

 Eskom	Specification	Technology
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Title: **SCOPE OF WORK FOR MAINTENANCE OF CAMDEN COOLING TOWERS FOR 4 YEARS**

Unique Identifier: **559-38530401**

Alternative Reference Number: **None**

Area of Applicability: **Engineering**

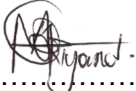
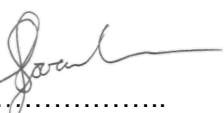
Documentation Type: **SOW**

Revision: **3**

Total Pages: **30**

Next Review Date: **N/A**

Disclosure Classification: **CONTROLLED DISCLOSURE**

Compiled by	Functional Responsibility	Authorised by
	 PP	PP S Govender 
Mxolisi Nyandeni System Engineer	Shaun Govender Turbine Engineering Manager	Mokgoba Shaku Engineering Manager
Date: 05-01-2026	Date: 19/02/2026	Date: 19-02-2026

File name: SCOPE OF WORK FOR MAINTENANCE OF CAMDEN COOLING TOWERS FOR 4 YEARS

Template ID: 32-4 (Rev 13) Document template (for procedures, manuals, standards, instructions, etc.

Formatted by: EDC_ Risk and Sustainability 13.03..24/EDC TR Formatted 03.06.2024

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1. EXECUTIVE SUMMARY

1.1 BACKGROUND

Camden Power Station started operating in 1967 and comprised six natural draught, asbestos cement packed, hyperbolic type Cooling Towers. The Cooling Towers were originally constructed and packed by Hamon Group. The cooling tower internals, consists of asbestos fill material, asbestos distribution pipework and drift eliminators which has been replaced with PVC material.

1.2 SCOPE

1.2.1 Purpose

This document stipulates the refurbishment work required on the Camden Cooling Towers which will have to be conducted under online conditions and off-line conditions upon agreement of necessity of scope of work with the system engineer. The aim is to restore cooling tower performance and reduce load losses caused by high condenser vacuum.

NB. The objective of the contract is to restore all the cooling towers to their optimal / required efficiency. Once all the maintenance is completed and accepted by the Eskom Engineer on all 6 cooling towers, periodic inspections will need to be executed on all the cooling towers and repairs will be done through task orders on an as and when requirement. Therefore, after acceptance of the refurbishment of all 6 cooling towers the contractor will reduce the staff to meet with the periodic inspections and as and when required maintenance.

- The Contractor is expected to take permits as per the Plant Safety Regulations (PSR) and High Voltage (HV) regulations. The Contractor must have responsible persons for each activity during normal working hours and on standby (and for multiple activities when required by the Employer if it is deemed to be safe)
- The Contractor is further expected to liaise on a daily basis with the Operating Department to plan work and to optimise the availability of the plant
- The Contractor must have representation in the Auxiliary Plant Maintenance meetings.
- The Contractor may be requested by the Employer to conduct plant modifications as per Engineering instructions or SOW's
- All work must be executed by qualified and trained personnel using the correct tools and equipment to ensure a reliable plant. Quality inspections to be done on all critical tasks with Eskom personal signing it off
- All welding work must comply with 240-106628253 - Standard for Welding Requirements on Eskom Plant. Welding procedures and welding QCP's must be supplied to Eskom for approval prior to welding work commencing. All weld repairs must be 100% Non-Destructive Tested (NDT) and inspected by an Eskom Welding Inspector
- All final welds must be NDT as per 240-83539994 Standard for Non-Destructive Testing on Eskom Plant

1.2.2 Applicability

This document applies to Camden Common Plant Maintenance and Camden Turbine Engineering Department, Materials Management Department, Camden Procurement Department Camden Management, Operations Department and Potential Contractors.

1.2.3 Effective date

Date of authorisation

1.2.4 Normative References (Eskom documents)

Standard	Description
204-63094243	Quality Management Systems
240-105020315	Standard for low pressure valves
ESKADAAI8, Rev 1	The safe processing, storing, removing and handling of asbestos and asbestos containing materials
240-56030508	Cooling Water System Health Care Guideline
240-123919938	Legionella Control and management in Water Systems
OHSA	Occupational Health and Safety Act 85 of 1993

1.2.5 Informative References (non-Eskom documents i.e., Acts, SANS, ISO, etc.)

Standard	Description
ISO 9001	Quality Management Systems
QM 58	Supplier Contract Quality Requirements Specification
SANS 966-1:2024	Unplasticized poly(vinyl chloride) (PVC-U) pressure pipe systems

1.3 DEFINITIONS

The Client	The end user will be Eskom who will be represented by Camden Power Station throughout the duration of the maintenance period
Contractor	Refers to the corporation appointed to perform the maintenance activity for the duration of the maintenance period.

1.4 ABBREVIATIONS

Abbreviation	Explanation
CW	Cooling Water
CT	Cooling Tower
DE	Drift Eliminator
ISO	International Standards Organization
OHSACT	Occupational Health and Safety Act.
PVC	Poly Vinyl Chloride – A type of synthetic polymer
QC	Quality Controller
QM	Quality Management
QCP	Quality Control Plan
SOW	Scope Of Work
UV	Ultra-Violet – refers to radiation from the sun

1.5 ROLES AND RESPONSIBILITIES

Contract Manager: Drive the tender process to effectively establish and manage the contract to execute the scope of work as presented in this document.

System Engineer: Assist with any technical abnormalities that might be encountered during the execution of the scope of work. Further to be involved in high level technical quality control pertaining to legal and ISO standards conformity.

Quality Department: Responsible for ensuring that all stipulated quality documentation and processes are adhered to in conformance with the requirements stipulated in this scope of work and the QM58 standard.

Contractor: Execute the scope of work stipulated in this document and conform to all the requirements set out in the final contract and this scope of work.

1.6 PROCESS FOR MONITORING

Monitoring of the progress and execution of this scope of work will be the responsibility of the contract managers.

1.7 RELATED/SUPPORTING DOCUMENTS

Not Applicable

2. REFURBISHMENT OF COOLING TOWERS

This scope of work contains basic technical specifications to be adhered to during refurbishment of the cooling tower internals, drain pond and surroundings. Cooling tower internals refers to:

- Distribution pipes and endcaps
- Drift eliminators

- Spray nozzles
- Fill packing
- Walkways
- Ponds

2.1 DOCUMENTATION

This section stipulates the use of technical documentation during the refurbishment process.

2.1.1 Quality Control Documentation

- Quality management during execution of any activity must be according to the requirements stipulated in QM58 document governing all Eskom related activities.
- As a bare minimum requirement, any work being executed must be executed according to a QCP that is pre-approved by the system engineer with relevant intervention points that must be adhered to.
- All QCP's must be accompanied by an execution programme with completion dates and durations of all activities on the QCPs.

2.1.2 Reports, Certificates and Data Packs

The following reports must be generated and supplied to the client before, during and after the execution of work:

Inspection report: Must be submitted to the client prior to commencement of any work.

Certificates: Must accompany all the supplied replacement components (sprayers, end caps, etc) supplied under this contract and must be included in the data packs.

Data Packs: Must be handed over to the client with any item worked on or supplied under this contract and must include all documentation relevant to the component or work executed.

3. GENERAL REQUIREMENTS

Camden Power Station has 6 natural draft cooling towers. These towers are maintained and cleaned during outages to improve and sustain their thermal efficiency.. This document aims at outlining the complete scope of work for all cleaning and maintenance related work of the 6 cooling towers for a period of 4 years during off-line opportunities. Task orders during this period shall include work instructions consisting of, but is not limited to the following:

- Draining and cleaning of the cooling tower pond
- Repairs/replacement of damaged drift eliminators, end caps, piping and sprayers.
- Repairs to walkways and staircases

- High pressure washing (typically 400 bar) of the fill from the top.
- High pressure washing (typically 400 bar) of distribution pipes.
- Washing (typically 6-10 bar) of the drift eliminators from the bottom.
- **The cleaning and removal of algae, mud, sludge and debris from the cooling tower.**
- Removal and disposal of all waste removed from the tower(s) including asbestos which requires proof of waste handling.

NB.: For off-line work to be completed, there is a possibility of main cooling tower isolation valves not functioning properly and thus perfect isolation may not be possible. Therefore, it is the responsibility of the contractor to make means to work in such conditions.

The contractor must be aware and fully comply with the following list of activities and requirements whenever work is carried out on site.

ACTIVITY	SPECIFICATIONS
3.1 ACCESS CONTROL	
Provide all authorised people with entry permits. Obtain permit to work as per site procedure.	
3.1.1 Relevant PPE to be used on specified systems, e.g., where there are chemicals etc.	Refer to Legionella Control and management in Water Systems (240-123919938)
3.2 QUALITY	
The contractor shall provide a detailed QCP, derived from the issued and accepted SOW from Camden Turbine Engineering. The QCP must make allowance for Engineering to add hold points, viewpoints, etc.	10 days before works starts on each work instruction/task order.

3.3 SPARES	
3.3.1 Spares will be provided by Eskom to the Contractor on a free issue stores withdrawal basis. Spare items required include: a) Sprayers body, nozzles, grommets and saddles. b) Endcaps (304 SS latch & body with rubber seal, fully openable i.e., exposing entire pipe end diameter for cleaning purposes.) c) Stainless steel repair clamps d) Fill replacement, blocks – only damaged sections as required. e) Drift eliminators: UV inhibited PVC only shall be allowed. The maximum unsupported span length 1.5 m. If additional support beams are required, these shall be of Grade 304 stainless steel or GRP. f) Distribution piping: 6", 8", 10" and 12" PVC class 9 piping and repair clamps. NOTE: Spares that are not stock (as and when required scope of work) will be provided by the contractor with the relevant datasheets provided to Eskom Turbine Engineering before scope of work commencement.	
3.4 ASBESTOS	
3.4.1 The existing distribution system and fill are manufactured from asbestos cement. Cutting and removal of any of the existing asbestos material may only be carried out by contractors (or sub-contractors) who have the necessary registration with the Department of Labour as Registered Asbestos Contractors.	
3.4.2 The appointed tenderer needs to comply with the OHSAct 85 of 1993 and more specifically the ASBESTOS ABATEMENT REGULATIONS 2020. The pre-identified waste site for disposal will be communicated to the relevant Eskom business unit in advanced and the internal, informal, auditing of the ultimate fate of the waste will be conducted by Eskom.	

3.4.3 The process will be under direction of the Occupational Hygiene Practitioner at the relevant Eskom business unit subjected to asbestos handling procedures, as stipulated in Eskom procedure 32-303 and the waste management procedure 32-245.

3.4.4 All the requirements of the Occupational Health and Safety Act 85 of 1993, Asbestos Regulations must be adhered to including:

- a. Asbestos plan drawn up by an accredited Approved Inspection Authority (AIA).
- b. Asbestos training for all personnel handling asbestos cement components as well as all those working in the dirty area.
- c. Demarcation of the site into clean and dirty (asbestos contaminated) areas.

3.5 PREPARATORY WORK FOR OFF-LINE WORK - COOLING TOWER ISOLATION AND DRAINING

3.5.1 Isolate the specific tower for maintenance.

Isolation to be carried out by the station (Ops)

3.5.2 Cooling Water in the cooling tower pond to be drained before work can start. If it is found that the cooling tower cannot be 100% isolated, the contractor must manage the level in the cooling tower pond by draining to an adjacent cooling tower pond as stipulated in section 3.7.

3.6 COOLING TOWER GEOMETRY

Cooling Towers	1, 2, 3, 4, 5 and 6
Distribution pipe material	Asbestos, PVC and Carbon Steel
Drift eliminator material	PVC
End-cap valves	Stainless Steel
Type of system / Fill	Asbestos
Tower diameter (skirt)	25 m
Pond diameter	43 m
Shell height	105 m
Air opening height	8 m
Ham Sprayer sizes	Thread = 2 ¼ BSF Material = ABS

Sprayer orientation	Upwards
No of sprayers/tower	7303 Cooling tower 1 and 3 7320 Cooling tower 2, 4, 5 and 6
Number of diametral duct(s)	16 (Refer to drawing KEC – 272 rev 4)

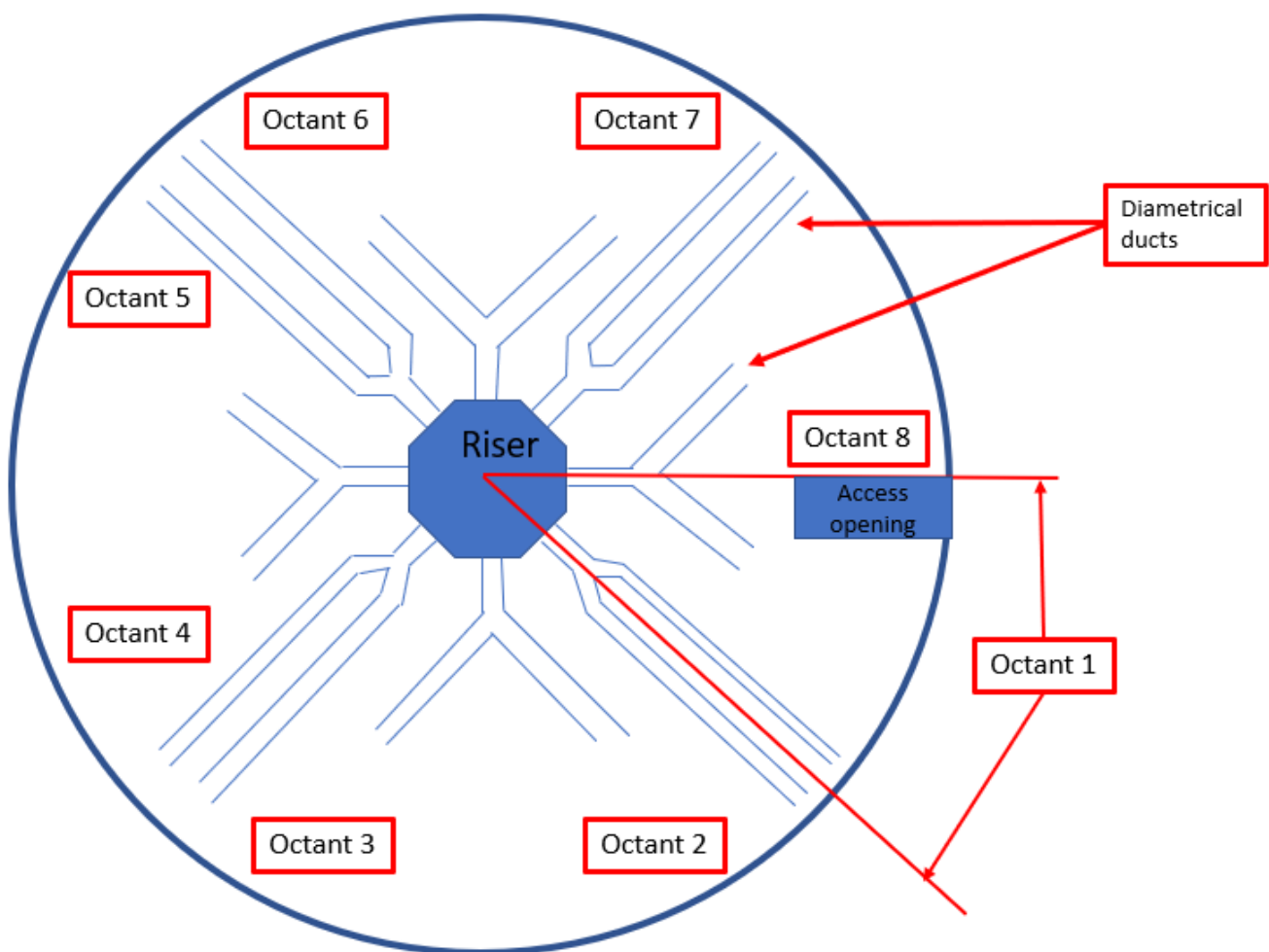
3.7 WATER AND ELECTRICITY SUPPLY/USAGE

- In order to save potable water, all water to be used as part of the maintenance contract shall be supplied/sourced from adjacent cooling tower ponds i.e., **no potable water is available for cleaning purposes.**
- Also note that in some cases isolation from the main CW system is not guaranteed. It will be the responsibility of the contractor to manage the level in the cooling tower pond using a drainage pump to an adjacent cooling tower pond. Therefore, the contractor shall supply pumping equipment for the supply to the relevant tower and removal/drainage from its pond.
- The supply to the tower shall be a minimum of **1000 L/min** at a pressure of at least **6 bar**. The drainage pump away from the tower shall be at least **100 L/s**.
- The contractor shall provide filters and all other necessary equipment and distribution piping for cleaning and scope related activities including HP water cleaning as detailed in Section 4 and 5.
- All equipment shall be powered by the contractor's own power supply i.e., Generators.

4. SCOPE OF WORK (OFF-LINE SCOPE)

ACTIVITY	COMMENTS
4.1 DIAMETRICAL DUCTS (OFF-LINE SCOPE)	NOTE: Debris and sludge must NOT be dumped down the risers or on top of the fill.
4.1.1 Position shade cloth below the distribution pipe that requires cleaning to collect all the debris which will be discharged at the sprayer nozzles during HP cleaning.	
4.1.2 Remove sprayers from diametrical ducts.	
4.1.3 All debris and sludge to be cleaned manually by bucket as far as practically possible and by HP cleaning from the end by opening the end flange. NB: No sludge or debris shall be thrown down the risers.	Eskom to designate an area for dumping sludge with the assistance from the station cleaning and Environmental.
4.1.4 HP-clean (400 bar and above at a flow rate of 45 l/min) the internal of all diametral ducts. This includes the removal of flakes and sludge. The HP nozzle to be used for cleaning of the diametral duct surfaces shall be a zero-degree non-rotating nozzle (i.e., the jet shall be a solid forward projecting jet).	Acceptance criteria: All scale to be removed until bare concrete.
4.1.5 Removal of fallen algae sheets and sludge from the top of the diametral ducts. NOTE: This is a continuous activity that should be carried out during the entire outage of the cooling towers.	
4.1.6 Diametral duct sprayers to be cleaned and replaced after the distribution pipes are cleaned. All damaged or missing diametral duct sprayers shall be replaced.	Acceptance criteria: All sprayers to be clean as visible from the walkways/diametrical duct floors.
4.2 DISTRIBUTION PIPEWORK AND SPRAYERS	
Distribution pipe cleaning shall be done in a systematic way (per Octant) and the contractor shall not be allowed to work in the entire cooling tower simultaneously in a hap-hazard manner.	

- All cleaning activities will be completed and all sprayers replaced before moving on to the next section to be cleaned. It is a mandatory requirement that the contractor clearly indicates which sections are completed on a daily basis to allow Eskom's QC's the opportunity to perform effective inspections on a timeous basis as inform by the Hold Points on the signed QCP by all the concerned departments.
- Eskom QC's will only inspect sections completed by the Contractor. Defects found in a completed section which does not meet the acceptance criteria will introduce a financial penalty towards the contractor (i.e., re-work until acceptance criteria is met will not come at extra cost to the client). The Contractor shall provide Camden Engineering with a cooling tower map with sections similar to the example provide below indicating the date when each section will be completed for inspection.
- In some cases, the task order may require only partial completion as agreed upon before work starts as per the identified defects on each part of the octants.



Cooling water towers 1 – 6

NB. All diametrical ducts to be fitted with blank flanges at pipe end as per drawing KEC – 272 Rev 4.

4.2.1 Open all end-cap valves. Any valve caps that are faulty or do not open must be removed and replaced.

Refer to figure below as example of endcaps to be used for replacements.



Specification for end-cap valves: 304 stainless steel valve body and latch with rubber seal, fully openable for cleaning purposes.

NB: Contractor to size end cap sleeves accordingly to fit endcaps.

4.2.2 HP-clean the distribution pipework internals. All sprayers to be removed before HP cleaning. • Pressure of between 400 bar (up to 600 bar) at the pump discharge with a flow rate of 45 l/m shall be maintained during cleaning. • Rotating nozzle to be used which travels the entire length of each pipe. (The length of the longest pipe is 32 metres.) • Various nozzles shall be available on site for cleaning of the pipes and the nozzle shall be centralised in the pipe. • If it is difficult for scale to be removed, it is the duty of the contractor to inspect ducts after drying for visible flakes that need to be removed by HP cleaning. The system engineer is to be with the contractor such that the cleanliness expectation from the system engineer can be communicated to the contractor.	Acceptance criteria: No loose debris or adherent scale should be visible in the entire length of the pipe.
4.2.3 Shade cloth to be placed below entire distribution pipe being cleaned to collect all debris which may be discharged via the sprayer holes during HP cleaning. The debris collected on the shade cloth must be removed from the cooling tower and not dropped on top of the fill (heat exchange will be affected). Any loose scale remaining in the distribution pipes after HP cleaning to be flushed from the distribution pipes.	Acceptance criteria: No loose debris should be visible on the fill. Eskom QC to inspect before and after of the fills at the area of work.

4.2.4 Broken and/or cracked pipes to be fitted with stainless steel clamps as shown below. The clamp consists of a flexible 304 stainless-steel band fully lined on the inside face with a rubber gasket with minimum operating pressure of 200 kPa. The ends of the one or more sections of the band are tightened together by a minimum of three long threaded stainless-steel studs and stainless-steel washers and nuts for tightening.

NPS pipe diameters are as follows: 12", 10", 8" and 6" at pipe end.



Acceptance criteria:

No broken or leaking pipes

4.2.5 After final inspection of HP cleaning, the sprayers are installed again. Only damaged or missing sprayers must be replaced.



Acceptance criteria:

All nozzles of all sprayers shall be clean and unobstructed.

NB. If distribution pipe sprayer mount is damaged, a stainless-steel strapped saddle and grommet to be used to attach nozzle onto the distribution pipe. The grommet is to be sized such that the inner diameter fits over the distribution pipe nozzle and sprayer can thread into grommet. Grommet material to be HDPE (see example concept below).



4.3 DRIFT ELIMINATORS

4.3.1 Cleaning of the DE's is generally not a high priority and shall not take preference over cleaning the distribution pipes or fill. The Contractor must do the cleaning **from below** ONLY (no from top cleaning allowed due to it being a safety hazard) and clean with water (typically 6-bar). Pressures higher have potential to damage the drift eliminators.

4.3.2 All fallen algae must be removed to avoid it falling through on top of the fill on a regular basis. When cleaning is done all flakes and excessive sludge will be removed. The contractor is to propose a method to clean the fallen algae **without** access on top of DE's for review by Eskom Engineering.

Acceptance criteria:

No visible sludge/mud/algae between DE panel profiles.

4.3.3 The contractor to replace all broken DE's and replace with UV stabilised PVC drift eliminators. The contractor to only carry out the replacement scope when defects are noted as on the following site photo.



Drift Eliminator specification:

The maximum unsupported span length for the drift eliminator is 1.5 m. If additional support beams are required these shall be of Grade 304 Stainless Steel or GRP. The support beams shall be designed to support at least 5 times of the weight of new drift eliminators.

The contractor shall supply a drawing of the drift eliminators used indicating the material and dimensions of the drift eliminators as well as maximum supporting beam span to avoid sagging or deformation at a continuous temperature of 45°C. **Only DE profiles with a proven track record shall be used, a verifiable reference list of where the drift eliminators were used in past to be supplied as part of the tender.**

The minimum technical requirements for the modules shall be:

- Maximum profile spacing of 55 mm
- Non see through design
- Minimum profile depth of 150 mm

4.4 FILL

- The approach to cleaning the fill shall be that of a systematic methodology.
- The contractor shall not be allowed to work in the entire cooling tower simultaneously. The contractor together with the Engineer will determine priority areas (classified by Octants) to be completed.
- It is a mandatory requirement that the contractor clearly indicates which sections are completed on a daily basis to allow Eskom's inspectors the opportunity to perform effective inspections on a daily basis (using QCP & hold points).

4.4.1 Fill to be cleaned from top with HP water between 400 bar and 600 bar at the pump discharge with a flow rate of 45 l/min. The nozzle discharge shall be directly forward and shall be a single jet, i.e., no rotating nozzles or nozzles with multiple jets allowed. A rigid lance shall be used which fits in between the sheets of fill and cleaning shall continue until a free jet/curtain of water discharge from the bottom. The gap, open space, between the asbestos fill sheets are typically 15 mm	Acceptance criteria: Pre and post inspection to be carried out as informed by QCP. The fill will be classified as clean when one can see the pond from the top of the fill.
4.4.2 Fill to be washed from the bottom with fire water/HP water to remove algae and sludge that could not be removed from above. Provision to be made for skyjacks for cleaning and inspection of fill from bottom.	Acceptance criteria: Pre and post inspection to be carried out.
4.4.3 Remove all debris on top of fill.	Acceptance criteria: As part of final inspections all debris on top of fill should have been removed.
4.4.4 All damaged fill to be replaced. Fill blocks of either HTP25, TC40V or VC25 are allowed. Additional support beams (Grade 304 stainless steel or GRP) shall be installed to support the fill blocks based on the supplier recommendation as per the data sheet. In the case where the supplier does not specifically recommend a spacing distance, the maximum allowable support beam spacing shall be 600 mm. The support beams should be able to withstand at least 100 kg/m².	Acceptance criteria: Upon inspection and approval by Eskom Engineering.
4.5 POND AND OUTLET SCREENS (OUTAGE BASED)	
4.5.1 Sludge and debris are to be removed from the pond by the contractor and dumped on a designated site area that will be predetermined by the Station. All dumped debris should be removed by the contractor.	Bobcats (or similar), brooms, spades and squeegees to be used for removing sludge from the ponds. Acceptance criteria: No mud layers (>10mm deep) or loose debris/particles (>10mm in diameter/length) anywhere on the pond floor.

4.5.2 The floor of the pond is then to be swept with brooms to remove all loose debris. The contractor must ensure that debris is <u>not</u> collected/ dumped to the outlet screens.	Acceptance criteria: No debris visible in pond or screen outlet.
4.6 WALKWAYS	
4.6.1 Replace all rotten wood walkways with suitable replacement. Contractor to specify suitable replacement based on successful service history in the same application	Acceptable criteria: Rotten wood walkways must be removed. Inspections to be carried by Eskom QC or Turbine Engineering
4.7 STAIRCASES	
4.7.1 Repair all defected staircases NB. Contractor to sub-contract with letter of agreement if civil work is not covered directly.	Acceptable criteria: No chipped or damaged staircase steps. To be inspected and by Eskom QC or Turbine Engineering

5. SITE EQUIPMENT REQUIREMENTS & TESTS

The contractor shall demonstrate to the Engineer that each of the **High-Pressure pumps can supply a volume flow rate of 45 l/min** with the pump being operated at rated speed with a pump **discharge pressure of 400 bar**. A container and stopwatch method, to be included as hold point on QCP, shall be used to verify.

The high-pressure pump and hoses shall be equipped with a self-operated device to prevent over-pressure such as stand-alone safety relief valve or fail-safe pressure switch. The HP hoses shall be equipped with a foot valve to enable the operator positioned inside the cooling tower to stop the flow to the nozzle as required.

The flexible hoses shall be considered as piping defined in PER. The Health and Safety Standard (design code) of the hose shall be specified. As a minimum the hoses shall be tested to **1.25 the design pressure** of the hose. Valid pressure test specifications and certificates to be available and traceable to each hose used on site. All operators shall be equipped with appropriate PPE and shall operate a dead-man device. Only one HP lance per dead man device allowed. The lance operator shall be equipped with appropriate PPE to be protected against the high-pressure water jets. The contractor shall provide power for all pumps supplied.

6. BILL OF QUANTITIES

6.1 SPARES

The bill of quantities below should be completed after reading and understanding the scope as defined in Section 4 and 5. Table 1 allows contractor quoting for **estimated quantities** as specified on the table for spares that Stores department will keep and allow withdrawal as per scope requirement.

Table 1. Estimated spares quantities

Item no	Description and Stock number	Unit	Stock number	Price (ZAR)	Total Units per outage	Total Price (ZAR)
1	Supply of the Carbon Steel distribution pipe work (6" pipe, 8" pipe, 10" pipe, 12" pipe, 15" pipe, 18" pipe, 21" pipe, 24" pipe and 36" pipe)	Per 6 m	Non-Stock		4 of each	
2	Supply of the PVC distribution 6" pipe work	Per 6 m	0771276		10	
3	Supply of the PVC distribution 8" pipe work	Per 6 m	0771277		20	

4	Supply of the PVC distribution 10" pipe work	Per 6 m	0771147		10	
5	Supply of the PVC distribution 12" pipe work	Per 6 m	0771146		8	
6	Supply of 6" pipe coupling	Each	248376		40	
7	Supply of 8" pipe coupling	Each	625034		70	
8	Supply of 10" pipe coupling	Each	625377		40	
9	Supply of 12" pipe coupling	Each	629165		15	
10	Supply of plastic sprinkler	Each	39875		7 100	
11	Supply of end cap/flap	Each	704765		150	

6.2 MAINTENANCE COSTING

The bill of quantities below should be completed after reading and understanding the scope as defined in Section 4 and 5. Table 2 allows the contractor to list total price as per estimated quantities for maintenance.

Table 2. On-site off-line maintenance estimated costs

Item no	Description	Unit	Estimated quantities	Total Price (ZAR)
1	Off-line removal of mud from all distribution channels using shovels & buckets. Wash all distribution channels clean (400 bar)	Per tower	30	
2	On site removal of mud/sludge to area to designated area	1 m ³	Per tower	
3	Handling and disposal of Asbestos material. Remove asbestos to an authorised dumping site. Safe disposal certificates to be handed to contract manager.	1 m ³	Per tower	
4	Off-line cleaning of the distribution pipe work, high pressure water jet clean scaled up pipes. Price to include different cleaning nozzle sizes and pressures to be used on asbestos and PVC pipes (400 bar)	Per tower	Per tower	
6	Off-line cleaning of all drift eliminators with high pressure water (~10 bar)	Per 1 m ²	50 m ²	
8	Off-line supply and replacement of defective or missing drift eliminators with new PVC eliminators and 304 stainless steel support on an as and when required basis . (All sizes & spacing to be the same as the original design)	Per 1 m ²	50 m ²	
10	Off-line replacement of all defective grommets with new saddle type HDPE grommets with stainless steel strapping on an as and when required basis . (Design to be approved by Eskom Engineering).	Per tower	100	
12	Off-line replacement of new cooling tower plastic sprinklers as per Eskom design requirement.	Per tower	5000	

14	Off-line stripping of damaged fill areas and repair damaged fill areas with new fill packs on an as and when required basis . Fill blocks of either HTP25, TC40V or VC25 are allowed. Data sheet of fill product to be supplied before installation. Supply and install 304 stainless steel or GRP fill support brackets and beams to support newly installed fill.	Per 1 m ²	50 m ²	
16	Off-line replacement of end cap valves, 304 stainless steel fully open rubber insert, 304 SS latch, SS bolt attached and SS washer and nut set. Sizes could vary between 6" to 12".	Per tower	150	
18	Off-line drain, wash and cleaning of cooling tower pond. The contractor supplies his own pumps for draining the cooling tower pond to provide access to the screens, removal of fill & pond cleaning. The water from the pond must be pumped to the nearest adjacent cooling tower pond. It is the responsibility of the contractor to dispose of all material containing asbestos to an approved asbestos disposal site, and all paperwork to be handed in to Eskom's hazardous waste controller (on-site and off-site dumping)	Per tower	Per tower	
19	Off-line GRP beam supply and install as required for DE installation.	Per tower	Per tower	
21	Off-line stainless steel clamp installation of broken pipe.	Per tower	100	
23	Rental of supply pump(s) per day (~1000 L/min)	Per tower	Per tower	
24	Rental of large drainage/submersible pump(s) per day (~100 L/s)	Per tower	Per tower	
25	Rental generator to supply power to pumps per day	Per tower	Per tower	

26	Rental on High Pressure water jet per day (min 400 bar)	Per tower	Per tower	
27	Rental of 30 L/s sludge pump per day.	Per tower	Per tower	

7. DESIGN AND SUPPLY RELATED COMPONENTS

Certain items and components are design and cooling tower specific. These items cannot be priced for upfront and shall require a design and/or drawings, approved by Eskom Turbine Engineering, before any work can commence. These items are not included in the initial contract value evaluated in Section 7.

These items include:

- Any type of ladder inside the cooling tower.
- Cooling tower pond screens
- Any civil repairs required to carry out the scope of work as described in Section 4 and 5.

8. TENDER RETURNABLES

The following section describes the mandatory and non-negotiable tender returnable documents. To an equitable technical evaluation of the tenders the contractor must provide all documentation as per the requirements below. **If not provided, the tender will be considered non-compliant and will not be evaluated.**

All tenders will clearly define the roles and activities to be carried out by all sub-contractors and include an agreement related to that specific part of the work.

8.1 GENERAL RETURNABLES FOR TECHNICAL EVALUATION

8.1.1 Asbestos certification

- Contractor must supply a valid certificate stating that the company is certified to handle and dispose asbestos products to a recognized hazardous waste disposal site(s).

8.1.2 Reference list of cooling tower maintenance contracts

- Verifiable Reference list of Cooling Tower maintenance contracts done in the last 5 years including high pressure water cleaning. Three verifiable references shall be provided. For each Cooling Tower Maintenance Reference, the following must be submitted in a form of Table:
 - Project Description: Brief description of the maintenance activities performed on a natural draft cooling tower during the specific project.
 - Physical location of the natural draft cooling tower on which maintenance activities was carried out.
 - Date when the maintenance activities were done
 - Water pressure that was used for cleaning of cooling tower distribution pipes (bar)
 - Company name of the client
 - Client engineer or client quality control representative details – Client Name, Surname, Contact Number and company e-mail address

8.1.3 Method statements providing details of the following:

- Cleaning of distribution piping and sprayers.
- Drift Eliminator Installation – a detailed method statement for engineering design, supply, support, and installation of drift eliminators for off-line maintenance conditions. This method statement must include, at a minimum:
 - Structural design approach for drift eliminators, including support and bracing systems
 - Material specifications and flexibility/rigidity considerations
 - Fixing and mounting methodology/philosophy
 - Handling and installation procedures during shutdown (off-line) maintenance
 - Risk identification and mitigation related to structural integrity and operational performance
 - The method statement must be on the contractor's company letter head

- Fill cleaning and/or repairment as stipulated in Sections 4 and 5.
- Repair of staircases
- Repair of DE's as stipulated in Sections 4 and 5.

8.1.4 Quality Control Plan

- The contractor must supply previously a fully signed off Quality Control Plan (QCP) by the client representative indicating installation and/or cleaning of Drift Eliminators, Distribution Pipes, sprayers and End Caps or walkways.

8.1.5 The contractor to submit a preliminary schedule (bar chart) for the complete off-line scope of work as per Section 4.

8.1.6 Exclusions/deviations/qualifications to technical specifications

- Exclusions, deviations, or qualifications to the technical specifications outlined in the tender documents must be clearly identified. If there are no exclusions, a clear statement to this effect must be provided. The following information to be considered:
 - List of exclusions
 - List of deviations
 - Qualifications

8.1.7 Technical Personnel

- Supervisor relevant experience in natural draft cooling tower maintenance related activities. The following information must be provided:
 - Number of years the supervisor has been supervising cooling tower related maintenance activities
 - Brief description of the maintenance activities which this supervisor overseen
 - Physical location of the natural draft cooling tower on which this supervisor overseen maintenance activities carried out

8.1.8 Cooling Tower HP Pump Requirements

- The contractor shall provide technical details of HP Pumps that will be on site during the cooling tower maintenance contact, the technical details of the pumps to be completed by populating the tables below:
- The contractor to complete Tables 3 as part of the tender

Table 3: HP (400 bar) Pumps Inventory

HP pump # ¹	Make & Model of pump	Pressure rating or range, bar ²	Flow range, L/min
1			
2			
3			
4			

¹ For this contract, at least 2 HP Pumps are required from the Contractor during the period of each Cooling Tower maintenance.

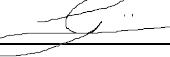
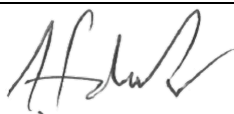
² Each pump shall produce 400 bar (at the pump outlet) at the pump discharge with a flow rate of 45 l/minute.

8.2 DRIFT ELIMINATORS

- Material of drift eliminators.
- Guaranteed drift loss expressed in % of circulating water flow.
- Reference installations (natural draft cooling tower).
- Material of drift eliminator support beams.
- Design load of drift eliminator support beams as well as support beam safety factor expressed in terms of drift eliminator weight.
- Drift eliminator support beam spacing. If this spacing exceeds 1 m, the Contractor **shall provide a detailed technical justification** considering the temperature the eliminators will be exposed to, **verifiable reference installations** where larger support spans were used, brochures or datasheets, etc.
- Drawing of the replacement distribution pipe end valve indicating component list with material identified.

9. ACCEPTANCE

This document has been seen, reviewed and accepted by:

Name	Designation	Signatures
Sabelo Mthethwa	Cooling Water Systems Engineer	
Giel Kruger	Common Plant Snr Technician	
Stefan Erasmus	Chief Technologist Generation Engineering - Feed heading and Condensate	
Francois Du Preez	Corporate Specialist- Generation Engineering - Feed heating and Condensate	

10. REVISIONS

Date	Rev.	Compiler	Remarks
-	1	Mthu Ramothibe	Original issue
05 May 2025	2	Mthu Ramothibe	Added components that are stock items and re-worked the quantities section
12 January 2026	3	Mxolisi Nyandeni	Removed on-line scope and aligned to TES

11. DEVELOPMENT TEAM

The following people were involved in the development of this document

- Mthu Ramothibe
- Sabelo Mthethwa
- Giel Kruger

12. ACKNOWLEDGEMENTS

- Francois Du Preez
- Senamile Nzama
- Stefan Erasmus

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