Eskom	Work Instruction	Medupi Power Station Project

Title: **Work Instruction: Commissioning and Completion of Medupi Power Station**

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1. Introduction

1.1 Objectives

The objective of this document is to ensure a standardised approach, actions and sequence when performing the “Commissioning and Completion of Medupi Power Station” process.

The document will also ensure that all activities, mechanisms and controls are clear at any stage of the process. This in turn enables the business to ensure the safety of people and plant and that Commissioning is executed in accordance with the User requirements based on FIDIC Contract or NEC Contract principles.

Furthermore, the document clearly shows those individuals responsible and accountable for ensuring the successful implementation of the process.

2. Supporting Clauses

2.1 Scope

The document will also ensure that all activities, mechanisms (enabling artefacts) and controls are clear at any stage of the process. This in turn enables the business to ensure the safety of people and plant and that Commissioning is executed in accordance with the User requirements based on FIDIC Contract or NEC Contract principles.

2.1.1 Purpose

The purpose of this work instruction is to ensure that the following objectives are achieved:

a) To ensure that the requirements of the OSH Act and the Employer’s Safety Standards are effectively implemented by the Employer’s and the Contractor’s personnel.

b) To establish meaningful communication links and interfaces between Medupi Power Station Project, Contractors, and Power Station staff.

c) To ensure that contractual requirements are met in a timely and cost-effective manner and that the Employer is not put to any disadvantage by having to bear liabilities which are the responsibility of the Contractor.

d) To ensure that all appropriate quality related requirements are met through applicable management system practices such as inspection, testing, quality control and quality assurance.

e) To ensure that the Power Station receives an asset on the planned date that is capable of commercial operation and fit for its purpose as planned in the Station URS.

Stipulate roles & accountabilities of Contractors, Team Medupi, and Generation.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

2.1.3 Effective date

Date of authorization of the work instruction.

2.2 Normative/Informative References

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

2.2.1 Normative

[1] ISO 9000 Quality Management Systems – Fundamentals and Vocabulary

[2] ISO 9001 Quality Management Systems – Requirements

[3] SANS 10142-1:2009 The Wiring of Premises – Part 1: Low-Voltage Installations

2.2.2 Informative

[4] 348-961711 (PPZ 200 5919) – Execution Plan

[5] 348-883902 (PPZ 200 1679) – Project Quality Plan

[6] 348-653867 (PPZ 200 5665) – Development and Change of Medupi QMS Documents

[7] 348-883808 (PPZ 200 1680) – Document and Records Management Work Instruction

[8] 240-114967625 - Operating Regulations for High Voltage Systems

[9] 348-702600 (PPZ 200 15406) – Take over Certificate

[10] 348-882606 (PPZ 200 64535) – Hand over review and Process

[11] 32 365 Completion of Power Plant Projects, Commissioning, Take-over from Contractors and Hand-over to the Generation Business

[12] 240-150642762 (36-681) – Plant Safety Regulations

[13] 201-504 – Project and Package Close-out and Post Project Review Guideline

[14] 240-53113685 – Group Technology Design Review Work instruction

[15] 240-53114026 – Group Technology Engineering Change Management Work instruction

2.3 Definitions

Term	Definition
Activity/Process Step	An activity is a single step/action/task in a process. An activity is usually
Certificate of Compliance	A certificate issued by an accredited person in respect of an electrical installation.
Cold Commissioning	Verifying and adjusting for service an item or section of plant which has been completed successfully, inspected, safety cleared and pre-commissioned, Characteristic for this phase is the lack of operating medium or fuel in the systems, energising takes place temporarily only and equipment and systems are not ready for continuous operation

Term	Definition
Commercial Operation Date	The date on which the System Operator and the Client deem and declare the plant ready for commercial operation
Commissioning	The process of putting into service an item of plan, which has been successfully tested and safety cleared in accordance with the contractual and performance requirement
Commissioning Manager	The person appointed by the Project Director to be accountable for the overall commissioning of the plant
Commissioning Period	The period from the date that the Safety Clearance Certificate is issued until the date that Take-Over is certified.
Commissioning Working Party (CWP)	A body of persons who meet as appointed, to coordinate and implement appropriate commissioning activities required to establish the performance of machinery and equipment under its control. Also, responsible for determining the adequacy of testing of plant for initial energising and controls the issuing of the safety clearance certificate. The SWP can be assembled at any time when requested to by the Commissioning manager to attend to problems that may arise requiring the dedicated attention of specialist persons
Commissioning Working Party Chairman (CWPC)	The person appointed by the Commissioning Manager to be responsible for the coordination of the commissioning of a defined item of plan.
Completion	When all requirements and obligations for completion as detailed in each specific contract have been met
Construction Period	The period from the Commencement Date until a safety clearance has been issued
Contractor	Means the person(s) named as contractor in the Letter of Tender accepted by the Employer and the legal successors in title to this person(s)
Day	Means a calendar day
Defects Notification Period	Means the period for notifying defects in the Works or a Section calculated from the date on which the Works or Section is completed.
Unit Manager	The Person appointed by the General Manager to be accountable for the Construction of the project.
Employer	Eskom Holdings Limited Reg. No. 2002/015527/06.
Employer's Requirements	Means the document entitled Employers Requirements as included in a design and build Contract. It specifies the purpose, scope, and/or design and/or other technical criteria, for the Works.
Energising	The application of voltage to machinery by electrical connection from other energised power systems or putting into operation by mechanical means or charging of pipe work or ducts, or loading of foundations.
Eskom Engineer	The employer's engineer responsible for a particular plant system.
FIDIC Engineer	Means the person appointed by the Employer to act as the Engineer for the purposes of the Contract.
Hand-over	The process of taking-over the responsibility for all, or part of the project, or its deliverables from the Contractor and transferring it to the Client. It is also the hand-over of the statutory accountability of the plant and equipment and includes all relevant documentation required to operate and maintain the plant. Typically, this takes place at the end of the project, or a major part thereof.

Term	Definition
Hot Commissioning	Putting into service and item or section of plant which has been completed successfully, inspected, safety cleared and pre-commissioned. Characteristic for this phase is the presence of operating medium and fuel in the systems, the permanent energising of equipment and systems and their readiness for continuous operation
Inspection	The process of measuring, examining, testing, gauging or otherwise comparing one or more attributes of a product with the applicable requirements.
ISO 9001	The ISO 9001 is a member of the ISO 9000 family. The ISO 9000 family of standards relate to quality management systems that are designed to help organisations ensure they meet the needs of customers and other stakeholders. The standards are published by the International Organisation for Standardisation (ISO)
OSH Act	Occupational Health and Safety Act number 85 of 1993, as amended.
Optimisation and Testing of Complete Plant	Adjusting of settings and controls and proving the plant meets the requirements set forth in the Contract.
Performance Certificate	A certificate issued by the Engineer that is deemed to constitute acceptance of the Works. The Certificate is issued under Sub Clause 11.9 the FIDIC Contract.
Permit to Work	Means a written declaration on the permit to work form, signed by the appointed person and issued to the responsible person in charge of the work, informing the latter that the plant to be worked on has been isolated as detailed.
Possession	The permission for the area, building or machinery to be used for carrying out the work subject to the regulations pertaining to Plant Permits and Work Permits.
Power Station Representative	The person appointed by the Power Station Manager to represent the Power Station (Client) at Team Medupi for the acceptance of plant on behalf of the Power Station Manager
Pre-Commissioning	Comprises all activities and testing prior to applying energy, excluding all power supplies required for pre-commissioning. These are activities witnessed or executed by commissioning staff which may be carried out parallel to construction and assembly.
Process	A Process is a composition of logically related business activities that together achieve a specified outcome or result. A process usually represents a subject or service area within a value chain.
Process Owner	Business individual that has the ultimate responsibility for the successful implementation (manually or through IT solutions), performance and continuous improvement of all levels of a specific process. The process owner is empowered and has the authority and ability to make decisions on necessary process changes.
Quality	The combination of features and characteristics of a product, process or service that have an impact on its ability to satisfy stated or implied needs.
RACI Matrix	The RACI matrix is a responsibility assignment matrix that describes the participation by various roles in completing tasks or deliverables for a business process.

Term	Definition
Safety Clearance Certificate	A certificate issued by the Employer to the Contractor that is mutually agreed with the Power Station and Contractor's representative that from the time and date stated the specified machinery is under the Employer's control. Further access to machinery is only permissible through the Employer's plant/work permit system. Plant must be Safety cleared before being energized from a permanent source of supply.
Start-up Meeting Committee	A body of persons who meet as necessary, to schedule commissioning activities chaired by the Commissioning Manager.
Sub-Process	A sub-process is a grouping of logically related business activities that are executed in parallel or in a specific sequence to achieve an outcome.
Taking Over	Process of transfer of responsibility for all, or part of a project, or its deliverables to the Employer form the Contractor.
Taking-Over Certificate	Means a certificate issued under Clause 10 of the FIDIC Contract (Employer's Taking Over)
Team Medupi Commissioning Representative	The person appointed by the Commissioning Manager to be responsible for the overall commissioning of specific plant.
Testing	The application of prescribed test loads or checks to ensure compliance with the applicable requirements.
Tests After Completion	Testing of the Works or a Section of the Works after the Works or Section has been taken over by the Employer.
Time for Completion	Means the time for completing the Works or a Section of the Works calculated from the Commencement Date
Works	Mean the Permanent Works and the Temporary Works, or either of them
Year	Means a period of 365 Days

2.4 Abbreviations

Abbreviation	Explanation
AFI	Application for Final Inspection
BoP	Balance of Plant
CoC	Certificate of Compliance
CWPC	Commissioning Working Party Chairperson
FAT	Factory Acceptance Test
FIDIC	Federation Internationale des Ingenieurs (The Federation of Consulting Engineers)
GT	Group Technology
ISO	International Organisation for Standardisation
KPA	Key Performance Area (s)
KPI	Key Performance Indicator (s)
LPE	Lead Project Engineer
MET	Medupi Execution Team, succeeded in title by Team Medupi

Abbreviation	Explanation
NEC	New Engineering Contract
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
ORHVS	Operating Regulations for High Voltage Systems (Eskom)
PCR	Pre-Commissioning Review (Construction Completion Review)
PSR	Plant Safety Regulations (Eskom)
SABS	South African Bureau of Standards
SANS	South African Nation Standard
SAT	Site Acceptance Test
SCC	Safety Clearance Certificate
UM	Unit Manager
URS	User Requirement Specification
VDSS	Vendor Document Submittal Schedule

2.5 Roles and Responsibilities

The parties or stakeholders responsible (R) and accountable (A) or to be consulted (C) and/or informed (I) relative to the implementation and maintenance of this QMS Terms of Reference document are defined in the Terms of Reference document RACI Matrix documented below:

Role	Responsibility	Description
Process Owner	Self-Assessment	The process owner for the Commissioning and Completion of Medupi Power Station will perform a self-assessment on the compiled work instruction.
	Process Execution	The process owner will direct the execution of the business process, sets operational goals and acts as mediator in the event of severe process dissimilarities amongst process users. He or she will ensure effective deployment of the process and IT applications and solutions to support the business process.
	Process Improvement	The process owner is responsible for effective performance monitoring to ensure quality process output and deliverables
	Process Review	The processes will be reviewed once every six (6) month. If the process has changed then the standard work instruction manual will need to be updated.
Lead Project Engineer	Update	The Lead Project Engineer shall:

		a) Review of commissioning documents and work instructions for Commissioning to implement. This is done in conjunction with the commissioning department. b) Do Construction Completion Review as per 240-53113685 to support commissioning activities as shown on the commissioning schedule. Liaise with the Quality department to ensure that data books are reviewed. c) Do Acceptance Testing Review "Establish agreed As-Commissioned Baseline by Verification that plant/asset performance and functions meet stakeholder/technical requirements". d) Sign off Contractors application for inspection of the Works" as per 348-860840 (Commissioning and completion Work instruction of Medupi Power Station). This form confirms that the contractor submitted all documentation that his professional engineer signed off that plant was built according to design and that Eskom Engineering completes a Pre-Commissioning Review (PCR). e) Attend start up meetings and participate in Commissioning Working Parties. Play integration role between different contractors and disciplines. NB: Mechanical Engineering to take the lead in this process. f) Resolve plant issues relating to the technical integrity of the Project. Follow NOD work instruction. g) Monitor acceptance and performance tests as specified in Contracts. h) Witness plant optimization. i) Manage the Engineering changes that might result during the commissioning phase.
Project Quality Manager	Quality Assurance	The Project Quality Manager will evaluate the implementation of this work instruction to ensure compliance to QMS quality requirements, and: a) Arranges AFI Walk down and require checks b) Ensures ITPs, Checklists and Test Certificates are signed off and inspections are carried out.

		c) Initiates, Tally defects, categorise and signs Punchlist. d) Signs off AFI. e) Submits AFI to Contractor / Eskom Commissioning. f) Registers AFI and Punchlist status. g) Re-inspects Punchlist items upon receipt of I&TN.
Human Resources	Process Training	The Human Resources unit is responsible to ensure that management; process participants and customers are adequately trained and understand the process.
Risk Management	Process Risk Management	Risk Management is responsible for risk identification and assessment.
Unit Manager		a) The Unit Manager ensures that the requirements for construction completion, plant checks, commissioning, take-over and hand-over are included in the Project Management Plan and Project schedule. b) Establish communication/interface links and meet on a regular basis with the Contractors, Construction Discipline Managers, Supervisors, Quality representatives, Engineering, Commissioning Managers and the Power Station Representatives for the purpose of discussing issues such as: • Safety assurance • Quality assurance • Construction • Hand-over to Commissioning • Take-over • Any other relevant issues c) Identify those working areas, buildings, machinery, etc. where possession, Safety clearance, Test on completion, Take-over certificate, Defects Notice and Performance certificate, as appropriate are to be issued. d) Ensure all terms and conditions of the contract are complied with. e) Ensure erection checks are done.

		f) Ensure that defects and deficiencies found during the Construction, Commissioning and Defects period are corrected. g) Effect sectional completion hand-over inclusive of the hand-over documentation packages to the Client's Representative. Ensure that a commissioning work instruction and Pre-Start check sheets are compiled by the Contractor for each plant system / sub-system and plant item requiring commissioning. These documents must be submitted to Engineering for review. a) Submit documentation of control demonstration and unit capabilities.
Commissioning Manager		a) The Commissioning Manager is responsible for the management and overall coordination of the Commissioning activities and the Commissioning Team. The Commissioning Manager is accountable for start-up activities at the site. b) Main duties are: 1. Plan the commissioning activities. 2. Chair the Start-up meeting. 3. Coordinate commissioning activities between the Contractors, Engineering, Team Medupi Construction Supervisors, Unit Managers, Site Engineering Manager Eskom Engineers, and the Client's Representative and ensure interfacing between all parties. 4. Appoint a CWPC who plans and coordinates all safety clearance inspections and commissioning activities for a defined item of plant. 5. Ensure that Safety clearance certificates are completed and signed. 6. Ensure that appropriate operating instructions are issued and adhered to in accordance with the Contractor's specifications when safety clearance certificates are issued.

		7. Ensure that Tests after completion are carried out in accordance with the documented plan with clearly set time periods and requirements and plant performance complies with the acceptance criteria stipulated in the individual contracts and the URS. 8. Manage the Permit to Work system with Generation employees and ensure that the required permits are issued to all personnel that require performing work (as per PSR and ORHVS) on the plant after the safety clearance certificate has been issued. 9. Ensure co-ordination of and integration of all isolations on the plant in preparation for a permit to work or work permit. 10. Maintain a cooperative relationship with the construction group for the management and scheduling of plant, equipment and system hand-over to commissioning.
Commissioning Senior Advisor/Supervisor		a) Coordinate all commissioning activities with the Contractors. b) Ensure latest revision of Plant Operating work instructions is available. c) Participate actively as part of the commissioning working party. d) Perform good relationship management between the different OEM's. e) Supervise Contractors Commissioning personnel when executing activities. f) Supervise and ensures that all statutory inspections and tests are executed before plant is put into operation. g) Through plant inspections and audits, ensures that the OHS Act and construction regulations are compiled to. h) Responsible for the correct implementation of work instructions and policies. i) Conduct plant inspections on site to ensure compliance to specification as pre- engineering specifications. j) Raise Notification of defect (NOD) when deviations are noted from the required scope of work.

		k) Perform Safety Clearance of plant prior to energising. l) Actively participate in the Start-up meeting permit to work planning session and advise accordingly. m) Supervise and raise defects through plant inspections and safety audits. n) Manage and ensures that defects reported during Commissioning Phase are closed out. o) Stop Work if the Contractor does not comply with the Eskom regulations. p) Supervise the execution of commissioning and measuring activities against such project plans. q) Chairs meetings with different contractors and Eskom departments to ensure proper commissioning integration between contractors. r) Conduct regular communication sessions and meetings with regards to the progress on site with all relevant stakeholders. s) Interfaces with Engineering during document reviews. t) Has an in-depth knowledge of the commissioning information and all standards specified. Manages the plant commissioning activities to ensure compliance to practise, standards, work instructions, and relevant legislation.

Table 1: RACI Matrix

Subject Description	The Employer (in terms of Fidic)	The Engineer (in terms of Fidic)	The Contractor (in terms of Fidic)	Unit Manager	Project Engineering Manager	Quality Project Manager	Commissioning Manager	Risk Management	Commissioning Party Working Chairman (CWPC)	Commissioning Senior Advisor/Supervisor	Station Power Representatives	Planning
Contractor's application for inspection of the works			A	I	I	R	I	I		I	I	I
Start-up Meeting	I	I	I	I	I	I	A		I	I	I	
AFI plant inspection and documentation review				A	R	R	I	C	I	I		I
Final/Partial Inspection of the Works			R	R	R	I	A	I	R	R	R	I
Safety clearance			R	R	R	I	A	I	R	R	R	I
Pre-commissioning			R	I	C		A		R	R	I	I
Final commissioning			R	I	C		A		R	R	I	I
Commissioning Certificate			R	I	R		A		R	R	R	I
Tests on Completion			R	I	C		A		R	R	I	I
Take over certificate	I	R	A	I	I		I				I	I
Tests after Completion			R	I	C		A		R	R	I	I
Hand over to Generation	I	I	I	R	A		I				R	I

2.6 Related / Supporting Documents

Forms and templates

[1] 348-24473 Document Self-Assessment Template

Records

[2] Minutes of meetings

[3] Inspection & Test plans

[4] As-build documents

[5] Drawings and Specifications

[6] Calibration certificates

[7] Operating and control philosophy document

[8] FAT and SAT Certificates

[9] Check Sheets

[10] Inspection Certificate

[11] Safety Clearance Certificate

[12] Taking-over Certificates

[13] Performance Certificates

[14] Test Results sheets

[15] Hand-over documentation packages

[16] Contractor's Application for Eskom's Inspection of the works /part of the Works

[17] Defect notification

[18] Clearance of notified defects

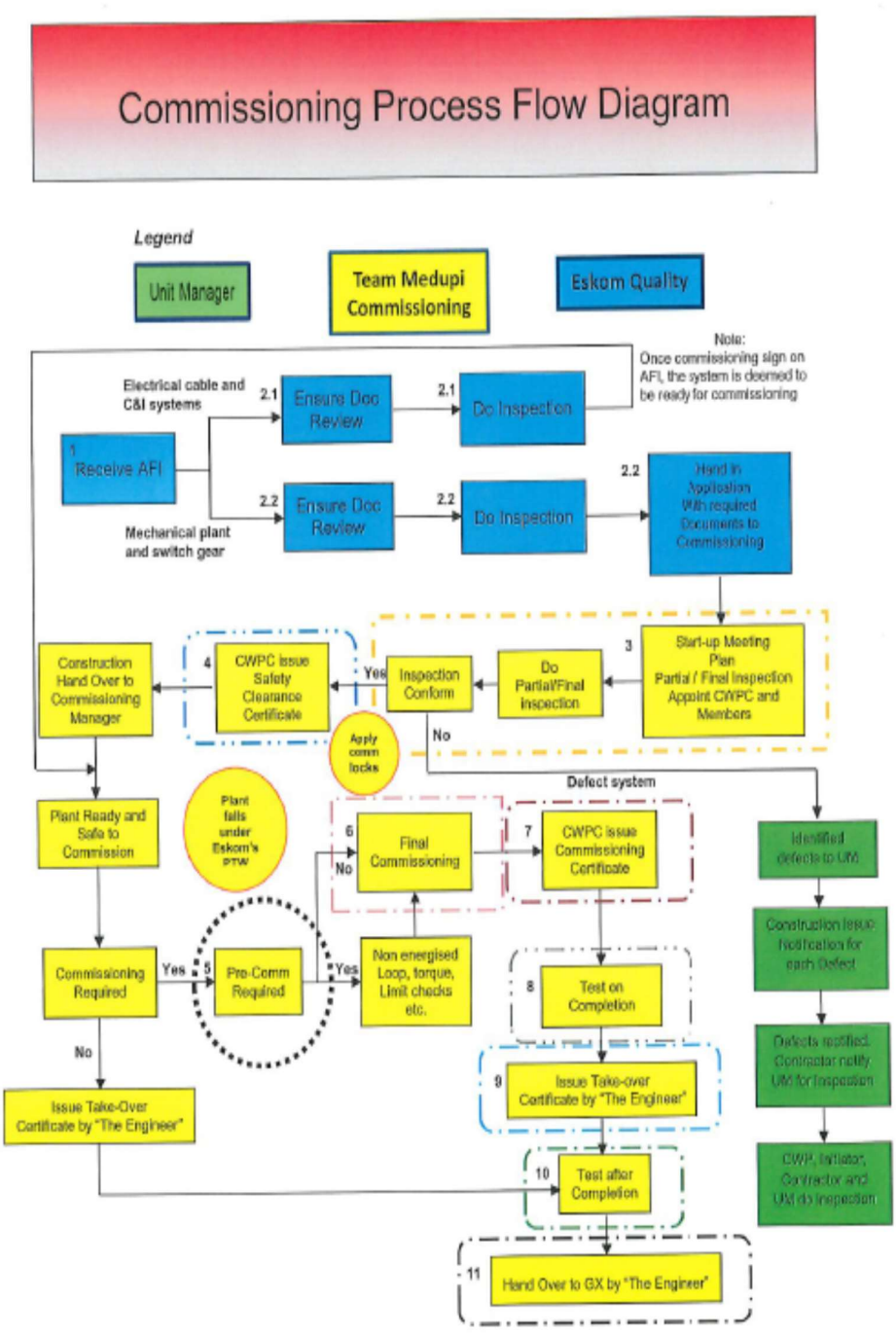
[19] Safety and Housekeeping Certificate

[20] Provisional Hand-over Certificate

[21] Modification Register

3. PROCESS DEFINITION

3.1 Process Map / Flowchart



3.2 Phases

a) Receive AFI's
b) Inspection
c) Start-up meeting / Final Inspection
d) CWPC Issue Safety Clearance Certificate
e) Pre-Commissioning
f) Final Commissioning
g) CWPC issue Commissioning Certificate
h) Test on Completion
i) Issue Take-over Certificate
j) Test after Completion
k) Hand Over to GX

3.3 Meetings to be held during contract period

a) The FIDIC Engineer convenes regular contractual project meetings.
b) The Commissioning Manager convenes regular Start-up meetings.
c) The CWP convenes meetings as and when required.
d) The Engineering Manager will ensure review meetings are held prior to Safety Clearance. The meeting will review all documentation applicable to that Plant prior to the inspection to ensure that all criteria have been met.
e) The proceedings of all meetings are recorded, and a copy of the minutes placed on the project file and recorded in the Documentation centre.

3.4 Inspections

The Unit Manager to ensure all inspections during construction and tests are carried out according to approved Inspection and Test Plans. The Unit Manager will co-ordinate all activities with the Contractor for the purpose of commissioning to the Start-up meeting.

3.5 Commissioning

Commissioning structure planning methods:

- The Commissioning Manager appoints a Commissioning Working Party Chairman (CWPC). The Team Medupi CWPC will liaise with the Contractors Commissioning Representative in all matters related to commissioning.

- All commissioning activities are planned via the scheduled Start-up Meetings.
- The minutes of the Start-up Meeting reflect all Commissioning activities as per the Project Plan and Commissioning Schedules.

The minutes of the Start-up Meeting reflect the following:

a) Milestone dates
b) One- and Six-week window
c) Commissioning activities
d) Safety clearance register
e) Plant exception register
f) Contractor requirements
g) Plant Permit status (current, new and cleared)

The Commissioning Manager chairs all Start-up Meetings.

The CWPC schedules meetings as and when required to discuss programme, progress and problem areas. The CWPC reports progress at the Start-up meeting as and when required. Persons to attend all start up meetings: Commissioning Representatives, Contractors Commissioning Representatives, CWPC, and representative of Unit Managers, Commissioning planner, Construction Supervisors, Generation representatives, Engineering, Quality and Safety.

3.6 Test on Completion

The Contractor shall carry out the Tests on Completion after providing the documents in accordance with Sub-Clause 5.6 (As-Built Documents) and 5.7 (Operation and Maintenance Manuals).

3.7 Works Inspection

The Unit Manager monitors the plant and the accepted construction/ commissioning programme. Contractors' application for inspection of the works will be submitted to the UM by the Contractor Construction department.

Inspection of the Works to be carried out by the UM, Engineering, Quality, and the Contractor. If work conforms a documentation review is held to determine if the minimum documentation for Safety Clearance as required by Engineering has been submitted by the Contractor to complete a PCR. The Unit manager representative, Engineering, Quality, and the Contractor sign the application for inspection. Team Medupi Commissioning requires the following minimum documents attached to the original Contractors application for inspection form to proceed with Final/Partial inspection and Safety clearance:

a) Signed Contractors application for Inspection of the Works
b) KKS Certificate
c) Earthing Certificate

d) P&ID/Single line drawings, GA and cable schedules

e) Exception form if required

f) Defect list

g) Commissioning work instruction

h) Commissioning schedule

i) Highlighted P&ID of plant that needs to be Safety cleared

j) A list identifying boundary points to be locked out, between plant that has been Safety cleared and plant that is still under construction.

If the Partial/Final inspection carried out by Commissioning fails, the Unit Manager will ensure that defects are corrected. A new Contractor application for Inspection of the Works will be submitted by the Contractor to Eskom Quality, plant inspection and documentation review will only be done on the affected areas. Upon approval of the re-submitted AFI by Quality Department, a new Application gets submitted to the Start-up meeting and a new inspection date is arranged by Eskom Commissioning department within 24 hours.

On completion of the inspection, the CWPC in consultation with the CWP members will decide if the plant conforms to the standard as specified and is within the scope of the request as submitted by the Contractor. If the plant conforms to the standard as specified, the CWP issues a part/final Inspection Certificate. This Partial/Final Certificate, with its relevant Quality records, forms the package required for safety clearance and commissioning to start.

A list of defects/punch list items will be handed over to the CWPC who will ensure it gets captured and discussed at the Start up meeting on a weekly basis. The Unit Manager is responsible to arrange for rectification and clearance of the defects.

The Commissioning Senior Supervisor will, in conjunction with the OEM Commissioning Supervisor / Engineer apply commissioning locks as required by the OEM commissioning team and tag the relevant plant with tags (sticker) indicating “Commissioned”, this applies to electrical and mechanical plant systems.

3.8 Safety Clearance of the Works or Section of the Works is <u>not</u> required when

a) Plant is energised from an external energy source other than the permanently installed plant i.e portable pumps, compressors, generators etc. (Not Eskom supply).

b) Pressure testing, leak testing and flushing activities are considered Construction activities and do not need to be Safety cleared prior to the test with the proviso that it is energised or supplied from a non-permanent energy source.

c) During Construction the Contractor will manage his own permit system as well as having a process in place to Safety check parts of the plant for the purpose of flushing and leak testing. Before applying any form of energy to a part of the plant during construction it must be communicated to the Contractor’s Commissioning and Construction managers who will evaluate the activity by doing a risk assessment.

d) Plant that has been Safety checked during the Construction phase by the Contractor for the purpose of flushing, cleaning or leak testing may after completion of the specific activity and if disconnected and dissipated of all energy sources, revert to a condition of Construction phase. All such situations will be evaluated by the relevant parties after a risk assessment has been done.

e) On completion of construction and before energizing from a permanent source the Eskom Safety Clearance process must be followed.

f) Safety clearance is not required for the following Control and Instrument equipment. Inspections by Commissioning will be done during the AFI inspection.

- DCS cubicles, network cubicles, HMI stations, control desk and engineering work stations.
- All field instrumentation (transmitters - 2 and 4 wire, convertors, TC`s, pneumatic actuator, analysers, etc.), including instrument cables and impulse lines.
- Junction box and trunk cables.
- LCS`s.
- Actuator splitter boxes including control and power cables.
- MV and LV switch gear interface.
- 24 V DC, 220V AC cables to DCS cubicles, sub-distribution boxes, burner cubicles and instruments power by 220V AC.
- C&I sub-distribution boxes.

g) Safety clearance not required for the following Electrical equipment. Inspections and verification by Commissioning will be done during the AFI inspection.

- All 11kV, 6.6kV, 690V, 400V, 220V and 220V DC electrical cables.
- Control and protection cables.

3.9 Safety Clearance of the Works or Section of the Works is required when:

Plant or equipment is energised from a permanent installed source. The CWPC in consultation with, GT, UM, Contractors Commissioning and Generation issue a Safety Clearance Certificate declaring the plant to be safe and ready for commissioning.

Rejected safety clearances follow a remedial path, as agreed with the Contractor, and the re-planning of the activity follows. A new date is arranged at the Start up meeting. Whenever plant or equipment poses a risk to safety of personnel or plant a Safety clearance certificate will not be issued until it has been cleared. Other defects will be evaluated by the Working party.

When plant does not conform to the URS and technical specifications but is deemed operable and maintainable, a plant exception is requested from Group Technology Engineering via a plant exception form. On acceptance of such an exception, safety clearance / commissioning / provisional / final hand-over may occur.

In terms of this work instruction the Commissioning Senior Technician is responsible for the immediate distribution of the Safety Clearance Certificate once signed, and copies of other relevant attachments, to the parties concerned as listed on the certificate.

The plant or equipment will be handed-over by the Contractor to the Contractors Commissioning Manager in writing. The Plant is now the responsibility of the Contractors Commissioning Manager and falls under the Eskom Safety Regulations governing work through the Permit to Work system. Access to the plant areas being safety cleared will be granted by the Contractor's Commissioning Manager. A register will be kept and a permit issued to those who will be allowed on the respective plants. Commissioning of the plant may now commence, using the required commissioning work instructions, check sheets, operating work instructions and test result sheets. The scheduling of permits will happen at the Start up meeting.

3.10 Commissioning of Plant

a) All commissioning activities will be performed as outlined in the commissioning work instruction for the relevant plant.

b) Operating (Physically on the plant and from the Operating desk) of plant will be carried out by Generation Operating personnel under supervision and instruction of the Contractor Commissioning representatives.

c) Should the commissioning process be suspended for a prolonged period such as overnight, or if all parties have to leave for other commitments, the Team Medupi Commissioning Representative will secure the plant (commissioning lock) for that period.

d) Should it be necessary for work to be carried out on the plant or a sanction for test is in progress, the plant must be isolated and a permit to work issued as per Eskom's plant safety regulations.

e) The compilation of the Commissioning work instructions is coordinated by Engineering. The work instructions will be compiled by the Contractor and reviewed by Engineering and Commissioning.

f) Once the Works has been commissioned a Commissioning Certificate must be issued by the Commissioning department in consultation with the Contractor Commissioning Manager.

g) When plant does not conform to the URS and Technical specifications but is deemed operable and maintainable, a plant exception is requested by Engineering from the Client via a plant exception form.

h) On acceptance of such an exception, safety clearance/ commissioning/ provisional/ final hand-over may occur.

3.11 Taking Over of Pant

a) The works shall be taken over by the Employer when the works have been completed in accordance with the Contract.

b) The Contractor may apply by notice to the Engineer for a Taking-over Certificate not earlier than 14 days before the Works will be complete and ready for taking over. The Contractor may apply for Sectional take over if applicable.

c) The Engineer shall, within 28 days after receiving the Contractors application issue or reject the application.

d) The Employer shall not use any part of the Works until the Engineer has issued a Taking-Over Certificate.

e) After the Engineer has issued a Taking-Over Certificate, the Contractor shall be given opportunity to complete outstanding Tests on Completion if outstanding.

f) These tests will include the 72 Hour test run, Optimisation, Capability tests, 30 Day trial run, AVR testing etc.

3.12 Defects

a) The contractor shall complete any work which is outstanding on the date stated in a Taking –Over Certificate within the time as instructed by the Unit Manager and execute all work required to remedy defects or damage, as may be notified by (or on behalf) the Employer on or before the expiry date of the Defects Notification Period.

b) The Defects Period starts after Take -Over and ends at the Defects Notification Period. The duration of this period depends on the conditions as set out in the contract.

c) During the Construction phase all defects will be captured by Eskom Quality on Punchlists.

d) At Final inspection all outstanding defects will be captured by Quality in a centralised data base.

e) Defect corrections will remain the responsibility of the Contractor until the Defect's period expires.

f) The relevant Contractor will notify the Quality Department via Inspection and Test Notification once these defects have been cleared to arrange for an inspection and sign-off of defects.

g) The Contract Manager will arrange a defects period expiry meeting to discuss the close-out of defects and other noted issues in view of issuing the defects certificate.

3.13 Test after Completion

a) Tests after completion shall be carried out as soon as reasonably practicable after the Works or Section has been taken over by the Employer.

b) The results of the Tests after Completion shall be evaluated by the Contractor and the Employer.

c) Once all the required Tests on Completion have been carried out successfully, Eskom Generation can submit its application for Commercial Operation.

3.14 Performance Certificate

a) The Performance Certificate gets issued by the Engineer to the Contractor when the Contractor has completed his obligations under the Contract.

b) The Engineer will issue the Certificate within 28 days after the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects.

c) A copy of the Certificate shall be issued to the Employer.

3.15 Commercial Operation

The Client or the Client's Representative shall ensure adherence to the National Control Generation Asset Integration Grid Code Compliance Process Work instruction.

3.16 Hand-over

a) The Employer will hand-over the plant to Generation once all documents have been submitted, reviewed, tests completed, and training done.

b) When a unit and all of its associated plant is optimised, capabilities demonstrated, the 72-hour run completed and grid code compliant, the Project Director shall arrange for the hand-over of the plant to the Client. Such approvals affect the transfer of the asset and the control of the plant from the Contractors, Unit Manager to the Client (e.g. Power Station Manager), and this includes transfer of statutory accountability.

c) All hand-over documentation for packages to be handed-over will be kept in the project documentation management system and Document Management centre until the plant is handover to the Client. The relevant hand-over documentation package will be transferred to the Client's documentation centre. It should be noted that the Document Manager is ultimately responsible to ensure that these documents are always kept up to date.

d) The Handover process is the responsibility of Engineering.

3.17 Records

It is recommended that the hand-over certificate and documentation package such as signed-off quality control plans, plant check sheets, erection check sheets, pre-commissioning check sheets, commissioning check sheets, commissioning, and optimisation test results, etc. be kept for a period of at least ten (10) years by the Client. These documents should be used as inputs for the development of SAP PM (or similar plant maintenance system) task list masters for the purposes of routine plant maintenance and outage management. Engineering related information such as technical specifications, designs, P&IDs and drawings, data books, Operating and maintenance manuals, etc. shall be kept for the life of the power station.

4. Process for Monitoring

4.1 Key Performance Areas and Indicators

The following Key Performance Areas / Indicators (KPAs / KPIs) shall be measured, analysed and reported. The Process Owner shall be accountable, and assign the responsibility at the frequency as indicated below, documented as part of the QMS measurement, analysis and improvement initiative.

Table 2: KPAs/KPIs

Key Performance Area	Key Performance Indicator	Target	Measure Frequency	Responsible	Record
Safety Clearance	Final Inspection by Commissioning	Zero defects	AFI received	CWP	I&TR
	Safety Clearance	Zero defects	% Inspections failed	CWP	I&TR

4.2 Document Review and Self-Assessment

4.2.1 Document Self-Assessment

The “Process Owner” identified on the front page of this document along with departmental personnel and the project QMS Engineer shall undertake a “self-check” review of the process defined in this document at six monthly intervals, commencing from the effective date of this document, to check:

a) the process / work instruction operational integrity.

b) process efficiency.

c) the level of stakeholder knowledge and implementation.

Participants and results of the “self-check” review shall be documented by the Process Owner in the “Self-Assessment Checklist” ***(QMS Template No. QMS 348-24473)*** included as an Appendix to this work instruction which shall be issued to medupiqa@eskom.co.za by the Process Owner once completed.

Process Owner shall proceed with any revision requirements in line with Medupi Work instructions

348-653867 “Development and Change of Medupi QMS Documents” and 348-883808 “Document and Record Management”

4.2.2 Review Period

All QMS documented work instruction shall undergo a 3-year compulsory review period from the effective date.

4.3 Training Requirements

No project specific training required to implement the process documented in this document beyond normal job function.

5. Acceptance

This document has been seen and accepted by:

Name	Designation
Howard Matsepe	Manager Commissioning
Thabisile Biyela	Senior Manager Project Portfolio Delivery Construction and Commissioning
Rofhiwa Nemutandani	Middle Manager Project Engineering
Brenda Mgidlana	Middle Manager Quality Assurance
Joseas Seabela	Manager Documents and Records Management
Ntahli Khuzwayo	Middle Manager Safety and Risk Management
Elvis Modise	Middle Manager Project Management
Themba Nxumalo	Senior Advisor Quality Assurance
Lungisani Xaba	Senior Advisor Quality Assurance

6. Revisions

Date	Rev.	Compiler	Remarks
June 2024	10	H Matsepe	Updated document number to 348-860840. Changed to new Medupi template. Table 1: added Start-up Meeting on RACI matrix. Table 2 targets updated.
March 2021	9	H Matsepe	Review and updated signatories
February 2020	8	JF Els	Document review with minor changes. Commissioning Certificate signatories changed.
December 2017	7	JF Els	Review and updated the document. Changed to new Medupi Format
April 2016	6	JF Els	Safety Clearance Process amended for Electrical / C&I equipment; Commissioning Process Flow Diagram update
February 2016	5	JF Els	Remove the Contractors Application for Inspection of the Works from this document and change the Process Flow Chart. Revoke Safety clearance removed from Process.

7. Development Team

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

- Freddie Els
- Mietek Warchal
- Johan Venter

Appendix A – Process Self-Assessment Checklist

A.1 Process Self-Assessment Checklist

Discipline: **Commissioning**	Applicable Document No.: 348-860840				Self Assessment Date:
Item No	**Ref Section**	**Self-Assessment Question**	**Compliant**		**Comment**
			Yes	**Part**	**No**
1	3.5	Did the Commissioning Manager convene regular Start-up Meetings?			
2	3.5	Are proceedings of the Start-up meeting recorded?			
3	3.5	Are all commissioning activities planned at the Start-up meeting?			
4	3.7	Did the CWP after Final inspection issue a Partly/Final inspection certificate?			
5	3.7	On completion of construction, did commissioning do a Safety Clearance before energising the plant?			
6	3.5	Does Permit to work scheduling happen at the Start-up Meeting?			
7					
Comments:					

Self-Assessment by:	Name:	Position:	Revision Required? (Yes / No)	Planned Revision Date:
Attendees:				