Eskom	Specification	Medupi Power Station

Title: **Medupi Power Station User Requirement Specification for Semi-Bulk and Bulk Chemical Supplier**

Document Identifier:	**240-128556944**
Alternative Reference Number:	**237-0509**
Area of Applicability:	**Medupi Power Station**
Functional Area:	**Chemistry**
Revision:	**3**
Total Pages:	**21**
Next Review Date:	**May 2029**
Disclosure Classification:	**Controlled Disclosure**

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Date: **2024/05/20**	Date: **2024/05/20**	Date: **2024/05/20**	Date: **2024/05/20**

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1. Introduction

For optimum operation of the Water Treatment, Sewage Treatment and Auxiliary Cooling Water Plants in Medupi power Station, there are required chemicals and specifications identified for maximum performance.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to outline the requirements and specifications of the chemicals needed for operation of Medupi Water Treatment, Auxiliary Cooling Water and Sewage Treatment Plants.

2.1.2 Applicability

This document is applicable to all Medupi Chemistry personnel and all relevant contractors.

2.1.3 Effective date

The effective date for the implementation of this URS will be immediately after the last signature.

2.2 Normative/Informative References

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

2.2.1 Normative

None

2.2.2 Informative

[1] Generation Technology User requirement specification guideline, reference no: GPM/0147, rev 1, date 2006-04-04.

2.3 Definitions

Definition	Explanation
Auxiliary Plant	A plant that its function is to supply cooling water mainly for the turbine and boiler plant for fast start-up and to adjust load output fast.
Coagulant	A substance that separates suspended solids from water.
Contractor	Service provider contracted for supplying specific service to Eskom, Medupi Power Station.
pH	Measure of the acidity or basicity of water

2.4 Abbreviations

Abbreviation	Explanation
CIP	Clean in place
COA	Certificate Of Analysis
Coag	Coagulant
$FeCl_3$	Ferric Chloride
Floc	Flogulant
HCl	Hydrochloric acid
ISO	International Standard Organisation
Min	Minimum
MSDS	Material Safety Data Sheet
$Na_2S_2O_5$	Sodium Meta bisulphite
NaOCl	Sodium hypochlorite
NEC	New Engineering contract
PO	Purchase order
RO	Reverse Osmosis
SAP	System application and products
SG	Specific Gravity
STP	Sewage Treatment Plant
TSP	Trisodium phosphate
TTA	Tolyltriazole
UF	Ultra-filtration
WTP	Water Treatment plant

2.5 Roles and Responsibilities

Table 1 outlines the line of responsibility, accountability and relevant stakeholders to be consulted and informed.

Table 1: Line of responsibility and Accountability (RACI)

Responsible	Accountable	Consult	Inform
Snr Technician	Senior Supervisor Tech Snr Technician	Chemistry Manager	SHEQ Advisor
Assurance that all action listed in this procedure are undertaken (follow up, advice, consultation)	Implementation of this procedure, random reviews and audits for adherence, provide assurance that any deviations will be corrected.	Provide support, advice and communication with outside stakeholders where needed	Planning and advice

2.6 Process for Monitoring

The WTP Senior Supervisor Tech is responsible to ensure compliance to this work instruction through the scheduled audits and reviews at least once in 3 years.

2.7 Related/Supporting Documents

[1] Construction Safety 32-136
[2] Life Saving Rules 240-60867265
[3] Driver Safety 32-93
[4] Vehicle Safety 32-345
[5] Incident Management 32-95
[6] Alcohol Policy GGP 1209
[7] Smoke Policy 32-36

3. Document Content

3.1 Requirements

3.1.1 Adherence to Eskom generic policies

All Contractor employees shall comply with Eskom's policies and site regulations, including but not limited to, use of cell phones in restricted areas, adherence to Eskom's Life Saving rules, no smoking policy, zero tolerance on alcohol usage, etc. These requirements will be detailed during the induction training process.

The contractor shall comply with Eskom policies and regulation, including confidentiality agreement.

The contractor shall comply with NEC contract signed.

3.1.2 Quality

The Contractor provides a complete Quality Assurance plan in accordance with the requirements of ISO 9001 2008 to the Employer for approval. This plan must ensure an integrated quality service as part of the contract. Execution of all quality related activities, including inspection and test plans compilation and execution, stores material quality inspections and all quality-related record keeping is part of the Contractor's scope of work.

3.1.3 Scope of work

[1] The supplier shall supply and deliver chemicals timely as per contract within two weeks of completion of procurement process.

[2] For quality control and traceability, the supplier shall supply a chemical together with their MSDS and COA corresponding to the specific batch number of a chemical.

[3] All orders and purchases shall be done on SAP.

[4] The contractor shall only deliver the product to the premises after the PO number has been released.

[5] Delivery of all chemicals shall be as per the employer's request, either at a suitable storage area, bulk storage tank or semi bulk storage tank.

[6] The Eskom employee shall accurately perform quality control of the product received before accepting the product.

[7] The Eskom employee shall sign on the chemical received form in Annexure B and file the necessary documents.

[8] If the chemical received do not meet the specifications though accepted and indicate compliance in COA, Eskom shall return the product back to the supplier for exchange for a new batch.

[9] The contractor shall ensure Health and safety requirement on the products supplied.

[10] Necessary manual as well as handling procedures must be given by the supplier.

[11] The z-scores of the contractor shall be submitted to Eskom yearly.

[12] The supplier as well as the Eskom employee they shall ensure that the product delivered is store appropriate to avoid damage and leakage.

3.1.4 Documentation

The contract shall be authorised and signed by responsible people between the supplier and Eskom.

3.1.5 Key dates

The supplier shall provide Medupi WTP, STP and Auxiliary plant with Floc, $Na_2S_2O_5$, Coag, Antiscalant, HCl, NaOCl, NaCl, $Na_2CO_3.1.5H_2O_2$, $C_2H_2O_5$, C_3H_3NOS, Na-DSS, $Na_2S_2O_4$, KOH, Na_4EDTA, $C_6H_8O_7$, TTA, TSP, DBNPA, Glutaraldeyde, ADBAC, MBT & TCMBT (blend), DTP, $FeCl_3$ and $Ca(OH)_2$ chemicals for the period stipulated in the contract.

3.1.6 Specifications

3.1.6.1 Hydrochloric acid

Characteristics	Criteria	Specification
Min concentration of 30 %, mercury free	SG at 25°C	1.146 minimum
	Strength	30 % m/m
	Iron	15 mg/kg
	Free chlorine	10 mg/kg

3.1.6.1.1 Hydrochloric acid delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.2 Sodium Hypochlorite

Characteristics	Criteria	Specification
Liquid with an available chlorine of 15 % m/v (as Cl2)	SG at 20 °C	1.23 minimum
	Available chlorine when dispatched (as Cl_2)	15 % m/v minimum
	Sodium hydroxide as NaOH	1.5 % m/v minimum

3.1.6.2.1 Sodium Hypochlorite delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.3 Sodium meta-bisulphite

Characteristics	Criteria	Specification
Food grade, minimum concentration of 97.2 % (m/m) $Na_2S_2O_5$	Sodium meta-bisulphite as $Na_2S_2O_5$	97.2% (m/m)
	pH value	4.0 - 4.8
	NaCl	50 ppm maximum
	Iron	5 ppm maximum
	Arsenic	1 ppm maximum
	Lead	1 ppm maximum
	Copper	1 ppm maximum
	Manganese	1 ppm maximum
	Mercury	0.1 ppm maximum
	Selenium	1 ppm maximum
	Zinc	1 ppm maximum

3.1.6.3.1 Sodium meta-bisulphite delivery

Chemical to be delivered in 25 kg clear plastic bags.

3.1.6.4 Sodium per-carbonate

Characteristics	Criteria	Specification
Power	Purity	90 % m/m minimum

3.1.6.4.1 Sodium per-carbonate delivery

Chemical to be delivered in 25 kg bags.

3.1.6.5 Sodium Chloride

Characteristics	Criteria	Specification
Granule, minimum concentration of 99.5 % (m/m) NaCl	Matter insoluble in water	0.05 % m/m maximum
	Calcium salts (as Ca)	0.03 % m/m maximum
	Magnesium salts (as Mg)	0.01 % m/m maximum
	Sulphate (as SO_4)	0.2 % m/m maximum
	Iron compound (as Fe)	10 ppm maximum
	Moisture content	1 % m/m maximum

3.1.6.5.1 Sodium Chloride delivery

Chemical to be delivered in 25 kg bags.

3.1.6.6 Oxonia active

Characteristics	Criteria	Specification
Liquid	peroxide	27 % m/v minimum
	peracetic	3 % m/v minimum

3.1.6.6.1 Oxonia active delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.7 Sodium salt of dodecylsulfate

Characteristics	Criteria	Specification
Power/Granule	Purity	99 % m/m minimum

3.1.6.7.1 Sodium salt of dodecylsulfate delivery

Chemical to be delivered in 25 kg bags.

3.1.6.8 Sodium hydrosulfite

Characteristics	Criteria	Specification
Power/Granule	Purity	90 % m/m minimum

3.1.6.8.1 Sodium hydrosulfite delivery

Chemical to be delivered in 25 kg bags.

3.1.6.9 Tetra sodium salt of EDTA

Characteristics	Criteria	Specification
Power/Granule	Purity	90 % m/m minimum

3.1.6.9.1 Tetra sodium salt of EDTA delivery

Chemical to be delivered in 25 kg bags.

3.1.6.10 Citric acid

Characteristics	Criteria	Specification
Power/Granule	Iron	5 ppm maximum
	Calcium	75 ppm maximum

3.1.6.10.1 Citric acid delivery

Chemical to be delivered in 25 kg bags.

3.1.6.11 Isothiazoline

Characteristics	Criteria	Specification
Liquid	Strength	20 % w/w minimum

3.1.6.11.1 Isothiazoline delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

Note: Auxiliary cooling Isothiazolinone should be provided as a blend of 5-chloro-2-methyl-4-isothiazolin-3-one, and 2-methyl-4-isothiazolinon-3-one.

3.1.6.12 Tolyltriazole

Characteristics	Criteria	Specification
Liquid with the concentration of 50 % TTA	SG	1.10 g/cm^3

3.1.6.12.1 Tolyltriazole delivery

Chemical to be delivered as 50% (m/m) solution in 25kg polycans.

3.1.6.13 Trisodium Phosphate

Characteristics	Criteria	Specification
Granule with the concentration of 99 % TSP	SG	1.10 g/cm^3

3.1.6.13.1 Trisodium Phosphate delivery

Chemical to be delivered in 25 kg bags.

3.1.6.14 2,2 Dibromo-3-nitrilopropionamide

Characteristics	Criteria	Specification
Liquid	Active solution	20 % w/w minimum

3.1.6.14.1 2,2 Dibromo-3-nitrilopronamide delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.15 Glutaraldehyde

Characteristics	Criteria	Specification
Liquid	Active solution	15 % w/w minimum

3.1.6.15.1 Glutaraldehyde delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.16 Alkyldimethylbenzylammoium Chloride

Characteristics	Criteria	Specification
Liquid	Active solution	15 % w/w minimum

3.1.6.16.1 Alkyldimethylbenzylammoium Chloride delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.17 Methylene bis (thiocyanate) & 2 (Thiocyanomethylthio) benzothiazole (blend)

Characteristics	Criteria	Specification
Liquid	Active concentration blend	30 % w/w minimum

3.1.6.17.1 Methylene bis (thiocyanate) & 2 (Thiocyanomethylthio) benzothiazole (blend) delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

Note: Biocide 0 and 0 should be provided as a blend, with each active ingredient having strength of ≥ 15% (w/w)

3.1.6.18 Amino trimethylene phosphonic acid

Characteristics	Criteria	Specification
Liquid	Active solution	20 % w/w minimum

3.1.6.18.1 Amino trimethylene phosphonic acid delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.19 Diethylene triamine penta

Characteristics	Criteria	Specification
Liquid	Active solution	3.0 % w/w minimum

3.1.6.19.1 Diethylene triamine penta delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.20 Ferric Chloride

Characteristics	Criteria	Specification
Liquid with a purity of 46 % $FeCl_3$	Ferric Chloride as $FeCl_3$	46 % (m/m) minimum
	SG at 20 ^oC	1.43 minimum

3.1.6.20.1 Ferric Chloride delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.21 Hydrated Lime

Characteristics	Criteria	Specification
Power, pale buff in colour	Calcium hydroxide	90 % m/m minimum

3.1.6.21.1 Hydrated Lime delivery

Chemical to be delivered in 25 kg bags.

3.1.6.22 Antiscalant

Characteristics	Criteria	Specification
Liquid	Appearance	Clear/Translucent
	SG	1.01 – 1.02
	pH	2.0 – 3.5

3.1.6.22.1 Spectra Guard delivery

Chemical to be delivered in 1 m^3 Flowbins with a lid that has a breather.

3.1.6.23 Flocculant and Coagulant

[1] The contractor shall assure pre-treating of raw water which will be suitable for potable and demineralized water production. The chemicals (Coagulant & flocculants) used shall bear no health risk and also shall be effective in 50 % organics removal from raw water.

[2] The pre-treatment program shall be established by the contractor taking into consideration the raw water quality supply changes.

[3] The active ingredient of chemical supplied to Medupi water treatment plant shall be made known the employer representative in writing.

[4] The Contractor shall do a jar test at Employer's laboratory at determined frequency to ensure that the removal of organics process is optimized.

[5] Analysis of the raw and clarified water shall be done by contractor in conjunction with employer representative to verify the effectiveness of the chemicals.

The following records shall be kept by contractor and employer;

- Frequency, number, type of samples collected and points of collection.
- Types of analysis conducted.
- Daily usage of chemicals.
- Dates when dosage rates are changed.

[6] The chemical composition of flocculant and coagulant supplied shall have no negative impact on demineralization process (membranes) as well as piping used in the system.

[7] The quality of treated raw water from clarifier outlet shall conform or exceed the Eskom standard specification targets.

3.1.7 Safety

3.1.7.1 Health and safety regulations

All Contractors shall comply with the Medupi Health and Safety Policy, some of the key requirements of which are attached as Annexure B.

Task Risk Assessments must be conducted jointly by the Employer and Contractor.

3.1.7.2 Health and safety regulations

Medical, ambulance and first aid facilities are provided on site by the Employer.

3.1.8 Technical support

The contract shall advise Eskom on storage and handling of the products supplied.

3.1.9 Communication and correspondence

The Contractor shall communicate with the WTP supervisor/Chemistry manager and the buyer if there are any changes on the orders or product. The communication shall be professionally via e-mail or post. The correspondence shall include the following:

[1] Medupi Power Station

[2] Employer's contract number

[3] Contract description

[4] Correspondence subject matter

[5] Contractors contract details

[6] Date

[7] Signatures of responsible people.

3.2 Tender requirements

The contractor shall supply a price list and tender documents

Medupi Power Station shall evaluate the tender according to Eskom policy on the issuing of the contract and the contract shall be discussed.

3.3 Common site services and conditions

3.3.1 Roads and vehicles

All traffic is limited to using existing roads.

All road signs and traffic laws / regulations on site will be adhered to.

Damage caused to underground services, structures, etc., as a result of the Contractor not using the prescribed routes will be recovered from the Contractor.

All Contractors shall comply with Eskom Vehicle and Driver Procedure 32 – 93 and Construction Site Vehicles requirements.

3.3.2 Security

Site access and departure

All vehicles and persons entering or leaving site will be subjected to Security checks and or search. This includes, but is not limited to briefcases and toolboxes. Personal tools need to be listed and acknowledged by Security when brought on site. This list will be used for verification when the tools are removed from site.

3.3.3 Tender Technical Evaluation Criteria

	Semi-Bulk and Bulk Chemical Supplier Services Contract	**Weighting**
TECHNICAL FUNCTIONALITY (100%)	Chemical Manufacturer IS0 9001 Accredited and ISO 14001 Certified /Accredited	**45%**
	Chemical Supplier must be IS0 14001 Accredited/Certified	**20%**
	The supplier must have at least five years of Eskom power station related experience on the supply of bulk and semi bulk chemicals.	**20%**
	99.9% On-time deliveries	**5%**
	0% chemical delivery return rate (due to poor chemical quality specification)	**5%**
	100% order and invoicing accuracy	**5%**
	TOTAL WEIGHTING	**100%**
	Acceptance criteria	**80 %**

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Jeridah Ratau	Snr Supervisor tech chemistry
Macheba Rakau	Snr Supervisor tech chemistry
Masilo Makgoba	Snr Supervisor tech chemistry
Nkululeko Makubalo	Snr Supervisor tech chemistry

5. Revisions

Date	Rev.	Compiler	Remarks
May 2024	3	ST Senama	added acceptance criteria, page 17. Updated chemical masses, page 19.
August 2020	2	R.M Mphela	Second Review 1. Updated Flowbin specification. 2. Sole supplier. 3. Antiscalant estimated quantity. 4. Cover page.
June 2017	1	R.M Mphela	First Review 1. Updated specifications 2. Compiled by, functional responsibility & authorised by.
April 2013	0	R.M Mphela	First Issue.

6. Development Team

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

- S.M Khanyile
- N. Nani
- N.C Monini

7. Acknowledgements

N/A

Appendix A – Chemical Estimated quantity

Chemical name	Formula/Abbreviation	Estimated quantity per year in Kg
Hydrochloric acid	HCl	40 000
Sodium hypochlorite	NaOCl	130 000
Sodium meta-bisulphite	$Na_2S_2O_5$	26 250
Sodium Chlorite	NaCl	18 750
Sodium percarbonate	$Na_2CO_3 1.5H_2O_2$	5 000
Oxonia active	$C_2H_2O_5$	12 000
Sodium salt of dodecylsulfate	Na-DSS	100
Sodium hydrosulfite	$Na_2SO_2O_4$	17 280
Tetra sodium salt of EDTA	Na_4EDTA	17 2800
Citric acid	$C_6H_8O_7$	5 760
Isothiazoline	C_3H_3NOS	47 688
Tolyltriazole	TTA	14 800
Trisodium phosphate	TSP	21 600
2,2 Dibromo-3-nitrilopropionamide	DBNPA	30 000
Glutaraldehyde	-	18 800
Alkyldimethylbenzylammoium Chloride	ADBAC	9 192
Methylene bis(thiocyanate) & 2 (Thiocyanomethylthio) benzothiazole (blend)	MBT &TCMBT	4 560
Amino trimethylene phosphonic acid	ATMP	48 000
Diethylene triamine penta	-	50 000
Ferric chloride	$FeCl_3$	30 000
Hydrated Lime	$Ca(OH)_2$	20 000
Flocculant	Floc	20 000

Coagulant	Coag	150 000
Antiscalant	Spectra Guard	43 200

Appendix B – Quality Control form for chemicals and consumables received

Eskom	**Quality Control form for chemicals/consumables**	**Allocation Centre**	
		Rev 0	**Page 1 of 1**

Chemical received:	
Expiry Date:	
Supplier:	Batch number:
Specifications:	
Quantity:	
Received by:	Date:
Quality check done by: Signature:	Date:
Accepted ☐	Rejected ☐ (Please tick)
Comments:	

Appendix C – Health and Safety Regulations

The Contractor and his subcontractors shall at all times comply with safety regulations imposed by any Act of Parliament, ordinance or any regulation or by-law of any local or statutory authority. Specifically, the Contractor shall comply with:

The Occupational Health and Safety Act, 1993, and all Regulations made there under

All Eskom Safety and Operating Procedures including:

[1] Construction Safety 32-136

[2] Life Saving Rules 240-60867265

[3] Driver Safety 32-93

[4] Vehicle Safety 32-345

[5] Incident Management 32-95

[6] Alcohol Policy GGP 1209

[7] Smoke Policy 32-36

Eskom Safety Principles:

[1] No operating condition, or urgency of service, can justify endangering the life of anyone or cause injury.

[2] Conduct business with respect and care for people and the environment and, ensure that adequate resources are available for SHE management.

[3] Entrench the belief that all injuries are preventable

[4] All employees and Contractors are responsible for their own and that of their colleagues safety

[5] The Contractor commits to employ only people who have been duly authorized in terms thereof and who have received sufficient training to ensure that they can comply therewith.

[6] No extension of time will be allowed as a result of any action taken by the Employer in terms of the above and the Contractor shall have no claim against the Employer as a result thereof.

[7] Furthermore, no amendments to the Act or Regulations or reasonable amendment to Eskom's Safety and Operating Procedures will entitle the Contractor to claim any additional costs incurred in complying therewith from Eskom.