	Scope of Work	Generation
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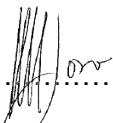
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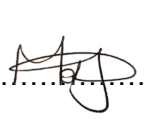
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1. Introduction

The Ash Plant is designed to handle the coarse and fly ash from six boilers to the ash disposal site at Tutuka Power Station. The ash plant scope of handling covers all units from unit 1 to 6 and the common inside ash plant at the Power Station and the ash disposal plant on the ash dump. The maintenance of the ash plant is to ensure that the plant remains reliability, available and maintainable in all times during the station life. The maintenance philosophy of the plant requires the preventative maintenance, inspections, plant repairs and other activities to be conducted to preserve the condition of the plant. This document provides the details of the areas that need to be covered and the activities required to done during the maintenance.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The purpose of this scope is to stipulate work that needs to be performed during the maintenance of the ash plant. The maintenance of the ash plant includes all the coarse ash conveyors, the conditioner conveyors, transverse and cross conveyors, overland conveyors, stacker system and spreader system and the emergency off-loading and on loading facilities at TT02 and all ancillary included as indicated in this document. The brine water pipe line from the TT02 area to the ash dump sprayers and both the pump stations at the ash dump with all its pipelines, hosepipes and sprayers are part of this scope. The potable water supply line from TT02 to the ash dump head tank is part of the scope.

2.1.2 Applicability

This document shall apply to Tutuka Power Station only.

2.1.3 Effective date

The effective date is the authorisation date.

2.2 Normative/Informative References

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

2.2.1 Normative

[1] 15OPPROP/AP – 008 Ash Conveyors Cleaning and Maintenance Procedure.

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- [2] 0.61/96347 Ash Dump Process Flow Diagram sheet 5 rev 0
- [3] 0.61/1482 Conveyor Equipment Schedule rev 4
- [4] 21.61/54817 Extendable Conveyor System P&ID rev 0
- [5] 21.61/54818 Shiftable Conveyor System P&ID rev 0
- [6] 21.61/54819 Spreader System P&ID rev 0
- [7] 21.61/54820 Stacker System P&ID rev 0
- [8] 0.61/17893 Stacker on Crawler General Arrangement A
- [9] 0.61/17894 Tripper Car General Arrangement rev 1
- [10] 21.61/54814 Ash conditioner conveyor P&ID drawing
- [11] 21.61/54815 Transverse conveyor P&ID drawing
- [12] 21.61/54816 Cross and overland conveyors P&ID drawing
- [13] 21.61/54766 Coarse ash conveyors P&ID drawing
- [14] 21.61/54821 Common plant scavenge water transport distribution & recovery system P&ID drawing

2.2.2 Informative

- [15] ISO 9001:2015 Quality management systems and standards.
- [16] 32-7 - Quality Management Policy

2.3 Definitions

2.3.1 Welding Artisan

Competent person who is qualified as welder and has underwent through the process of examination.

2.3.2 Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.3.3 Client

A person for whom repair work is being performed.

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2.3.4 Engineer

- a) A competent person who-
 - i. Prepares a design;
 - ii. Checks and approves a design;
 - iii. Arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the *Employer*, or
 - iv. Designs temporary work, including its components;

2.3.5 System

An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services and other support facets.

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2.4 Abbreviations

Abbreviation & Acronyms	Description
ADF	Ash Dump Facility
AKZ	Anlagenkennzeichnungssystem
QCP	Quality Control Procedure
SHE	Safety, Health & Environmental
TPH	Tons per hour

2.5 Roles and Responsibilities

Designer:

- As per OHS Act (85/1993),
- Performs calculations, compiles drawings, design details and specifications (structures and plant must be resistant to corrosive environment),

Tutuka Operating:

- Ensure system is operated according to the procedure to be developed by the designer

Tutuka Maintenance:

- Ensure the plant is maintained as per PM's developed by designer

2.6 Process for Monitoring

- Method Statement.
- Quality Control Plan.
- Splicing procedure.
- Fluid coupling filling procedure
- Shaft Alignment procedure

2.7 Related/Supporting Documents

N/A

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3. Background

There are six conditioner conveyors which transport the conditioned ash from the relevant ash conditioner to the selected transverse conveyor. Each conditioner conveyor has a moving head. There are six short coarse ash conveyor and six long coarse ash conveyors which transport the coarse ash from the boiler submerged scraper conveyors to the selected transverse conveyor. Each long coarse ash conveyor has a moving head. The two transverse conveyors can feed any of the two cross conveyors and the two cross conveyors can feed any of the two overland conveyors. The transverse conveyor length is about 600 meters and the cross conveyor length is about 250 meters. The transverse conveyor uses each a 110 kW motor drive and each cross conveyors are using the 90 kW drives. The conditioner and short coarse ash conveyors are using 7,5 kW drives and the long coarse ash conveyors are using the 11 kW size drives. The ash dump plant consists of two cross conveyors moving heads which feeds the overland conveyors. The transverse and cross conveyor moving heads have rack and pinion systems and chutes. Any of the two cross conveyors can feed any of the overland conveyors. The overland conveyor structure is 3800 meters long and each conveyor has two drives (D001 and D002). The size of each drive is 300 kW and the conveyor also has an electric winch system for the belt tension control. This electric winch system consists of a motor, gearbox, cables and trolley car with bend pulley.

Both these ash overland conveyors can feed either on the main shuttle conveyor or onto the standby shuttle conveyor. The length of the main shuttle conveyor is approximately 20 meters and the standby shuttle conveyor length is approximately 30 meters long. Each shuttle conveyor has a screw take – up at the tail end. The main shuttle conveyor feeds onto the main extendible conveyor. The standby shuttle conveyor feeds onto the standby extendible conveyor.

The structure length of the main extendible conveyor is 2800 meters and this conveyor extends every year with 80 meters due to the growth of the main ash dump. The main extendible conveyor consists of three drives which are located at the tail end. This conveyor has a gravity take-up tower at its tail-end.

This main extendible conveyor feeds onto the shiftable conveyor and the structure length of this conveyor is approximately 1000 meters. This conveyor has a single 315 kW drive at the tail end and the electric winch system is also at the tail end of this conveyor. It consists of electric motor, gearbox, cables and trolley car. This complete conveyor is movable in case of stacker shifting.

This shiftable conveyor then feeds the link conveyor via the tripper car which travels along the length of the shift able conveyor. The link conveyor then feeds the stacker boom conveyor. The stacker machine is a crawler mounted machine which supports the boom conveyor and the head section of the link conveyor. The stacker system can travel on the east side of the shiftable conveyor to perform the front stack and it can travel at the west of the shiftable conveyor to perform the back stack. The stacker boom conveyor can slew 240 degrees and this slewing system has two drives with pinions and slew gear. The boom conveyor luffing system is a hydraulic cylinder system.

The length of the standby extendible conveyor is approximately 3100 meters long and it becomes longer over time depending on the growth of the standby ash dump. The final length of this

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conveyor is approximately 3500 meters. This conveyor is a twin tail drive pulleys with three drives conveyor with a gravity take-up system at the tail end of this conveyor belt.

The size of each conveyor drive is 315 kW and the winch system consists of electric motor, gearbox, cables and trolley car. This standby extendable conveyor then feeds the spreader machine via the tripper car. The spreader machine and tripper car travels on rails. These rails are supported on sleepers and these sleepers are on the ash platform. The spreader bogie wheels are electric driven and this machine can travel to the front or to the back. The spreader boom conveyor can only stack the ash at the front and side ways of the machine. The slew angle of this boom conveyor is 180 degrees. The spreader slewing system is via the slew drives, pinions and slew gear. The boom conveyor luffing system is a hydraulic system. The shifting of this spreader is by using the rail leap frog shifting process. This spreader machine only travels to the east side of the standby ash dump.

For conveyor equipment schedules, refer to drawings 0.61/21818 sheet 1 Rev B and drawing 0.61/15482 Rev 0. For more information on the stacker machine refer to the operating and maintenance manuals of the stacker machine and spreader machine.

3.1 Need Statement

The ash plant requires maintenance as per maintenance strategy and philosophy. The existing ash plant is over 34 years old and requires more attention and care to ensure that reliability and availability are kept interact. The maintenance of the plant must consider, but not be limited to, the following:

- Six conditioner conveyors with its chutes and moving heads.
- Six short coarse ash conveyors with its chutes.
- Six long coarse ash conveyors with its chutes and moving heads.
- Two transverse conveyors with its chutes and moving heads.
- Two cross conveyors with its chutes and moving heads.
- The link point (transfer points) between cross and overland conveyors with ancillary services.
- The complete overland conveyors system with ancillary.
- Transfer point between overland conveyors and shuttle conveyors.
- The main and standby extendable systems with ancillary.
- Shiftable conveyor.
- The tripper cars, stacker and spreader.
- Brine water supply pipe from TT02 to the ash dump sprayers.
- South clean and dirty water dam pump houses with all its piping and ancillary
- North clean water dam pump house with all its piping and ancillary.

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- Potable water supply line.

4. Scope

The scope of work is for the plant inspection and record all defects on a daily basis, perform preventative maintenance, chute cleaning, plant repairs, lubrications, conveyor belt replacements, belt extensions, belt splicing, belt insert, belt repair, pulley cleaning and relagging, idler inspection and replacements, skirting thickness measurement and replacements, handling of sleepers and rails for the spreader machine, and the shifting of the stacker machine. General plant cleaning of the complete plant and the cleaning of the settling sump at TT02 is part of the scope of work.

The contractor shall maintain the defect record list for the period of the contract and track the similar failure defects. The contract shall provide Eskom Contract Supervisor with the weekly report of all reported defects and inspection conducted. The contractor will be provided with the template of the report upon the commencement of the contract.

The contractor is to clean all the coarse conveyor chutes on all the units once per shift and to do coarse ash plant inspections once a week. Any repairs, scarper cleaning and adjustments, idlers' replacements, skirtings' replacements, plummer blocks greasing, pulley laggings replacements, belt replacement etc should be planned with the relevant Production Manager, so that the unit operating supervisor can arrange for emergency damping at the grizzly conveyors.

The contractor is to clean all the conditioner discharge chutes and the conditioner conveyor chutes on all the ash conditioner conveyors once per shift and to do conditioner conveyors inspections once a week. Any repairs, scarper cleaning and adjustments, idler replacements, skirtings' replacements, plummer block greasing, pulley lagging replacements, belt replacement, moving head repair work should be planned with the relevant Production Manager. There are three conditioners conveyor running per week, while the remaining three-conditioner conveyors are standing for cleaning and maintenance purposes. These belts changeovers take place every Thursdays.

One transverse conveyor and one cross conveyor stream are normally in operation for a week and then changed over every Thursdays. One stream will be running while the other stream are on standby for maintenance and cleaning. The proposal is to clean the upstream chutes and these transverse conveyors chutes first and let these conveyors run empty at TT02. Then maintenance can be done on the relevant conveyor stream. The moving heads cleaning and maintenance on these transverse and cross conveyors can also be performed during this period.

The contractor is to clean the transverse and cross conveyor chutes at the transfer houses TT01 and at TT02 once per shift. The contractor is responsible to note if the ash on loading to the cross conveyors and overland conveyors is in the middle of the carry belt. The contractor is to perform inspection and repairs on the transverse and cross conveyors moving head systems. This involves pinion and plummer block repairs, rail repairs, rails cleaning, wheels greasing and travel wheel repairs. The contractor is to advice Eskom which spare parts he/she requires for repairs.

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The function of the settling sump at TT02 is to collect the rain water and washing water at the transfer house area. The contractor is clean this compete area and between the overland conveyor tail end areas. The contactor is to operate the water and ash level inside the settling sump. If the one side of the settling sump is dry, then the contractor is to remove this ash settlement inside the sump. The contractor must also operate the sump pump, so that the water level inside this sump is at minimum level in case of rain and floor washing. The sump cleaning operation should be once per month and the sump pump operation is every day. The floor washing should be two times per week

Due to the overland conveyor roof construction, the contractor needs to walk between the conveyors belts for overland conveyor inspection. This conveyor belt inspection should at least two times per week. The one conveyor stream runs for seven days, and then the other belt runs for seven days. The conveyor inspection should be performed, while the belt is running and the necessary repairs must be done under the plant permit system. Each overland conveyor has two belt turn over systems and it requires cleaning every week. The contractor is also responsible for belt scraper cleaning, adjustments and replacements. The V – plough inspections, repairs or replacements is also part of the scope of work. The contractor is to check the gearbox oil levels once per week and to lubricate the pulley bearings once per month. The contractor needs to take fluid coupling oil samples from the four fluid couplings and to analyse this oil for any particles and water ingress, once a month. In case of any dirty oil, then the relevant fluid coupling oil needs replacement. These fluid coupling oils in general need replacement every 6 months. The grid couplings at the gearboxes input shafts and at the gearboxes output shafts needs greasing every 3 months. The inspection of the winch cables, wheels and trolley car system must be once per month and this must be done by a qualified rigger. If the contractor notes, that there is a conveyor drive vibration problem, he/she must inform Eskom, so that Eskom can do vibration readings. The contractor is also responsible to monitor the stock levels of every item of this conveyor system.

The ash stacker system is approximately 85% of the time in operation and the standby spreader machine is approximately 15% of the time in operation. The spreader system is only in operation during the shifting process of the stacker system, stacker maintenance and stacker system break downs. The contractor is to inspect the stacker system every day, due to the high load factor of this system. Any repairs, replacements and chute cleaning must be planned so that other disciplines also can have an opportunity to perform maintenance. The ash chutes on the stacker system requires cleaning two times per week and in this period the contractor can do the necessary repairs, scraper cleaning and adjustments. In most cases the conveyor bearing greasing can be performed under plant in operation permit. But if there is dangerous moving parts close by, then plant isolation permit has to be taken for save bearing greasing actions. The number of bearings which require greasing on the total ash stacker plant is approximately 214. The relagging of pulleys and the replacements of the boom and link conveyor belts can be planned during the stacker shifts. The inspection of the extendable and shiftable conveyors' winch take up systems must be once per month. This must be done by qualified riggers. The power cable reel and control cable reel systems on the stacker tripper car must be inspected by the contractor once a week and to perform the required repairs. The inspection, lubrication and repairs on the stacker tripper car and stacker machine bogie wheels pins, bushes, bogie wheels, equalizer beams, drive tumblers with its bushes and shafts, crawler idler and its bushes and shafts, crawler system, stacker slewing and

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luffing systems are part of the scope of work. The luffing cylinder replacement and the power pack refurbishment is also part of this scope. The stacker crawler tension adjustment needs to be done by the contractor and any worn component of these crawlers must be replaced by the contractor. The contractor is to replace all tripper car travel drives. The contractor is also to replace the stacker top slew pins and beams between the stacker and link conveyor. The stacker tripper car front-end bogie supports steel work and link conveyor tail-end support pin needs replacement.

The contractor must also inspect all the gearboxes oil levels and top up when required. The number of gearboxes on the plant at the stacker system is 21.

The testing of structure welding, pin joints and bogie wheel system must be performed once per year.

The inspection and maintenance of all the storm brakes on the boom conveyor slewing system and tripper car is part of the scope of work.

The ash stacker system requires shifting every six months and the contractor must perform the total scope of work. This involves main extendable tripper car rail extension, shifting of the shiftable conveyor to the new position, pulling of the main extendable tripper car to the new position, driving of the ash stacker to the new position and the removal of all anchor plates and the installation of all anchor plates. The contractor is to build new conveyor modules and perform belt extension every two shifts. The installation of all idlers is part of the scope of work. The conveyor module extension is 80 meters. The two splices must also be performed by the contractor. The contractor is also responsible to handle the 3, 3 kV cables during the shift. New cable joints, once per year, needs to be done by the EMD contractor. Eskom will do the C&I part of this shift. The contractor must also repair any rail failures during the stacker shifting process. The contractor's land surveyor must set out the centre pins for the extendible conveyor and shiftable conveyor before the shiftable conveyor tail end station and shiftable conveyor plat forms can be constructed before the stacker shift starts. During conveyors extending and shifting the contractor must ensure that the survey for align straight the belt through its length from the tail end to the discharge chute is conducted and review by Eskom whenever the extension or shifting take place. The contractor shall ensure that the belt is straight and all possible misalignment of the conveyor structure is within recommended coordinates. The contractor on the weekly report to be issued to Eskom Engineering may suggest engineering solution or change of maintenance frequency.

The contractor must also perform spreader system plant inspection two times per week; perform the required repairs, cleaning and replacements. The contractor must make sure that this is on standby and reliable in case of stacker system failure. The chutes and belt scrapers require cleaning once per week. Since this system is standing most of the time, there is more than enough time to perform the required maintenance work. The contractor must also insure that the spreader system must not operate more than 15% of the time. The contractor must keep record of the running hours of the stacker and spreader systems. This will insure that the two ash dumps are in balance. The spreader boom conveyor support cables, major structure, pivot points and bogie wheels support steel work must be tested at the welding joints. This testing frequency is once per year. The contractor must also perform rail extension in front of the machine, so that this machine can stack the ash at the crest of the ash dump. The standby extendable conveyor requires belt extension three times per year. Please note it is depended on the usage of this machine. The

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standby extendible conveyor needs surveying and shifting of modules, so that this conveyor only have one horizontal radius of 5000 meters. It will help with the belt training. The conveyor length is 3300 meters.

The conveyor length extension is 80 meters and the belt splices is part of the scope of work. The contractor must also assemble the conveyor modules on the plant. The handling of these modules and belting has to be performed by the contractor. The handling of the rails and sleepers are part of the scope of work. The length of each rail is approximately 18 meters. The 11kV to 3, 3 kV transformer also require shifting to the location. This normally happens once per year. The shifting of this transformer and the two cable joints is part of the scope of work.

The contractor is responsible for all the lubrications and inspections and top ups of all the gearboxes and fluid coupling. The number of greasing points is 94. The number of gearboxes involved with the standby system including the shuttle conveyor is 15. The contractor is also check the spreader luffing hydraulic system, which involves the maintaining of the oil level, repairs of any oil leaks and the replacement of the oil filters. The inspection and maintaining of the power and control cable reel gearboxes and magnet couplings are also part of the scope of work. The spreader eight travel drives need replacement.

There are four critical scoop fluid couplings at the Ash Overland Conveyor belts on north and south overland conveyors. These couplings require filling up of oil after repair or after inspection, oil leak inspection, and visual inspection in terms of vibration monitoring, alignment with electric motors and gearboxes as well as temperature monitoring. The oil coolers must be inspected for any leaks, condition of the cooling fins, oil circulation, fan operations and be inspected every week. The contractor shall ensure that there is no oil/grease leak around the gearboxes, pulleys, couplings and motors. Any oil or grease spillage found around ash plant must be investigated and documented.

The contractor is also responsible for the north and south dam pump stations. The pumps and pipe lines inspections frequency should be at least two times per month. If any repairs are required on these pumps, it is part of the maintenance scope of work. The brine water pipe line and potable water pipe lines from TT02 to the sprayers and potable head tank must be inspected by the contractor and any repairs and HDPE pipe welding need to be performed by the contractor.

The south and north dams pump houses need to be inspected and these pumps need test running once every week. Any water leaks need to be repaired. The sump pump sump needs to be inspected and the sump pumps need to be tested once a week, to make sure that it is available to drain any water from these pump house floors. Any water leak on the discharge pipe line need to be repaired by the Contractor.

In terms of spares the contractor is responsible for ensuring that the spares are levelled up and all the spares available are readily available and in good working conditions whenever required. Eskom has a routable process where the contractor can be very aware that the spare is no longer repairable. If the spare is no longer repairable or the cost of repairing is 70% or more than one of the new spare the new spare must be bought based on routable process.

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The contractor shall review the current recommended spares and advise where there is a need to adjust the spares required to ensure that Ash Plant Facility is reliable, available and maintainable to suit operating and maintenance philosophy. The contractor shall have a capability of conducting reliability centre maintenance where the contractor will adhere to automated preventative maintenance stored in the system.

If there is any steel work repairs and steel sections, replacement need on the conveyors and stacker/spreader system, then the contractor need to do these steel work repairs.

The contractor is also responsible for any lifting which may be required during heavy equipment removal, handling and installation.

5. Quality Control

The contractor shall prepare a method statement for each and every to be executed and quality control document which are required to be sent for approval before any work can be executed. The Eskom Contract Supervisor of the area shall give a good ahead for any repair and installation that will be required.

All conveyor belt splicing must have quality control plan and be inspected by Eskom Contract Supervisor to ensure the quality work of the splice. The bolts and nuts shall always meet the design specification. If the contractor is not sure about the specification, he/she should consult with the Eskom Engineer of the area. All splicing of the belt will require the splicing procedure and quality control plan to be sent for Eskom review and approval.

All welding repairs and structural repairs must be done with accordance to Eskom latest version of welding rule book. All design standards must be adhered to and Welding Procedure Specification (WPS) must be approved. Welding Procedure Specification (WPS) must be supported by welding qualification records and welder's qualifications.

The *Maintenance* shall include as a minimum the following activities and interventions:

- Approval of Method Statement and quality control plan – hold point for Engineer;

5.1 Procedures, Guidelines & Other Documents

- Quality Control Plan.
- Method Statement.
- Splicing procedure submitted by the contractor.

6. General

The contractor must have enough artisans and laboures to maintain the inside and outside running plant, during the stacker shifting period or during the belt and rail extension on the spreader machine. He/she may reduce his/her work force during the normal operation of the ash conveyor plant.

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The contractor is also responsible for the general site cleaning and workshop cleaning.

The contractor must have at least eight responsible persons who can take out plant isolation permits and he/she must supply sufficient manpower for standby purposes. The working hours during plant breakdowns must not exceed the hours as specified by law. The contractor must be able to replace tired workers. There should be sufficient personal that the Contractor can work at four places at the same time. Each team needs to work independently from other teams by have its own responsible person and artisans. The artisan of each team will communicate among the different teams and with operating and to his/her supervisors with two-way radios. The contractor should have two supervisors.

The contractor is responsible to dispose scrape metal in the correct bins and the spares and tools have to be safe keeping in the stores in a neatly manner.

The contractor personal has to be transported in buses with safety belts and the contractor may not transport his personal behind bakkies (LDV).

The contractor must perform tool box meeting every morning before any work can start and the contractor must also inspect the tools for safe usage.

The contractor is to perform a risk assessment before any task is performed and he/she is to refer to the attached "Safety and health & environmental requirements for contractors" to insure safe working environment.

The contractor is responsible for lifting slings and chain blocks inspection. All lifting equipment must be inspected by Eskom and the contractor is responsible to take it to the riggers' work shop for testing and inspection.

In case for replacements of any gearbox, pulley and fluid drive, the contractor must take the defected gearbox, pulley or fluid drive to Eskom's Main Stores for repairs. All spares, including belts must be handled by the contractor. The contractor may use the crane with the operator and the tractor and trailer from Eskom. He/she has to make all the arrangements.

- Contractor to provide rigging equipment up to 15 Tons
- Contractor to provide Hydraulic bearing puller on an "as and when required" basis to perform work
- Alignment Technicians must be able to perform laser alignment and provide certificates after every alignment activity
- All work will be issued via SAP Maintenance system.
- The *Employer's* Lifesaving rules, Safety rules / procedures to be adhered to.
- Standby crew to attend to breakdowns on an "as and when required" basis.
- All Artisans to be authorized in terms of Plant Safety Regulations (PSR) within 6 months after the contract has been awarded.
- The *Contractor* must provide Quality Control Plan documents for approval by *Service Manager* prior to performing any activity.
- The *Contractor* to provide proof of experience (CVs) and qualifications for all personnel.
- The Artisan must have a Red Seal qualification (section 28 will not be allowed)

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- In the case of absence for more than two days (Sick or Annual Leave) a substitute must available to maintain the plant.
- In the case where one or more employees of the *Contractor* are requested to leave site for other reasons than Annual leave or negotiated leave with the *Service Manager*, The personnel must be replaced immediately with the same skill level, qualifications and experience
- Rigging tools and electrical equipment to be inspected regularly and filed as per the OHSACT requirement.
- All PPE to be provided by *Contractor*.
- Good housekeeping at all times. The *Contractor* must clean and remove all debris after completing a task.
- All communications must be printed and filed on *Service Manager's* file.
- Timesheets to be logged and signed by Contract Supervisor and *Contractor*.
- Daily attendance register must be submitted on a daily basis to the Contract Supervisor
- Site Manager to provide weekly plant status report
- Provide SANS approved Safety harnesses as per the Safety Requirements of the *Employer*.
- Yearly induction must be attended all personnel.
- Workshop portable tools to be provided by the *Contractor*.
- *Contractor* to provide QCP's and programme
- Safety Officer to provide monthly safety report

7. Man power:

- 1 x Site Manager
- 2 x Supervisors,
- 1 x Safety Officer,
- 8 x Artisans qualified Fitters, Each artisan with PSR. (belt training, bearings, hydraulics, 5 ton rigging, belt scrapers, gearboxes, couplings, fluid couplings, idlers, stacker/spreader, etc
- 2 x Riggers with a red seal,
- 8 x Semi-skilled,
- 8 x Assistants,
- 2 x Storemen
- 1 x Boiler maker
- 1 x Welder
- 2 x drive alignment technicians
- 6 x greasers
- 1 x Crane driver

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8 Tools and equipment:

- Eskom Standard Complete tool box set per artisan. Refer to artisan toolbox list.
- Torque wrenches
- Hydraulic pullers , 50 tons and 100 tons
- Hydraulic power pack with four 100 ton jacks
- Jacks, 25 mm, 50 mm, 100 mm,200mm and 300 mm
- 2 x Mobile Welders on trailers set.
- Generator 220/380V , 60 A
- 4 x 200 Watts Spot lights on stands
- 15 ton crane to handle heavy equipment.
- 4 – ton truck to transport any equipment on site.
- 2 x trailers for idler handling
- 4 x belt stands, two 10 tons and two 4 tons
- Angle grinders.
- Laser Alignment equipment and clock gauges for conveyor drives alignments. (Prufteknik)
- Two way radios with batteries and chargers.
- 2 x Long feeler gauges, 729865 B for pulley bearings
- 2 x HN 4-16 Hook spanner adjustable for pulley bearings
- 2 x TMFN 23-30 Impact spanner for pulley bearings
- 2 x TMFN 30-40 Impact spanner for pulley bearings
- 2 x TMFN 40-52 Impact spanner for pulley bearings
- 2 x TMJL 100- Hydraulic pump 100 MPa for pulley bearings
- 2 x 7298619 E – Hydraulic pump 150 MPa for pulley bearings
- 2 x Copper hammer, THO527 – 0160 – 25 mm for pulley bearings
- 2 x Copper hammers, THO527 – 0161 – 32 mm for pulley bearings
- 2 x Lock spanner set, TMHN 7 for pulley bearings
- 2 x Hydraulic nut, HVM 34E for pulley bearings
- 2 x Hydraulic nut, HVM 36E for pulley bearings
- 2 x Hydraulic nut, HVM 38E for pulley bearings
- 2 x Hydraulic nut, HVM 44E for pulley bearings
- 2 x Hydraulic nut, HVM 48E for pulley bearings
- 2 x Hydraulic nut, HVM 52E for pulley bearings

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- 2 x Axial lock nut socket, TMFS 11 for pulley bearings
- 2 x Axial lock nut socket, TMFS 16 for pulley bearings
- 2 x Axial lock nut socket, TMFS 17 for pulley bearings
- 2 x Axial lock nut socket, TMFS 20 for pulley bearings
- 750 kg chain blocks per artisan.
- 2 x Mobile cutting torch trailers with spare wheels and fire extinguishers.
- Belt clamps. 4 x 750 mm, 4 x 1200, 4 x 1800.
- HDPE class 16 pipe welding machines, from OD 63 to OD 355.

9 Price list:

Item	Description per Unit	Unit	Expected Quantity	Rate	Price
1	Monthly fixed cost	/ month	60 months		
	1 x Site Manager	Hr			
	2 x Site Supervisors	Hr			
	1 x Safety Officer	Hr			
	8 x Qualified Fitters	Hr			
	2 x Riggers	Hr			
	8 x Semi-skilled	Hr			
	8 x Assistants	Hr			
	2 x Storemen	Hr			
	1 x Boiler maker	Hr			
	1 x Welder	Hr			
	2 x drive alignment technicians	Hr			
	1 x HDPE pipe welder	Hr			
	6 x greasers	Hr			
	1 x Crane driver	Hr			

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2	Saturday Overtime				
	Site Supervisor	Hr			
	Safety Officer	Hr			
	2 x Fitter	Hr			
	Rigger	Hr			
	2 x Semi- skilled	Hr			
	Assistant	Hr			
3	Sunday / PH Overtime				
	Site Supervisor	Hr			
	Safety Officer	Hr			
	2 x Fitter	Hr			
	Rigger	Hr			
	2 x Semi- skilled	Hr			
	Assistant	Hr			
4	Standby allowance for 1 team	/week			
	a) Fitters 1 Off				
	b) Semi –skilled 2 Off				
	c) Supervisor 1 Off				
	d) Assistant 1 Off				
5	Site establishment	Sum	1		
6	Artisans tool box sets	Sum	8		
7	Other tools and equipment as per section 8.	Sum	1		
8	Site de-establishment	Sum	1		
9	Compilation of safety file	Sum	1		
10	Safety induction	Sum	1		
11	Personal transport	Sum	60 months		
12	Accommodation	Sum	60 months		

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- **Accommodation and traveling will be included in hourly rates.**
- **Total cost breakdown must be submitted by the *Contractor***
- **In the case where the *Contractor's* site has already been developed no Site establishment will be applicable**

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ARTISAN TOOLKIT - MECHANICAL:

QTY	DESCRIPTION	SIZE	MAKE	PRICE
1	TOOLBOX	5 TIER	AUDELL	
1	PADLOCK	50MM	VIRO	
1	IMPERIAL ALLEN KEYS	1/16" – ½ "	FUHR	
1	METRIC ALLEN KEYS	1,5 – 12MM	FUHR	
1	HAMMER (BALL POINT)	300G	LASHER	
1	HAMMER (BALL POINT)	900G	LASHER	
1	SHIFTING SPANNER	300MM	GEDORE	
1	SHIFTING SPANNER	150MM	GEDORE	
1	DIVIDER	150MM (50/6)	GROZ	
1	FEELER GAUGE	26 BLADE	BOKER	
1	CENTER PUNCH		GEDORE	
1	STEEL RULE	300MM	S/STEEL	
1	STEEL RULE	150MM	S/STEEL	
1	HACKSAW FRAME	300MM	ECLIPSE	
1	TIN SNIPS	250MM	WISS	
1	VICE GRIP	137/250MM	GEDORE	
1	WATER PUMP PLIERS	145/250MM	GEDORE	
1	ENGINEERS INSULATED PLIERS	200MM	MTS	
1	FLAT BASTARD FILE	250MM	PFERD	
1	FLAT 2 ND CUT FILE	250MM		
1	FLAT SMOOTH FILE	250MM		
1	FLAT 2 ND CUT FILE	200MM		
1	FLAT SMOOTH FILE	200MM		
1	FLAT 2 ND CUT FILE	150MM		
1	FLAT SMOOTH FILE	150MM		
1	BOBBEJAAN SPANNER	350MM	GEDORE	
1	CHISEL FLAT	16 X 150MM	MITCO	
1	TAPE MEASURE	5M	STANLEY	
1	SCRIBER	150MM	GROZ	

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8	FILE HANDLES (PLASTIC)		PFERD	
1	PAINT BRUSH	25MM		
1	SOFT FACE HAMMER (NYLON)	40MM	WERA	
1	COMBINATION SPANNER SET	6 – 32MM (18)	GEDORE	
1	ENGINEER SQUARE	100MM	GROZ	
1	PIPE WRENCH	227/350MM	GEDORE	
1	INSULATED ENGINEERS PLIER	200MM	MTS	
1	BLACKTIP SCREWDRIVER SET	6 PIECE	WERA	
1	VERNIER 530-102	200MM	MITUTOYO	
1	MICROMETER	0-25MM	MITUTOYO	
1	SCREW CUTTING GAUGE		GROZ	
1	SCREW PITCH GAUGE		GERMAN	
1	RADIUS GAUGE	26M	M&W	
1	HAMMER	4LB	LASHER	
1	DRIVE C19 TMZ SOCKET SET	½"	GEDORE	
1	TOMMY BAR	450MM	AFTOOL	
	OTHER TOOLS & EQUIPMENT: Refer to section 8 to see the other tools and equipment list.			

Notes: Each artisan to have his own toolbox as per tool list above.

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8. Acceptance

This document has been seen and accepted by:

Name	Designation
Monyane Mokoena	Tutuka Auxiliary Engineering Manager
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9. Revisions

Date	Rev.	Compiler	Remarks
December 2020	0.1	T Mamphogoro	Draft
January 2021	1	T Mamphogoro	The document has been finalised.

10. Development Team

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

- Thabelo Mamphogoro
- Egard Janse Van Rensburg

11. Acknowledgements

- N/A

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