regulations is the responsibility of every employee and *Contractor.*

***Contractor* SHEQ Policy**

All *Contractors* shall have an OHS policy signed by the CEO of the *Contractor* and prominently displayed where employees normally report for duty.

Signed copy of the OHS policy shall form part of the SHEQ file.

SHE PLAN REQUIREMENTS:-

- Principal *Contractors* shall develop a suitable and sufficiently documented site specific SHE plans, based on the scope of work and client SHEQ specification.
- The SHE plan must be pre-approved by the client for implementation. The principal *Contractor*/*Contractor* has a responsibility to send the SHE plan to the client for approval prior to commencement of work.
- The SHE plan must be applied from the commencement of and for the duration the construction work, which must be updated / reviewed as the work progresses / changes.

When a principal *Contractor* intends appointing *Contractor*, the principal *Contractor* shall ensure that the *Contractor* provides and demonstrate a suitable, sufficiently documented and coherent site specific health and safety plan, based on the client's SHEQ specifications and scope of work

3.1.1 Health and Safety Arrangements

The *Contractor* ensures that all his personnel attend a Health and Safety Induction Course prior to contract starting date, and annual re- induction. The Induction Course is presented by the *Employer's* Safety Risk Department at Tutuka Power Station. Arrangements are made with Safety Risk Management, by the *Contractor.*

The *Employer's* Safety Risk Manager visits and inspects the *Contractor's* workplace or site yard and the working areas to ensure that tools; machinery and Equipment comply with the minimum safety requirements.

The *Service Manager* may instruct the *Contractor* to stop work, where the *Contractor's* personnel fail to conform to safety standards or contravene health and safety regulations. Such stop-work order is not a compensation event. The *Service Manager* may instruct the *Contractor* to discipline his employees and to submit a disciplinary action report to the *Service Manager*. The *Contractor* implements additional health and safety precautions where necessary.

Health and safety

The *Contractor* complies with the Occupational Health and Safety Act 85 of 1993, as well as per the *Employer's* procedure as stipulated below:

- SHEQ Policy 32-727
- The *Employer's* Procurement and Supply Chain Management Procedure 32-1034
- SHE Requirements for the *Employer's* Commercial Process 32-726
- *Contractor* Health and Safety Requirements 32-136
- Integrated SHE Organization; Roles and Responsibilities and Statutory Appointments 32- 296
- Live-saving Rules 240-62196227
- Working at Heights 32-418
- The *Employer's* Vehicle Safety Specifications 32-345
- Tutuka *Contracto*r SHEQ Specifications 14RISK SRM - 084

Site Regulations and Procedures

Site Regulations

The latest revision Tutuka Power Station Site Regulations form part of this contract.
Copies of these procedures are available on request.
(Any additional site regulations implemented will be applicable)
Safety risk management

"Standard for health and safety at Tutaka Power Station - requirements to be met by *Contractors".*

Vehicle and driver safety

All drivers, passengers and pedestrians must obey vehicle safety requirements in terms of the National Road Traffic Act, Act No 93 of 1996, as amended, including other relevant provincial or local requirements.

Speed Limit

All vehicles must be driven with due consideration for personnel and property. All speed limits will be adhered to on the premises at all times.

Transportation of passengers: open LDV's:

With effect from 31 May 2006 no *Employer* employee or *Contractor* would be allowed to transport passengers on the back of open light delivery vehicles (LDV's). It is a legal requirement to provide safe transportation of the *Employe*r and *Contractor* employees – therefore the following will be enforced:

The *Employer's* Life Saving Rules:

Five Life Saving Rules have been developed that will apply to all the *Employer's* employees, *agents*, *Consultants* and *Contractors*.

- Rule 1: Open, Isolate, Test, Earth, Bond, and/or Insulate before touch - that is any plant operating above 1 000 V.
- Rule 2: Hook up at heights - no person may work at height where there is a risk of falling.
- Rule 3: Buckle up – no person may drive any vehicle for the *Employer's* business and/or on the *Employer's* premises: unless the driver and all passengers are wearing seat belts.

  The *Employer* takes a "ZERO TOLERANCE" attitude to drivers and passengers who do not wear safety belts when driving in a vehicle for the *Employer's* Business and / or on the *Employer's* premises. The violation of this very important safety rule as well as any safety rule while performing work for or on behalf of the *Empl*oyer may result in the *Employer* terminating your obligation to perform work in terms of your contract with the *Employer.*

  All occupants must wear their safety belts properly, and must never put the shoulder belt under their arm or behind their backs. Drivers and all passengers must buckle-up at all times for the sake of themselves and their families.

- Rule 4: Be sober (no person is allowed to work under the influence of drugs and Alcohol.
- Rule 5: Use a permit to work – where an authorization limitations exists, no person shall work without the required permit to work.

The *Contractor* acknowledges that it is fully aware of the requirements of all the above and undertakes to employ only people who have been duly authorised in terms thereof and who have received sufficient safety training to ensure that they can comply therewith.

The *Contractor* undertakes not to do, or not to allow anything to be done which will contravene any of the provisions of the Act, Regulations or Safety and Operating Procedures.

The *Contractor* shall appoint a person who will liaise with the *Employers* Safety Officer responsible for the premises relevant to this contract.

Do safety audits at the *Contractor's* premises, its work-places and on its employees;

Refuse any employee, sub-Contractor or agent of the *Contractor* access to its premises if such person has been found to commit any unlawful act or any unsafe working practice or is found to be not authorised or qualifies in terms of the OHSACT;

Issue the *Contractor* with a work stop order or a compliance order should *Employer* become aware of any unsafe working procedures or conditions or any non-compliance with the Act, Regulations and Procedures by the *Contractor* or any of its employees, sub-Contractors or agents.

The *Contractors* Health and safety file is to be submitted for approval to the *Employer*s Safety Officer before contract commencement.

All work stoppages called by the *Employer* to be adhered to

Contractor is Responsible to ensure that his Letter of Good standing is valid at all times as stipulated in the construction regulations point 7 (C) (iv) and she specifications 2.5.2 (iv) and 3.10*Contractor* will not be allowed on site if his letter of good standing is not valid

3.1.2 First aid and fire fighting

Adequate first aid and fire fighting equipment to be provided by the *Employer*
All *Contractor* personnel must have First aid and firefighting training
Fire extinguishers to be provided by the *Contractor*

3.1.3 Fire Precautions

Any tampering with the *Employer's* fire equipment is strictly forbidden.

All exit doors, fire escape routes, walkways, stairways, stair landings and access to electrical distribution boards is kept free of obstruction, and are not used for work or storage at any time. Fire fighting equipment must remain accessible at all times.
The *Contractor* takes the necessary action to safe guard the area to prevent injury and the spreading of the fire.

3.1.4 Security, fire protection and safety

The *Contractor* shall be responsible for ensuring the security of the works, and of his plant, equipment and materials. To that end he shall make adequate provision for access control, lighting and watchman to the works where required.

3.1.5. Fire protection

The provision of the *Employer's* standard NWS 1494 "Fire Prevention and Protection of *Contractor's* premises at New Works sites" shall be applicable.

3.1.6 Safety and incident prevention

The *Contractor* shall implement and maintain an active Site Safety and Accident Prevention Programme in accordance with the Tutuka SHEQ Specifications. The overriding regulations will however be the Occupational Health and Safety Act.

- Incident Management, Corrective & Prevention Action Procedure to be adhered to – 14Risk IM PC-019

3.1.7 Reporting of accidents

The *Employer* follows an accident prevention policy that includes the investigation of all accidents involving personnel and property. This is done with the intention of introducing control measures to prevent a recurrence of the same incidents. The *Contractor* is expected to fully co-operate to achieve this objective. The *Service Manager* must be informed immediately of any incidents. A written report to be submitted to the *Employer within 24 Hours* of incidents and any damage to property or equipment

NOTE! This report does not relieve the *Contractor* of his legal obligations to report certain incidents to the Department of Labour, or to keep records in terms of the Occupational Health and Safety Act, and Compensation for Occupational Injuries and Diseases Act.

3.1.8 Occupational Health and Safety Act 85 0f 1993 – SECTION 37

In accordance with Section 37 (2) of the Act, the *Contractor* is appointed by the *Employer* as mandatory to assume Health and Safety duties and responsibilities. The *Contractor* ensures compliance with all requirements of the Act and any instruction or notification that enhances those requirements.

The *Contractor* acknowledges that he is fully aware of all the requirements of the Occupational Health and Safety Act and undertakes to employ only staff who have been duly authorised in terms thereof and who receive sufficient safety training to ensure that they can comply therewith.

The *Contractor* undertakes not to do, and not to allow anything to be done which will contravene any of the provisions of the Act, Regulations or Safety and Operating Procedures.

3.1.9 The *Contractor* appoints a person who liaises with the *Employer's* Safety Officer, responsible for the premises relevant to the Contract. The person appointed shall on request:

- Supply the *Employer's* Safety Officer with copies of minutes of all Health and Safety Committee meetings, whenever required.
- Supply the *Employer's* Safety Officer with copies of all appointments in respect of employees employed on this contract, in terms of the Act and Regulations and shall notify the *Employer's* Safety Officer of any changes there to.

The *Employer* may, at any stage during the duration of this contract:

- perform safety audits at the *Contractor's* premises, its work place and its employees;
- refuse any employee, *Subcontractor* or agent of the *Contractor* access to its premises if such person is found to commit any unsafe act or any unsafe working practice or is found not to be duly authorised nor qualified in terms of the Act;
- Issue the *Contractor* with an instruction to stop work should the *Employer* become aware of any unsafe working procedure or condition or any non - compliance with the Act, Regulations and Procedures referred to in the Occupational Health and Safety Act - 85 of 1993 and all Regulations made hereunder as well as all the *Employer's* Safety and Operating Procedures. Any such instruction is not a compensation event. Furthermore, no amendments to the act or the Regulations or reasonable amendment to the *Employer's* Safety and Operating Procedures will entitle the *Contractor* to claim any additional costs or time incurred in complying therewith, from the *Employer*

3.1.10 Safety Regulations of the *Employer*

The *Contractor* conforms to the *Employer's* Plant Safety Regulations
The *Employer* makes available to the *Contractor*, on request, a copy of the latest revision of the Plant Safety Regulations.

3.2 Environmental constraints and management

The *Contractor* shall comply with the environmental criteria and constraints stated in the following:-

All waste from the project must be disposed in a sound environmental manner in accordance with Tutuka Power Station Waste Management Procedure 14 Risk ENV-013. Oil spillages must be contained and cleaned as per Oil Spill Management procedure 15 ENPRENV-001. The project must conform to the *Employer's* Environmental Legal and other Requirements procedure 14 Risk ENV-012 and the project must conform to Tutuka Power Station ISO14001 Standard with reference to Tutuka Power Station's Environmental Management System Manual 14 Risk ENV-010. All environmental incidents must be dealt

with as per the Station's Incident Management, Corrective and Preventative Procedure 14 Risk PC-001 and all environmental incidents must be reported to the Environmental Department on site with Telephone Number 017-7495536/9231.

3.3 Quality assurance requirements

The *Contractor* shall be required to demonstrate by means of a Quality Plan that this organisation is so structured that all the requirements of the specification will be properly monitored and controlled. The Quality Plan and Control procedures are to be carried out in accordance with QM 58.The Quality Control document is to be submitted for approval to Tutuka within three (3) days after order placement by the *Contractor*.

No work may commence unless the Quality Control document has been approved in writing and a copy submitted to *the Service Manager*. *The Contractor*, in conjunction with Tutuka Engineering must sign off all Quality Control documents after completing all work on site. *The Contractor* to submit a copy of the final signed off document to *the Service Manager* within 1 week after Completion of each activity or task

- QCP and contract quality plan standards as per QM 58 to be adhered to
- The *Contractor* must provide Quality Control Plan documents for approval by *Employer's Service Manager* performing any activity.

4 Procurement

4.1 People

4.1.1 Minimum requirements of people employed

The *Contractor* must submit Curriculum Vitae's, certified copies of qualifications and/or certificates of its qualified staff prior to work commencing on site

- All relevant personnel names and titles must be specified to the *service manager*
- All new staff to do induction training
- All new staff to be approved by *Service Manager* before entering the site or commencing work
- All new staff must hand in all qualifications and relevant documentation to the *Service Manager*
- When changing personnel a new access to work form to be completed by the *Contractor*
- Only required specified approved amount of personnel to be allowed on site, pre-arranged with *Service Manager*
- All replacements of staff will be in the same discipline (eg. an artisan to be replaced with an artisan with proof of qualifications

4.1.2 BBBEE and preferencing scheme

- As per Clause Z3 within contract data

4.1.3 Procurement Requirements:

SUPPLIERS DEVELOPMENT, LOCALISATION AND INDUSTRIALISATION

Section 1: Pre-qualification Criteria for Preferential Procurement

SDL&I will apply the following pre-qualification criteria as envisaged in PPPFA 2017 regulation 4

	YES	NO
a) Minimum BBBEE status level of contributor?	☑	☐
If *Yes,* what is the BBBEE status and/or level required	Level 1-2	

	YES	NO
b) Is there BBBEE category targeted for this enquiry?	☐	☑
If *Yes,* BBBEE category		

Tender Returnable if the above elements are requirements;

- An original or certified copy of sworn affidavit in the case of EME's must be submitted (affidavit must be completed fully), or
- An original or certified copy of B-BBEE Certificate issued by CIPC for EME's. OR
- An original or certified copy of the B-BBEE certificate / sworn affidavit in the case of QSE's must be submitted, or
- An original or certified copy of the B-BBEE certificate issued by SANAS Accredited Verification Agency must for LME's must be submitted, or
- For JV's only an original or certified copy B-BBEE Certificate issued by a SANAS Accredited Verification Agency will be accepted.

	YES	NO
c) Minimum subcontracting requirement for this?	☑	☐
If *Yes,* what is the minimum percentage?	**30%**	

Tender Returnable if the above element is a requirement;

- Proof of a sub-contract agreement/s must be submitted.
- Sub-contractor/s B-BBEE certificate / sworn affidavit must be submitted.
- Sub-contracting agreements can only be concluded with one or more of the following entities;
- an EME or QSE which is at least 51% owned by black people;
- an EME or QSE which is at least 51% owned by black people who are youth;
- an EME or QSE which is at least 51% owned by black people who are women;
- an EME or QSE which is at least 51% owned by black people with disabilities;
- an EME or QSE which is 51% owned by black people living in rural or underdeveloped area or townships;
- a cooperative which is at least 51% owned by black people;
- a EME or QSE which is at least 51% owned by black people who are military veterans

Section 2: Mandatory Requirements

2.1 Designated Sectors

When applicable the following stipulated minimum threshold for Local Production and Content must be achieved in full by the tenderer

	YES	NO
a) Is this Commodity or part of it a Designated Sector?	☐	☑

Please indicate below Designated Components

Commodity	Components	Local Content Threshold
PPE		100%

NOTE 1:

Mandatory Returnables: Condition of contract award

- (F1) - SBD 6.2 Declaration Form
- (F2) - Annexure C (Local Content Declaration-Summary Schedule

Non Mandatory Returnables:

- (F3) - Annexure D-Imported Content Declaration – Supporting Schedule to Annexure C
- (F4) - Annexure E-Local Content Declaration- Supporting Schedule to Annexure C.

2.2 CIDB Skills Development

Continuation of Mandatory Requirements

	YES	NO
a) Is there CIDB compulsory training?	☐	☑
If *Yes,* what is the% of the Construction Skills Development Goal % (CSDG)		

If the answer above is Yes, it will then be mandatory for the supplier to match Eskom's targets

Criteria	Eskom Target	Tenderer Commitment
CSDG Percentage	N/A	N/A
Description	CIDB Skills	N/A

Note 3: Failure by the Contractor/Service Provider/Supplier to meet the CIDB CSDG mandatory % will render their tender non-responsive.

Section 3: SDL&I Undertaking

Tenderers who complete and submit the undertaking as required, but who do not meet Eskom's targets, will not be disqualified. SDL&I undertakings do not form part of scoring but commitments will form part of contractual obligations

B-BBEE Requirements

Tenderers will be required to maintain or improve their B-BBEE Recognition Level for the duration of the contract.

Local Procurement Content

Local Procurement Content" refers to value added in South Africa by South African resources. Where a single contract involves a combination of local and imported goods and/or services, the tender response must be separated into its components as per the Price Schedule included with the tender documents. Local procurement content is total spend minus the imported component.

Local Procurement Content	**Eskom Target**	**Tenderer Proposal**
	100%	

Job Opportunities

Tenderer to indicate number of Jobs to be created and/or retained from this contract;

Number of Jobs to be created	**Number of Jobs to be retained**

Skills Development

Tenderers are required to propose against the following training initiatives:

Category	**Eskom Target**	**Tenderer Proposal**
Supervisor	1	
Safety Officer	**1**	

Enterprise Development (ED)

The tenderer shall submit an Enterprise Development plan that seeks to provide assistance or acceleration of Black Enterprises leading to growth and sustainability of their businesses. A detailed ED plan that shows impact to the beneficiary should be submitted to the employer for approval prior to contract award. ED implementation plan should include

- Clear objective;
- Priority interventions
- Key performance indicators; and
- A concise implementation plan with clearly articulated milestones

Preference shall be given to Local to site EME level 1 companies. The successful tenderer is required to identify and incubate an SME from the designated groups in the Gert Sibande District.

Tenderers to submit a letter of intent to do Enterprise Development as part of tender submission.

The ED agreement must be entered into with the beneficiary and sent to Eskom for review and acceptance. The accepted ED programme will be monitored throughout the duration of the contract.

Note:
Sub-contractor may be the Supplier Development beneficiary of the Contractor.

Section 4: SDL&I Penalty

- Eskom will apply a penalty of 2.5% of the Contract Value for failure to meet SDL&I obligations.
- For the duration of the contract, Eskom will retain 2.5% of every invoice (excluding VAT) as security for the fulfilment of all SDL&I Obligations. The retained amounts shall only be released to the Contractor upon fulfilment of all SDL&I obligations at the end of the contract.
- Alternatively the Contractor shall submit a bond equivalent to 2.5% of the Contract Value and shall only be released to the Contractor upon fulfilment of all SDL&I Obligations

Section 5: Reporting and Monitoring

- The suppliers shall on a monthly/quarterly basis submit a report to Eskom in accordance with Data Collection Template on their compliance with the SDL&I obligations described above.
- Eskom shall review the SDL&I reports submitted by the suppliers within 60 (sixty) days of receipt of the reports and notify the suppliers in writing if their SDL&I obligations have not been met.
- Upon notification by Eskom that the suppliers have not met their SDL&I obligations, the suppliers shall be required to implement corrective measures to meet those SDL&I obligations before the commencement of the following report, failing which Retention clauses shall be invoked.
- Every contract shall be accompanied by the SDL&I Implementation Schedule which must be completed by the suppliers and returned to SDL&I representative for acceptance 28 days after contract award. This will be used as a reference document for monitoring, measuring and reporting on the supplier's progress in delivering on their stated SDL&I commitments

Section 7: General Information on Validity of Sworn Affidavits

The following must be considered when it comes to validity of Affidavits;

Tenderers submitting B-BBEE Sworn Affidavits must ensure that the affidavits meet the following key pointers to ensure their validity:

- Name/s of deponent as they appear in the identity document and the identity number.
- Designation of the deponent as the **director**, **owner** or **member** must be indicated in order to know that person is duly authorised to depose of an affidavit. **(Mark the applicable option).**
- Name of enterprise as per enterprise registration documents issued by the CIPC, where applicable, and enterprise business address.
- Percentage of black ownership, black female ownership and designated group. In the case of specialised enterprises as per Statement 004, the percentage of black beneficiaries must be reflected. (**No blank spaces to be left**).
- Indicate total revenue for the year under review and whether it is based on **audited financial statements** or **management account**. **(Mark the applicable option).**
- Financial year end as per the **enterprise's registration documents**, which was used to determine the total revenue. (Financial year end to be stipulated by **day/month/year).**
- B-BBEE Status level. An enterprise can only have one status level. **(Tick applicable level)**
- Empowering supplier status must be indicated. For QSEs, the deponent must select the basis for the empowering supplier status.
- Date deponent signed and date of Commissioner of Oath must be the same. **(The sworn affidavit must be signed in the presence of the Commissioner of Oath. Furthermore the Commissioner must also sign and stamp)**
- Commissioner of Oath cannot be an employee or ex officio of the enterprise because, a person cannot by law, commission a sworn affidavit in which they have an interest.

PPPFA STRATEGY

Indicate the percentage (%) that is allocated to:

Price	**90%**
BBBEE Status	**10%**
Designated commodity **(Yes/No)**	**No**

4.2 Subcontracting

4.2.1 Preferred subcontractors

- If in the event of Sub – Contracting the Sub – contractor must meet all technical requirements

4.2.2 Subcontract documentation, and assessment of subcontract tenders

- Sub – Contractor must submit all tender documents for that specific scope

4.2.3 Limitations on subcontracting

- As per SDL&I requirements.

4.2.4 Attendance on subcontractors

- Not Applicable

4.3 Plant and Materials

4.3.1 Specifications

- The *Contractor* is not allowed to use any materials or spares for private usage or on other Of the *Employer's* sites
- Where applicable:- All plant spares and materials to be inspected (Quality Checked) before installing at plant.
- Risk Assessment to be completed and current
- *Contractor* must be "trained and authorised" with the necessary PPE, equipment, tools, skilled to handle any equipment, spares, tools and materials related to the scope of work

4.3.2 Correction of defects

- All work done under a permit must be done in accordance with the *Employer's* Low Voltage Regulations as stipulated in the hand book on Plant Safety Regulations. This includes the barricading to cordon-off areas where the *Contractor* is working and safety signs indicating that men working overhead when doing maintenance and repairs to load / spreading beams. A copy of the hand book can be given to the *Contractor* on request
- Rework occurs when an Equipment or plant has to be worked on again within a given time frame of 0 to 90 days on the same Plant and by the same Work centre, and it will be on the *Contractor* own cost.
- As per clause 42 in the NEC3 TSC.
- In case of rework caused due to the *Contractor's* negligence, all costs will be on the *Contractor's* account.

4.3.3 *Contractor*'s procurement of Plant and Materials

- The *Contractor* will supply its own consumables, materials and chemicals.

4.3.4 Tests and inspections before delivery

- N/A

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

- N/A

5 Working on the Affected Property

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

- Lifesaving rules and all the *Employers* procedures to be adhered at all times
- Access is limited and controlled by Plant Safety Regulations requirements.

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

5.2 People restrictions, hours of work, conduct and records

- Overtime will be required, but must be approved by the *Service Manager*
- Timesheets to be logged and signed by *Service Manager* at all times
- All overtime worked must comply with the *Employer's* overtime policy.

5.3 Health and safety facilities on the Affected Property

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

First aid centre

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

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

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

5.4 Environmental controls, fauna & flora

Environmental management

- Proper care of the natural environment is important to prevent nuisance and environmental degradation.
- All *Contractors* shall comply with the *Employer's* environmental management procedures and Environmental legislation
- Environmental incidents shall be reported to the *Employer*s Environmental Department as per incident management requirements.

Waste Management

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

certificates on file.

Types and colours of bins used on site:

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

Radiation protection

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

Hazardous Substances

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

Environmental management

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

Handling of waste produced by the *Contractor*

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

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

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

Waste from the cleaning and maintenance of equipment

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

Stockpiling of waste

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

Hazardous waste

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

Pest Control

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

Water Conservation

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

Air Pollution

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

Ground Pollution

- Measures to prevent or control ground contamination shall be put in place e.g. drip trays, bund walls.

- Spill containment, clean-up and ground rehabilitation shall be done as per Tutuka procedures

5.5 Cooperating with and obtaining acceptance of others

Interface with Others

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

Planning

Programmes are submitted in hard and electronic copy. The software package is MS Projects and primavera, Open Plan or equivalent, accepted and signed by both parties .

Progress report

A progress report will be submitted to the *Service Manager* as agreed by both parties. This report should include the following:

- Detailed scope of work breakdown schedule
- Actual verses targeted completion percentages of the scope of work on duration and performance.
- A notice request on any scaffolding requirements or changes one shift prior to the requirement thereof (note the *Employer* will not be held liable for any late requests)

Requirements for Completion.

Completion is when the *contractor* has done all the work, which the Works Information states he is to do by the Completion Date and has corrected notified Defects, which would have prevented the *Employer* from using the works.

The Site is handed back to the *Employer* in a condition acceptable to the *Service Manager*

5.6 Records of *Contractor*'s Equipment

- *Contractor's* equipment (Cell phones with Camera's, Computers, Camera's etc.) to be declared and signed in at security.
- All test equipment must be calibrated and tested regularly and certificates must be handed in to the *Service Manager* for record keeping
- *Contractor* to have in a list of all tools to be used on site and to report and indicate when ever new tools are added and list should be available on *Service Manager* request.
- *Contractor* is accountable for the safe keeping of the tool list.
- *Contractor* to have its own gas monitors that must be approved by the *Employer*
- All equipment and tools needs to be marked and a list off all tools with the identification number to be provided to the *Service Manager* when entering site.
- All lost equipment and tools to be declared during each shift to the *Service Manager* and full details of incident.
- *Contractor* is responsible to safeguard all equipment's and to ensure that all work continues without any delays

5.7 Equipment provided by the *Employer*

- For the purpose of expediting the works, the *Employe*r may make facilities and services available to the *Contractor* as provided at no cost to the *Contractor*. The *Contractor* will not receive any reimbursement or make any change to the beneficial use of the facilities or services.
- The *Employer* may allow the *Contractor*, for the execution of the works, the reasonable use of its workshop, cranes, tools and equipment, provided that the *Employer's* own work and business are not interfered with in any manner by such use. The *Contractor* shall leave all workshops, cranes, tools and equipment in as good a condition as he found them, fair wear and tear excepted, and shall be liable for any damages by the *Employer* as a result of any act of negligence by the *Contractor*, his employees or sub-contractor while using such workshop, cranes, tools and equipment.
- The *Contractor* is responsible for the repair, replacement or correction as necessary of all pieces of tools and equipment supplied by the *Employer* which are damaged and/or lost whilst in the *Contractor's* custody and control.
- The *Contractor* must ensure that any one of his employees or Sub-contractor, operating hoist equipment belonging to the *Employe*r, is authorised by the *Employer*

5.8 Site services and facilities

5.8.1 Provided by the *Employer*

Supply of electricity

The *Employer* supplies 220 & 380 V AC power supply at existing points for the purpose of the works only. All installations or equipment complies with all relevant safety regulations and requirements. Failure to comply with the safety requirements may lead to immediate disconnection. Uninterrupted supply is not guaranteed and is not grounds for compensation events. The *contractor* makes arrangements, at his own expense, to maintain continuity and quality of power supply.

Water

The *Employer* supplies potable water for the purpose of the works, at existing points and in reasonable quantities. Uninterrupted supply is not guaranteed and is not grounds for compensation events.

Compressed air

Compressed air is available for the works and pre- authorization should be obtained.

Lighting

All temporary local lighting, in accordance with the requirements of the Factories Inspector, is provided by the *Contractor* at his own expense. No local lighting is provided by the *Employer.*

5.8.2 Provided by the *Contractor*

- *Contractor* to provide and insure safe transportation services for all his *Contractors* and it must comply to 32-93 and 32-345 procedures
- *Contractor* to provide own (Coffee, sugar, milk, tea etc.)
- All computers/Laptops and printers accessories needed to be provided by the *Contractor.*
- The *Contractor* to provide accommodation and meals for his / her employees and costs for this to be included in the contract price.
- All PPE to be provided by *Contractor*
- Provide SABS approved Safety harnesses as per *Employers* Safety Requirements.
- *Contractor* will provide a method statement to explain how the scope of work will be executed
- *Contractor to* provide own tools and calibrated equipment (including gas monitors) to perform all work according to the scope of work including 220 or 380 VAC extensions, and lead lights, and must insure that all tools and equipment are in good condition and safe to work with.
- Certified copies of ID's and Qualifications to be provided by the *Contractor* on contract award
- *Contractor* to provide own laboratory equipment if needed.

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For the Method Statement the Contractor will:

a) Supply a letter of undertaking that the *Contractor* does have the correct tools and Equipment to perform the activity, *Contracto*r also to provide a list of tools and equipment that is registered on the Company's register.
b) QCP's and Certified Letters to be provided for prove of previous similar activities done, with references of previous activities done

Personal Protective Equipment

The *Contractor* supplies, maintains and ensures that his personnel at all times wear personal protective equipment as required per site.

Housekeeping

The *Contractor's* Equipment does not impair the operation of the plant or access to the plant.

Access permits

All applicable *Contractor* personnel shall be issued with access and vehicle permits (*Contractor* Permit) which will contain the following information:

- Name
- ID Number
- Company
- Validity date

All *Contractor* permits must be submitted to Protective Services when the workers leave the Site after Completion of the works.

The *Contractor* applies to the *Employers* Protective Services for the issuing of permits.
The *Contractor* submits his application at least 24 hours prior to entering the Security area. This application form must be delivered to Protective Services, or can be faxed to (017) 749 9168
The form contains the following information:

- Employee Name.
- Employee ID Number.
- The *Employer's* Safety Co-ordinators signature.
- The *Employer's Service Manager's* signature.
- Copy of the first page of the ID book of every employee of the *Contractor*, photocopied to reduce the size to 65%.

The form is appended to the *Contractor's* Safety Manual, referred to in Section 2.3.2 (b).

The *Contractor's* visitors and personnel shall conform to the security arrangements in force at the Site at all times.

The Chief of Protective Services may, with valid cause, remove any of the *Contractor's* personnel from Site, either temporarily or permanently. He may deny access to the Site to any person whom, in the opinion of the said Chief of Protective Services, constitutes a security risk.

No unauthorized vehicles will be allowed on Site. Contract vehicle application should be directed to the *Service Manager.*

The *Contractor* will be limited to the working areas associated with the works. The *Contractor* is forbidden to enter any other areas, and must ensure that his employees abide by these regulations.

Parking inside the Power Station is allowed. The parking application must be addressed to the protective services. All *Contractor*s will supply protective services with their vehicles registration numbers.

No recruiting of casual labour may be done on the *Employer's* premises, including the area outside the power station security gate.

The *Contractor* obtains the access procedures, from *the Service Manager*, which may change depending on the prevailing security situation.

Temporary cabling

The *Contractor* will be provided with all temporary wiring and cabling to lead power from the point of supply to the various points where it is required. *Contractor* should ensure that all cables are properly barricaded as per OHS ACT requirements The *Contractor* maintains and removes it on Completion.

5.9 Control of noise, dust, water and waste

- All necessary and relevant PPE must be used at all time when entering or working on plant
- Risk assessments must be completed before commencing with any task to be current at all times (Live Document)
- All relevant procedures to be used at all times.

5.10 Hook ups to existing works

- The *Employer* reserves the right to have any of the *Contractor's* personnel removed off site without cancelling the contract if, in the *Employer's* opinion, it is warranted.
- The *Employe*r reserves the right to request disciplinary / corrective action if, and when, required.
- The main *Contractor* is accountable for the management of their sub-contractors and suppliers and to ensure that the applicable legal and the *Employer's* requirements (applicable during contract execution) are complied with by the sub-contractors and suppliers (all tiers). If there are non-

conformances / non-compliance to applicable legal and the *Employer's* requirements identified, then the Main Service Provider/Principle *Contractor* will be penalised.

- The *Contractor* shall operate under the direction and instructions of the *Employer's* Manager or such person/people as may be appointed by him if not in conflict with the Occupational Health and Safety Act and the Generation Plant and Safety Regulations.
- *The Contractor shall maintain a high standard of workmanship expected by the Employer and shall comply with any quality assurance and quality procedures implemented by the Employer.*
- The *Employer* reserves the right to have any of the *Contractor's* personnel removed off site without any compensation to the *Contractor* in the event of the *Contractor's* personnel being in contravention with the OHS Act or any of the *Employers* rules , regulations and procedures
- The *Employer* reserves the right to terminate the contract, once **3 non-conformances / PIR'S** are raised against the *Contractor* after the correct NEC procedures were followed
- The *Employer* reserves the right to request disciplinary/corrective action if, and when, required.
- The *Contractor* must submit Curriculum Vitae's of its entire staff prior to work commencing on site.
- The *Contractor* must submit certified copies of qualifications and or certificates of its entire staff prior to work commencing on site.
- All *Contractor* supervisors) must be authorised in Plant Safety Regulations as per legislative requirements and the period within which this requirement must be fully met, will be finalised and confirmed within six months on contract award.
- The *Contractor* will be responsible for the full payment of the legislative training costs for every employee at the *Contractor's* cost, in the event that the employee have to redo the training due to failing at the first attempt as well as the subsequent attempts that follows until the employee is authorised.
- All unknown / known services will be brought to the attention of the *Contractor* by *Service Manager*. Should the *Contractor* encounter any other services in the work area, he will immediately bring them to the attention of the *Service Manager* who will issue instructions as to what actions are to be taken.
- No welding will be allowed on site.
- The *Employer* carries no responsibility for unforeseen delays unless such a delay is negotiated within 24 hours of the occurrence and written agreement is submitted by the *Employer.*
- Care must be taken to prevent damage to any surroundings such as the plant, roads and equipment in and around existing buildings.
- The *Contractor* and his employees will be required to conduct themselves at all times in proper and orderly manner while on the *Employer's* premises.
- The *Contractor* and his employees may only smoke in the allowed / designated areas.
- The *Employer* will take immediate steps to institute criminal investigations in the event of any suspected criminal acts e.g. theft etc.

5.10.2 Qualifications (Note – the below mentioned will change from time to time based on the skills required per contract)

Minimum qualifications requirements of people employed by the *Contractor* are as follows:

- HPWJ and Machine operators, trained and certified – provide proof and CV
- Assistants (at least have passed grade 10, provide qualifications and CV)
- Technician (trade test and capable of performing maintenance and service of high pressure water jet machines – provide proof and CV)
- Supervisor (trained and certified to operate HPWJ machines and 3 years relevant supervisory experience – provide proof and CV)
- Paint applicator shall be qualified and certified by the SAQCC(corrosion protection) – general heavy duty coatings applicator (PA 1)
- Quality Inspector – To have an Diploma in Quality Control (Should be SAIW qualification) level 1 and 2 is an advantage , and provide proof of relevant 5 years minimum experience and CV

5.10.3 Training

a) The *Employer* will provide Plant Safety Regulations (PSR) training necessary for the *Contractor* in order to carry out the works within first course availability after the contract has been awarded.
b) The *Employer* will provide any training deemed necessary by the *Service Manager* for the *Contractor* to perform the service. The *Contractor* shall be obliged to carry out the service for which the training was provided.

5.11 Tests and inspections

5.11.1 Description of tests and inspections

- Scaling assessment by the use of Endoscope before and after washing
- Weber Reilly soluble salt test after bristle blasting has occurred (the minimum salt requirements must meet the specification of the chosen corrosion protection product.

5.11.2 Materials facilities and samples for tests and inspections

- N/A

6 List of drawings

6.1 Drawings issued by the *Employer*

- Tube map will be available from Engineering

1. Appendix A

X17 LOW SERVICE DAMAGES				
ITEM	**DESRICPTION OF TASK**	**QUALITY OF PERFORMANCE**	**REASON FOR DAMAGES**	**DAMAGES TO BE IMPLEMENTED**
Response time	Report to site within 24 hours of callout	Late arrival	Production loss Plant unavailability	5% of Assessment value
Quality of work	Cleaning of condenser tubes	Tubes not cleaned thoroughly and/or areas missed and left out	Poor plant performance after HP cleaning	20% of Assessment value
Scope related required equipment	Equipment availability	Unavailability of equipment	Delay of progress	10% of Assessment value
Plant Damage	Cleaning of condenser	Damage to plant Equipment or components	Negligence	Cost of Repairs
Condenser Cleaner	Condenser Cleaner	Delayed	Delaying to complete work in time	5% of Assessment value

Appendix B

KPI						
Percentage Allocation	**Description**	**Definition and measurement method**	**Source of information**	**Unit of measure**	**Performance range (Floor to Ceiling)**	**Individual weight**
Service provider	Safety Sustainability	Combined LTIR for Employees and Contractors. If Fatality > 0 LTIR Score revert to zero = Floor. If fatality = 0 LTIR Score is calculated based on performance range based on set targets	Shareholder Compact(contractor Safety Rep & Eskom Safety)	Percentage		
	Condenser Performance after cleaning	Kick in = , Base = , Target = , Stretch = , Ceiling = (Engineering to assist with yardsticks)	PGM	MW hours/Time/		
	Non Confirmance Report	No of NCR's (0=100%,3 or less is 50%, 3 or above is 0%)	Quality Assurance Recording	Percentage		

	Due Date Performance - Mianenance Opportunities & Outage Management	Count the actual number of cleaning completed on time divided total number of cleanings per annum as a % (total number of outages = 12. Total completed on time = 9/12 X100 = 75%) as per assesments on completed work	Cleaning service provider and Eskom Audited DDP data base	Percentage		
	Compliance to Plant Safety Regulation	Supervisor authorized to take Plant permit to work for the team. Candidate successful on PSR exam = 50%, Candidate successful on Examining committee = 100%, Candidates not successful = 0%	EAL training records and/or Exam Results/Authorization Certificate	Percentage		
	Response time on Call outs	within 8 hour=100%, within 24 hours=80%,within 48 hours=0%	Phone Records or Emails.	Percentage		

Appendix C

Risk Register

Description of the risk		Action to avoid or reduce the risk	
Risk event	**Cause & possible outcome**	**Action to be taken and who in terms of the contract is responsible for taking it**	
Insufficient cleaning pressure	Delay completion	Pump to be tested before cleaning	
Stuck cleaning lance nozzle	Insufficient cleaning	Inspect Nozzles before starting a new row.	
High pressure - exceeding stated maximum pressure	Damage the tubes	Pump discharge pressure to be monitored all the time.	
Failure to stop water flow through the nozzle before inserting lance on the new tube	Damage the tubes and the tube sheet	Operator to remove foot on the foot-valve to stop the flow.	
Use of incorrect chemical mixture	Damage the tubes	Test chemical to ensure the its according to specification	
Unavailability of continouse sampling on both waterbox and steam space side	Damage condenser tubes and condenser structutre	sample request to be communicated early to site chemical services	
water Level dropping in the condenser steam space.	Damage to condenser staructure	Continouse monitoring of condenser level on steam space to ensure that level is topped up incase it drops.	