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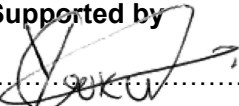


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2 Description of the Works

2.1 Executive overview

Kusile Power Station is a new-build coal fired power station located in the Nkangala district of Mpumalanga, South Africa. A 13m x 24m Workshop building is required for to perform maintenance on the mills.

The *Works* include:

- The detailed design review, procurement, installation, construction and commissioning of the building including associated civil and structural infrastructure such as, access roads, and landscaping in accordance with the *Employer's* design.
- Issuing of professional engineering certificates for building including associated civil and structural infrastructure such as access roads and landscaping upon completion.
- The procurement, installation, construction and commissioning of mechanical infrastructure in accordance with the *Employer's* detailed design
- The integration with Employer's design, procurement, construction, installation, commissioning and testing including providing documentation for the entire electrical reticulation.
- The procurement, construction, installation, commissioning and testing including providing documentation for the earthing and lightning protection
- The procurement, construction, installation, commissioning and testing including providing documentation for the lighting to ensure that the interior and exterior lighting for the Mill Maintenance.
- The procurement, construction, installation, commissioning and testing including providing documentation for the HVAC system for the scope of the project.
- The procurement, construction, installation, commissioning and testing including providing documentation for the Fire Protection and Detection systems for the scope of this project complies with 240 – 54937450 Fire Protection & Life safety Design Standard and 240 – 56737448 Fire Detection & Life Safety Design Standard, respectively and the requirements of this specification.
- The installation, commissioning, and testing including providing applicable documentation, for the CBMS interface for Fire Detection monitoring.

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2.2 Employer's objectives and purpose of the Works

The *Employer* requires a facility that performs maintenance and repair work of mill equipment.

2.3 Interpretation and terminology

2.3.1 List of Definitions

Table 1 - List of Definitions

Definition	Description
Employer	The person named as the Employer in the Appendix to Tender and the legal successors in title to this person.
Others	Others, as defined in this document includes the other discipline specific Contractors i.e. Electrical, Civil and Structural, etc.
Project Manager	The person appointed by the Employer to act as the Project Manager for the purposes of the Contract and named in the Appendix to Tender, or other person appointed from time to time by the Employer and notified to the Contractor as per NEC procedures.
Subcontractor	Party employed by the Contractor for specialised work (i.e. Electrical, Mechanical and Civil and Structural installations)
Technical Specification	The document/s forming part of the contract in which are described the methods of executing the various items of work to be done, as well as the nature and quality of the materials to be supplied and includes technical schedules and drawings attached thereto as well as all samples and patterns.

2.3.2 List of Abbreviations

The following abbreviations are used in this Works Information:

Table 2 - List of Abbreviations

Abbreviation	Description
AFC	Approved for construction
CBMS	Consolidated Building Management System
e.g.,	Example
FGD	Flue Gas Desulphurisation
GME	FGD Crystalliser Salts Recovery system
ISO	International Standards Organisation
kPa	Kilopascal
LOSS	Limits of Supply and Scope
LOSS	Limits of Supply and Scope
LPS	Low Pressure Services
OEM	Original Equipment Manufacturer
OHSA	Occupational Health and Safety Act

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Rev	Revision
SANS	South African National Standards
SGA	Fire and Floor wash system
SHEQ	Safety Health Environmental and Quality
VDSS	Vendor Document Submittal Schedule
WWTP	Wastewater Treatment Plant

2.3.3 Normative References

- [1] ISO 9001: Quality Management Systems.
- [2] Occupational Health and Safety Act No. 85 of 1993
- [3] 240-76992014: Project/Plant Specific Technical Documents and Records Management Work Instruction
- [4] 240-124499452 Kusile Project Document Work Instruction
- [5] 240-86973501: Engineering Drawing Standard
- [6] Construction Regulations, 2014
- [7] 240-53114026: Eskom Project Engineering Change Management Procedure
- [8] 240-53113685: Design Review Procedure

2.3.4 Informative References

- [1] 240-53114026 Engineering Change Procedure
- [2] 366-473709 – Mill Maintenance (Civil works datapack)
- [3] 366-439026 – Mill Maintenance (Earthworks datapack)

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3 Employer's Design

- The extent of the *Employer's* design is as described in the *Employer's* Works Information and the *Employer's* drawings.
- The *Employer* has no design responsibility for the *Contractor's* portion of the works.
- The *Contractor* brings to the *Project Managers* attention, any changes that are required to the *Employer's* design. All changes proposed by the *Contractor* are motivated and submitted as a mark-up of the *Employer's* design documents for acceptance by the *Project Manager*.
- The design remains the property of the *Employer*.
- The *Employer* has conducted the detailed design of part of the works, the extent of which is indicated in the drawings/documents referenced in Table 6 of Appendix 7.5 below.
- The Contractor will be required to issue all statutory certificates associated with the scope [Civil Professional engineering certificates, CoC's, etc.]
- The Employer will make available all the required native files to the Contractor to enable completion of the design reviews and updating of the Employer's drawings.

3.1 Architectural Design

The *Employer* has conducted the architectural design of the building as detailed in drawing listed in Table 6 in Appendix 7.5

3.2 Structural Design

The *Employer* has conducted the structural design of the building including associated infrastructure such as entrance ramp as detailed in drawing listed in Table 6 in Appendix 7.5.

The structural design of the building consists of a structural concrete frame supporting a steel roof truss with IBR sheeting covering. The steel stub columns are supporting the concrete frame designed by the Employer. The building has a gantry Crane and reinforced concrete ground slab supported by engineered fill.

A portion of the works has already been constructed by others as per data packs 366-473709 & 366-439026. Most of the concrete scope below TOS (Top of Slab 0.00m level) is complete. The Contractor would have to make provision for the entrance ramp and apron slabs. Please refer to Figures 1 and 2 below.

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Figure 1



Figure 2

3.3 Site Layout Design

The extent of the *Employer's* design is as shown and described in the *Employer's* drawings and *Works Information* which indicates what is to be supplied and built/installed. The final ground levels are designed to

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drain towards the storm Water Channel. The Contractor is to make provision for engineered fill and landscaping.

All works to be constructed according to information provided on the drawings listed in Table 6 in Appendix 7.5.

3.4 Stormwater Design

The *Employer's* stormwater drainage design consists of surface drainage from the surrounding area into a pre-cast channel which encircles the building. The drainage channel drains into the adjacent road north of the building as indicated on the *Employer's* drawings. The area is to be shaped to facilitate surface drainage into the precast channel. Part of the Stormwater scope will be the construction of the composite retaining wall. Refer to drawing listed as per Table 6 in Appendix 7.5.

All works to be constructed according to information provided on the drawings listed in Table 6 in Appendix 7.5.

3.5 Plumbing Design

The Employer's plumbing design consists of sewer reticulation and potable water reticulation of the building, detailed in drawing listed in Table 6 in Appendix 7.5

The sewer design of the building consists of a below grade and above grade piping which services both the tearoom and the ablution facilities.

The water supply design of the building consists of also below grade and above grade reticulation which services both the tearoom and the ablution facilities.

A portion of the works has already been constructed by others as per data packs 366-439026 and 366-473709 . All below grade reticulation scope is complete. As for the outstanding reticulation scope is to be constructed by the contractor. The Contractor would have to make provision for the construction of the sewer & water supply reticulation.

3.6 Electrical Design

An issued for construction design is provided by the Employer. The contractor is required to perform a detailed design review and construct accordingly. Any clarification or changes are to be submitted to the employer for consideration. All drawings from the Employer's design for the works are provided for review, procurement, construction, installation, commissioning, and testing. The following drawings are applicable:

- 0.90/24777 Kusile Power station Mill Maintenance workshop ground floor plan, Lighting, small power and Lightning protection, sheet 1 & 2.

3.6.1 Power supply

The Mill Maintenance bulk power supply will be provided via a Mini-sub placed outside the Mill Maintenance workshop. The Mini-Sub is provided by the *Employer*. The *Contractor* is required to provide the associated circuit breakers in the outdoor mini-sub LV compartments and cabling from the Mini-Sub to the Mill Maintenance building Distribution board.

3.7 CBMS Design

The *Employer's* detailed design includes monitoring of the Fire Detection System (constructed by the Contractor) in the Mill Maintenance Workshop via the CBMS. The equipment detailed below will be free issued by the Employer is as follows:

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-
- 1 x Wall Mounted Network Cabinet
 - 1 x Patch Panel (to be supplied by the Fibre Contractor)
 - Fibre cabling between the patch panel and the main fire panel

The Contractor is required to install, test and commission the interface for fire detection monitoring. The associated detailed designs are as per Table 6 in appendix 7.5.

3.8 Mechanical Design

The *Employer's* designs are described in detail below and drawings are listed in Table 6 of appendix 7.5.

The *Employer* has completed the detail design for the mechanical scope below:

1. Fire protection for the Mill Maintenance: The water supply to the Workshop will be an extension of the existing Fire and Floor wash (SGA) system. The system will provide fire water to a location inside the Workshop portion of the building at the required flow and pressure. Also, two Co2 (1x5kg & 1x9kg) fire extinguishers will need to be supplied in the same location. Additional details are covered in section 2.8.1.
2. Fire detection system for the Mill Maintenance: The fire detection design features one fire loop that is connected to one main fire detection panel. This fire loop features 4x Smoke detectors, 1x heat detectors, 4x wall mounted strobes, 1x ceiling mounted strobe, 1x single phase isolator and 1x Siren. The associated detailed designs are as per Table 6 in appendix 7.5.
3. HVAC for the Mill Maintenance: The Workshop portion of the building only features four weather louvers for natural ventilation. The Tea Room, and Office houses two indoor split units that will provide air conditioning to these rooms. A further two outdoor split units will be installed to provide supply air to the General Store, Tool Store, Passage, Tea Room and Office via a series of ducts that run in the ceiling. The supply air portion of the design also features a series of axial fans, Supply Air Disc valves, and Air volume diffusers. For the extraction system, there are a series of ducts that services the Ablution facilities & Tea Room. The extraction system also features a series of axial fans, and exhaust air disc valves. The contractor is required to review the associated HVAC documentation and provide a detailed designed solution for procurement, construction, installation, commissioning, and testing. The associated concept designs are as per Table 6 in Appendix 7.5. Additional details are covered in section 2.8.2.

3.8.1 FIRE PROTECTION

General

The Contractor shall be responsible for the manufacture, installation, commissioning and supply of a fully functional fire protection and prevention system, in accordance with the Employer's design, to achieve the following:

- Minimize fire occurrence, both incidental and accidental, through passive fire protection
- Minimize losses in the event of a fire
- Maximize personnel safety
- Provide a Building layout which will facilitate firefighting operations

All operation and maintenance manuals shall be supplied to Eskom as Eskom property.

The Employer shall provide a fire water connection to the Contractor at a pressure of approximately 8 bar.

The construction materials used shall meet the definition of non-combustible according to SANS 428.

The Contractor is required to provide all statutory certification for the associated installation.

The associated detailed designs are as per Table 6 in Appendix 7.5.

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Works to be performed by the Contractor

The Contractor shall cover all the fire protection requirements for the identified areas in this building.

The overall design responsibility of the fire system shall lie with the associated Designer. Accountability for any design changes proposed by the Contractor will be the responsibility of the contractor. All designs done by the Contractor shall be subject to the Employer's approval prior to commencement of manufacturing and installation.

All equipment utilised for this installation shall be readily available in the industry.

Pipe work

- Buried Fire Water Pipework

The connection point shall be supplied by the Employer.

Underground piping material shall be HPDE in accordance with SANS 4427 and buried in accordance to SANS 1200 LB.

The pipe shall be connected to the Employer's existing buried piping network.

The contractor shall ensure the Employer's pipe is reconnected.

- Above grade Fire Water Pipework

Pipework shall comply to Employer Standard, 240-123801640 - Standard for Low Pressure Pipelines.

All above ground pipe-work shall be galvanised steel according to SANS 121. Pipes shall conform to SANS 62 and SANS 719. All pipes up to 50NB shall be screwed and anything above 50NB shall be flanged.

Fire Fighting Pipelines shall be identified/coated in accordance with 240-145581571-Standard for the Identification of the Contents of Pipelines and Vessels.

Hose Reels

Fire hose reels shall be located in accordance with SANS 10400 requirements at a rate of 1 per 500m² of floor area or part thereof.

As the buildings on site and other services may not be conducive to effective location of fire hose reels, locations may be adjusted to provide the best coverage based on the 30m length of hose associated with hose reels.

Fire Extinguishers

Fire extinguishers are to be located at positions close to potential fire risks and generally at a rate of 1 per 100m² or 1 per 200m² based on the level of risk. The fire extinguisher types that will be supplied are as follows:

- 9kg DCP (dry chemical powder) or 2 x 4,5kg fire extinguishers that shall be positioned in the majority of plant areas.
- 5kg CO₂ (carbon dioxide) that essentially will be positioned in electrical switchgear rooms, substations and control rooms.

Portable fire extinguishers shall comply with the requirements of SANS 1910, "Portable refillable fire extinguishers".

Fire Hydrants

Fire hydrants shall be supplied in the areas where hydrant protection is required, based on the design done by the Employer. The design shall conform to the standards referenced in SANS 10400 - T. All hydrant connections are standardized fittings throughout the station and readily available in the industry.

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Fire hydrants shall be supplied through 80mm risers. Pipes feeding hydrants shall not be smaller than 100NB. The flow rate for the fire hydrants based on SANS 10400 is 20litres/sec (1200 litres/min) and standard requirement is the simultaneous flow of two hydrants with the most remote hydrant having a pressure of 350kPa.

The fire hydrant specification is as follows:

- Inlet: 80mm, Male BSP Thread
- Fire Hydrant Outlet: 65mm Female Instantaneous Outlet with double opposing "lugs".
- Body Material: Cast Iron or Bronze
- Spindle material: Stainless Steel
- Spindle Square Size: 16mm (to SANS 1128 Specification)
- Working Pressure: Seat tested to 16 bar
- Hydrants should be located every 150m, refer to potable and fire water pipe routing.

Passive Fire Protection

Passive fire protection shall adhere to the recommendations of NPFA 850.

Safety Signs

The Contractor shall supply all Symbolic Safety Signs for the respective areas under this contract as per SANS 1186.

Terminal Points

The Fire Water Terminal Point shall be provided by the Employer, and is shown as TP 16-26-773 on drawing 0.90/24116.

3.8.2 HVAC

The associated detailed designs are as per Table 6 in appendix 7.5. The following should be adhered to for Close Control Units:

Under-ceiling Close Control Split Units

The unit cabinets are to be constructed from fully galvanised sheet metal powder coated to an approved colour. Each unit is to be provided complete with fans, fan motors and drives, direct expansion cooling coil, hot gas reheating (or electric heaters), air filters, control system with alarms and switchboard.

The contractor is to supply and install custom build drain pans underneath the indoor units. The custom drain pans are to be manufactured from 1,2mm 316-stainless steel and must accommodate a 25mm drain connection. The sides of the drain pan are to be 50mm high and must extend 50mm larger than the footprint of the entire size of the indoor units. The indoor units are to be installed inside the drain pans. The contractor is to allow for adequate PVC drain piping for this purpose. The drainpipe is to be routed to the nearest drain point located on the outside of the building.

Fan motors are to be non-overloading at any operating point of their performance curves. Fan delivery must not decrease more than 10% when filter dirty. The operation point is to be in stable part of curve.

The units are to operate continuously without damage or malfunction for the following range of conditions at local altitude:

a) Indoor Unit: Entering Air Dry Bulb Temperature: 18°C to 28°C and entering Air Wet Bulb Temperature: 13°C to 20°C

b) Condensing Unit: Entering Air Temperature: -5°C to 50°C

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The units must be fully protected and shall fail safe. Minimum safety protection, caused by possible external abnormal conditions, shall be provided for the following:

- a) High discharge pressure. (Manual reset)
- b) Low Suction pressure. (Auto reset)
- c) Thermal overload for single phase motors.
- d) Combined thermal overload and phase-failure for three phase motors.
- e) Low oil pressure differential.
- f) An excessive drop of voltage or power interruption shall disconnect the system with automatic re-start and normal operation and control when fault condition is rectified.

Indoor Units

The indoor units are to have a rigid steel frame with cover plates which will accommodate supply fan, evaporator coil, air filters, drip tray inside unit with suitable condensate drain point.

The indoor fan is to be selected assuming a pressure drop across the filter equal to the average pressure drop caused by the filter in its clean and dirty states.

The cooling coil must consist out of aluminium fins mechanically bonded to copper tubes. The unit is to be fitted with an anti-freeze stat.

The unit is to be equipped with a drip tray manufactured from galvanized steel. The condensate is to be drained to the nearest drain point (See drawing for possible drain point). The condensate lines are to be equipped with a water trap and the lines are to be made of I.D Ø25mm x O.D Ø26mm PVC tubing which must be properly secured to the building structure.

Outdoor Units

The condensing units are to be factory fabricated and be suitable for outdoor installation. The casing and structure for the condensing units are to be of robust construction and must be machine pressed and folded. The panels are to be of galvanized sheet metal steel duly powder coated. The casing is to have removable panels to allow access to the condenser coil, the compressor and fan. The condensing unit is to consist of a compressor, condenser coil, fan, refrigerant accessories and the necessary controls. The condensing units are to be installed onto the concrete plinth or against the outside by means of channel frames with stainless steel bolts/chemical anchors. Vibration eliminators are to be installed between the condensing unit frames and the supporting brackets.

Condenser coils are to have copper tubes, mechanically expanded into aluminium fins. The coil in the outdoor unit is to be "hail"-proof. Compressors may be either semi-hermetic, suitable for field servicing or hermetically sealed.

Condenser coils offered are to provide special protection against harsh and salty environmental conditions, coils shall either be copper / copper, epoxy coated / or any other coil fin protection process. Coil protection offered is to be a standard application applied and approved by the manufacturer.

Management Controllers

The closed control split units are to be fitted with a controller to fully control the operation of the units and it must be able to accommodate alarm signals. The controller of the units is to be set up to control on the return air temperature and programmed such that should the temperatures within the respective rooms rise above 26°C or should a fault occur on the running unit, the controller will automatically start the standby unit.

The controller is to be able to switch over operation of the units at specified intervals, for instance once every week, to ensure equal operating time of both units. Manual override switch is to be installed to have any HVAC equipment switched on by maintenance when required.

The controller must accommodate fault signals with date and time, which will send a signal to the HVAC BMS in case of any failure or other parameter faults on the unit. The common controller is to indicate the operating status of the unit and malfunction by means of readout displays and audible alarm of the following malfunctions:

- a) System fault
- b) Loss of Air Flow
- c) Clogged or Dirty Filters
- d) High Room Temperature
- e) Low Room Temperature
- f) High Room Humidity
- g) AC failure to be connected at the incoming power point of the air conditioning units or isolators on load side of isolator.

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The common controller is to be compactable to connect with Fire Detection System and Building Management System (BMS) of standard makes. One signal per zone from the FDS to the HVAC System, indicating a fire instance, is accommodated for as a hard-wired fail-safe (normally energised) connection from the FDS to the HVAC System. The intelligence to open/close fire dampers or stop/start fans lies within the HVAC controller and is based on the fire and smoke extraction philosophy.

Down/Over Blow Equipment Cooling Units

Each unit is to be provided complete with fans, fan motors and drives, direct expansion cooling coil, hot gas reheating (or electric heaters), air filters, control system with alarms and switchboard.

The cabinets are to be designed to supply air from the bottom and return air to the filters in the top portion of the unit. The cabinet frames are to be constructed of welded tubular steel. All interior sheet metal is to be welded to the frame assembly. Exterior panels are to have concealed fasteners and must be quickly removable for easy access to the components. The panels are to be arranged to provide access to the electrical control panel and compressor section without interrupting the air flow. All exterior panels are insulated with a minimum of 25 mm thick closed cell foam Insulation.

4 Contractors Design Responsibility

4.1 Responsibility for Design

- The *Contractor* takes full professional accountability and liability for all designs done by the *Contractor*.
- The *Contractor* is responsible for the design of all temporary works required for the execution of the *Works*.
- All designs, design reports and Construction drawings prepared by the *Contractor* are signed off by an ECSA Professionally registered Engineer who takes full professional accountability for the designs.
- The *Contractor* submits a Structural Professional Engineering Certificate signed by an ECSA professionally registered civil engineer confirming that all designs done by the *Contractor* has been designed in accordance with the relevant codes and standards. Certification is done in accordance with SANS 10400.
- The *Contractor* is mandated in terms of Construction Regulations 2014: Duties of Designer, 6(1) g to fulfil the duties described therein or the detailed designs done by the *Contractor*. Any risk associated with the *Contractor's* design is highlighted to the *Employer* together with mitigation measures.
- Where the *Contractor* requires additional information to design or install certain components of the Plant or the *Employer's* design, the *Contractor* notifies the *Project Manager* for acceptance of the *Contractor's* requirements, before continuing with the *works*.
- The *Contractor* is responsible to ensure compliance with the Works Information. The *Contractor* supplies as-built information and drawings of all components he designed to the *Employer* for acceptance 10 days after commissioning, prior to handover.
- Any and all changes required for construction or manufacturing that impact or change the *Employer's* design is redlined on drawings by the *Contractor*. The redline drawings include notes for clarification purposes. The engineering change process will be used in the case of any design changes. The *Contractor* submits the redlined drawings to the *Project Manager* for his acceptance. The contractor is responsible for completing black lined drawings once construction is completed. The final redlined and blacklined drawings are to be included in the data books.
- The *Contractor's* design engineer carries out inspections at appropriate stages throughout the construction of the *works* to verify that the construction is carried out in accordance with the *Employers* and *Contractor's* design.
- The *Contractor* and his sub-*Contractors* perform the *works* in compliance with legislation, rules and regulations, applicable national and international engineering codes, environmental standards, other applicable standards, statutory requirements and this Works Information.
- The *Contractor's* design is required to be in accordance with the *Employer's* Standards referenced in Appendix 7.6.

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- The *Contractor* is responsible to ensure compliance with the *Employer's* Works Information.

4.2 **Contractor's Civil & Structural Design**

The *Contractor* is responsible for the detailed design of all the *Works* which have not been designed by the *Employer*. It is the contractors' responsibility to provide a working solution, any revisions to existing designs to ensure functionality is the responsibility of the contractor.

4.2.1 **Roller Shutter Doors**

- The *Contractor* is required to provide all roller shutter doors in accordance with the information provided by the *Employer*. The *Contractor* is to be requested to do detail design, procure, install, commission and sign-off the roller shutter doors design before final submission to the *Employer*, for final acceptance. All drawings issued during the tender stage are therefore not to be used for construction. The Contractor will revise all drawings to a Construction status before construction can take place.

4.2.2 **5T Gantry Crane**

- The Contractor is required to conduct the detailed design for 5t Gantry Crane taking into account any designs done by the Employer or existing infrastructure which may interface with or be affected by the structure. Where the Contractor's design interfaces with the Employer's design or existing infrastructure and requires any changes to accommodate these interfaces such as cast in bolts, penetrations, changes to avoid clashes etc. the Contractor submits his proposals to the Employer for his acceptance. The details of all loads from the contractors design exerted on the Employer's design or existing infrastructure is submitted to the Employer for review and acceptance of the information.

4.2.3 **Supports for electrical services**

- Electrical light fittings will be required to be supported by the building's steel roof trusses designed by the *Employer*.
- The *Contractor* submits the details of all supports and connections to the existing structure including all loads to the *Project Manager* as indicated in Section 4.3 below.
- The Contractor to ensure that maintenance of the lights can be easily performed by ensuring easy access to the lights e.g., Lights could be lowered to allow the bulb to be easily changed.

4.3 **Contractor's Electrical Design**

4.3.1 **General**

- a. Unless stipulated the Generation Plant Electrical Specification (474-11542) must be adhered to for all electrical requirements within the works.
- b. The contractor is required to perform a detailed design review of the provided designs. Any updates are to be communicated to the employer for review and acceptance before installation. The *Contractor* sizes, supplies and installs circuit breakers in the outdoor mini-sub LV compartments (as depicted in the *Employers* Design in Section 2.6.1) to supply the loads required by the Mill Maintenance workshop (small power and lighting DB and 5T gantry crane)

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4.3.2 Cabling and Racking

- a) The Contractor sizes, installs, routes and terminates and tests all required cabling for the Mill Maintenance Workshop this includes the supply cabling from the outdoor Mini-Sub (stated in the Employers Design section i.e. Section 2.6.1) to the small power and lighting DB and 5T gantry crane.
- b) For all the Works, the Contractor ensures that all cables and cable racks are installed as per SANS 10198 and 240-56227443 (Requirements for Control and Power Cables for Power Stations).

4.3.3 Lighting and Small Power Installations

- a) The Contractor is responsible for the review of the provided lighting and small power layout and thereafter the procurement, construction, installation, commissioning and testing including providing documentation for the interior and exterior lighting for the Mill Maintenance Workshop Building.
- b) The Contractor complies with the Coal Fired Power Stations Lighting and Small Power Installation Standard (240-55714363) for all lighting and small power that forms part of the scope of this project.

4.3.3.1 Certificate of Compliance

- a) The *Contractor* is to issue COC's for all electrical work completed as required by:
 - SANS 10142-1.
 - Occupational Health and Safety Act, (OHS Act 85 of 1993).

4.3.3.2 Labelling

- a) All electrical circuits and equipment are to be labelled by the Contractor according to the KKS Coding Standard 240-93576498 and 24071432150 Plant labelling standard.

4.3.4 Earthing and Lightning Protection

- a) The Contractor is responsible for the design, procurement, construction, installation, commissioning and testing including providing documentation for the earthing and lightning protection for the scope of this project to comply with 240-56356396 Earthing and Lightning Protection Standard and the requirements of this specification. The Contractor is responsible to ensure interfacing of the earthing and lightning protection designed for this project to the Power Station earth.
- b) The *Contractor* ensures that the Earthing and Lightning Protection system satisfies the following requirements:
 - To limit the touch potentials on structures and equipment and to provide low impedance return path to limit the damage to equipment by fault currents, during normal or abnormal system conditions.
 - The installation is protected from lightning by conducting the strike through a preferred path to earth.
 - All non-current carrying metal parts of the installation is earthed.
 - Protect plant and people against the effects of lightning;
 - Protect electrical components against incoming surges;
 - Provide a path for the dissipation of electrostatic discharge; and
 - To provide a reference point for electrical signals.
- c) The *Contractor* shall comply to the requirements of the following standards for all earthing and lightning protection designed, procured, constructed, installed, commissioned and tested including providing documentation for this project:

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- Earthing and Lightning Protection Standard (240-56356396)
 - Protection against lightning - Physical damage to structures and life hazard (SANS 10313)
 - The wiring of Premises (SANS 10142-1).
 - The installation shall be earthed in accordance with the requirements 0.54/393.
- d) The contractor is responsible to connect the designed building earth mat to the station earth mat.
- e) The *Contractor* is responsible to procure, construct, install, terminate, commission and test including providing documentation for all earth wire.
- f) The *Contractor* to submit all designs and documentation to the Project Manager for acceptance before any procurement or manufacturing of any equipment occurs.

4.3.5 Fire Barrier Requirements

- a) Fire barriers are installed wherever electrical cables pass through walls, floors and ceilings, inside low and medium voltage switchboards, transformers, battery chargers, UPSs' which are boundary elements of a specified fire zone. Fire barriers are required to have a fire rating of 2 hours minimum.
- b) The *Contractor* ensures that wherever cables pass through holes or slots in floors and walls or enter or leave sleeve pipes in floors or walls; the openings should be sealed with the approved material. This material is domed or slightly raised towards the centre to prevent the accumulation of water or oil in the seal. The sealing material should be water resistant and provides a barrier for smoke and toxic fumes.
- c) Test certificates are to be provided with fire barriers in accordance with:
- SANS 10177-2, Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements.

4.4 Contractor's CBMS Design

The *Contractor* is required to install, test and commission the fire detection monitoring interface, using the Employer's existing design and the equipment supplied, as stated in Section 3.7.

4.5 Contractor's Design Integration

The *Contractor* is required to conduct his detailed designs ensuring design integration with the *Employer's* detailed design. The *Contractor's* detailed design considers all existing services identified ensuring no clashes with existing infrastructure.

4.6 Use of the Contractor's design

All documentation, as specified in this Works Information, forms part of the *works* and is supplied to the *Project Manager* by the *Contractor*. The *Employer* reserves the right to issue the *Contractor's* design or drawings to other contractors for purposes of maintenance, spares, verifications, modifications in future or any other purposes required by the *Employer*. The *Employer* has total rights to use the design as the *Employer* requires. The *Contractor* notes that all drawings and other documentation supplied to the *Employer* become the property of the *Employer* upon completion of the *works*.

4.7 Contractor's Temporary works

The contractor is responsible for all temporary works designed to execute the works. Please take note of additional requirements as per Appendix 7.2.

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4.8 Correction of defects

The *Project Manager* cannot certify Completion until all the work is free of Defects which would have, in his opinion, prevented the *Employer* from using the *works* and Others from doing their work.

4.9 Excavations

No excavations are permitted without an excavation permit obtained from the Project Manager. The *Contractor* complies with the requirements of the Construction Regulations. Excavations are performed such that it imposes a minimum restriction on access to Site for Others. Excavation permits are only issued if the area has been scanned by the *Contractor*, to ensure that there are no underground services in the area to be excavated. Refer to 32-727, Eskom Safety, Health, Environment and Quality (SHEQ) Policy.

4.10 Underground services, other existing services, cable and pipe trenches and covers

- **Piping in Existing Areas** - Before installation of piping in existing areas, the routings of new piping to be installed shall be walked down to verify that the piping and supports can be installed as designed without interference. If the piping as designed would interfere with existing facilities and underground utilities, the pipe routing shall be reviewed with the Employer and shall then be altered or existing piping shall be relocated. All pipe revised routings shall be subject to approval by the Engineer.
- Before commencement of any excavation, the Contractor will apply for an excavation permit from the Employer
- See Appendix E which refers to drawings that show existing electrical services in the area.

4.11 Surveys

4.11.1 Site survey

The *Contractor* carries out a comprehensive site survey and verifies coordinates, elevations and dimensions with those shown on the *Employer's* drawings, a month prior to the commencement of any construction works. The *Contractor* submits this site survey in the form of a report for acceptance by the *Project Manager*. This report highlights any discrepancies, errors or omissions found in the survey.

4.11.2 Ground control survey

The *Contractor* conducts a ground control survey of underground utilities, services, trenches and tunnels that might affect the construction of structures. The *Contractor* submits the perimeters of the survey to the *Project Manager* for acceptance.

The position of underground services, underground utilities, trenches, vaults, exclusion zones and surface penetrations are physically identified by the *Contractor*. The outcome of this survey is submitted to the *Project Manager* in the form of a ground control survey report for acceptance.

The *Contractor* relocates underground services which interfere with the construction of the *works* only with prior acceptance from the *Project Manager*.

4.12 Structural Loading Certificates

Loading certificates are to be issued by a Professionally Registered Civil Engineer before construction can continue in certain instances as per the table below. Loading certificates to confirm that the structure has been constructed according to designs. The Contractor is to be in possession of the loading certificate before construction can continue as indicated below. Loading certificates to be added to data books once construction is completed.

Table 3 - Loading Certificate Holding Points

Loading Certificate issued after	Holding point for	Loading Certificate Issued by
----------------------------------	-------------------	-------------------------------

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Construction of the structural concrete works	Erection of building super structure	Loading certificate for the building issued by the Contractor's Professionally Registered Civil Engineer
Erection of steel super structure	Installation of building masonry and IBR cladding	Loading certificate for steel superstructure issued by the Employer's Professionally Registered Civil Engineer

Information/inspection sheets/certificates provided to the Professionally Registered Civil Engineer includes but is not limited to the following:

- Inspection Test Plan
- Founding conditions
- Contractor information requests
- Non-conformance reports
- Concessions
- Concrete inspection checklist
- Concrete cube register
- Post concrete inspection
- Slump test documents
- Survey (Alignment of Columns – Vertical, Horizontal)
- Remedial Works Approval (If required)

The Engineer may request any additional information required to determine that items have been constructed according to designs.

4.13 Completion, testing, commissioning

4.13.1 Commissioning

- The Contractor is fully responsible for all commissioning and start-up activities for the mechanical and electrical systems installed by the Contractor, including, but not limited to, all craft labour and supervision. The Employer will provide assistance for coordination with other interfacing packages. Instrument calibration will be performed by the Contractor.
- Commissioning procedures are required for each of the systems and need to be accepted by the *Project Manager* prior to the commencement of any commissioning. The commissioning must be performed in accordance with; relevant standards, specifications and the Kusile Commissioning procedure

4.13.2 Performance tests after Completion

- The Contractor to do tests and produce documentation to demonstrate that the equipment they provided meet the Employers performance requirements. E.g motors, lighting. The Employer is required to witness the testing.
- The Contractor shall field performance test all centrifugal pumping systems. Contractor shall furnish all labour, materials and test equipment inclusive of temporary piping, valves, instruments, etc. Testing shall be performed in accordance with ISO 9906 and any allowances made for inaccuracies due to site testing shall be approved by the Engineer.

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4.14 Document and Configuration Management

4.14.1 Document Management

Documents are to be managed as per Appendix 7.3.

4.14.2 Configuration Management

The plant [documentation and installation] is to be labelled as per Appendix 7.4

4.14.3 As-built Drawings

The required as-built information to be in accordance with Appendix 7.1 under subsection 7.1.5

5 Authorisation

This document has been seen and accepted by:

Name & Surname	Designation
Tumiso Rail	Project Engineering Manager
Yuvir Gokul	Engineering Design Work Lead
Calvin Langley	Lead Civil Site Engineer
Ayo Jimoh	Lead Civil Discipline Engineer
Shamita Lalla	Lead Integration Engineer
Shreenu Rampukar	C&I Engineer
Tseliso Msimanga	C&I Engineer
Goldstone Khumalo	Lead Electrical Engineer
Godwin Fuhnwi	HVAC Engineer
Simon Peter	Configuration
Dhires Ram	LPS Fire Engineer

6 Revisions

Date	Rev.	Compiler	Remarks
April 2020	0	C. Langley	Draft document for review
June 2022	01	A. Jimoh/T. Mgangxela	Additional Information
July 2022	02	A. Jimoh/T. Mgangxela	Additional Information
August 2022	03	T. Mdlalose	Additional Information and editing
August 2022	04	T.Mdlalose	Addressing of comments from the MDR committee

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7 Development Team

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

- Calvin Langley – Lead Civil Site Engineer
- Thembisa Mgangxela – Senior Civil Technician
- Ayo Jimoh – Lead Civil Site Engineer
- Thabani Mdlalose – Civil Site Engineer

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8 Appendices

8.1 Additional Requirements

8.1.1 List of applicable standards

All references to standard/codes/publications are to be the latest issue of each, together with the latest additions and/or amendments thereto, as of the date of contract, unless otherwise indicated. This list is not all-inclusive and does not relieve the *Contractor* from complying with all applicable codes.

Table 4: List of applicable standards for construction

Code	Description
SANS 1200 series	Standardised specification for civil engineering construction (except parts superseded by SANS 2001)
SANS 1393	Construction management systems – Requirements
SANS 1921	Construction and management requirements for works contracts
SANS 2001	Construction works
SANS 3001	Civil engineering test methods
SANS 10120	Code of practice for use with standardised specifications for civil engineering construction and contract documents
SANS 10400	The application of the National Building Regulations
SANS 10403	Formatting and compilation of construction procurement documents
SANS 10845	Construction procurement
SANS 18173	Non-destructive testing – general items and definitions
OHS Act 85 of 1993	Construction Regulations, 2014
NKP Act 102 of 1980	National Key Point Act, 102 of 1980
EPA	South African Environment Protection Act
AWS D1.1	Structural welding code – steel
SANS 50025	Hot rolled products of structural steels
32-245	Eskom Waste Management Standard
32-727	Eskom Safety, Health, Environment and Quality (SHEQ) Policy
240-72273656	Power Generation Asset Critical Classification Standard
240-83539994	Standard for Non-Destructive Testing (NDT) on Eskom Plant
240-105658000	Supplier Quality Management Specification
240-106365693	Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings
240-106628253	Standard for Welding Requirements on Eskom Plant
240-107981296	Constructability Assessment Guideline
240-144332407	Guideline for Eskom Power Stations Concrete Remedial Work

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8.1.2 Standard clauses

The *Contractor* carries out the civil, structural and building portion of the *works* in accordance with the Occupational Health and Safety Act (85/1993): Construction Regulations, 2014 and the National Building Regulations.

The *Contractor* provides all labour, installation tackle, gear and tools, vehicles, rigging tackle, temporary works/ scaffolding including any geotechnical works required, craneage and foundations for such, consumables, bulk mixing plant, site workshops, site offices, stores, facilities, Equipment and cleaning materials required to Provide the Works. The *Contractor* is responsible for the supply/ procurement of Plant and Material, fabrication/manufacturing, shop detailing, painting/ galvanising, handling, shipping, storage, testing, delivery, off-loading, erection/construction, disposal of debris, final painting and finishing complete in every detail of structural steelwork, concrete structures, miscellaneous support steel and concrete, access platforms, staircases, foundations, Equipment and spares required to supply the *works*. The *Contractor* is responsible to construct any works that can reasonably be inferred from this Works Information and the *Employer's* drawings.

The *Contractor* provides all the test equipment for testing, the sub-assemblies and the functional groups for site testing, commissioning and performance testing.

The *Contractor* provides all necessary temporary works required to complete the *works*. This includes scaffolding, suspended platforms, rope access work, material hoists, cranes, services etc.

The *Contractor* carries out manufacturing and proves standards of quality by means of inspections at every stage of the project.

During the erection period, the *Contractor* as a builder and/or user of machinery performs 'building work' in terms of OHS Act. The *Contractor*, before taking occupation on a Site, obtains a permit to work from the *Project Manager*. Before a part of the Site is released for access to Others, the said part conforms to the safety requirements of OHS Act. The party taking access then becomes the 'User' in terms of the OHS Act. The releasing of a part of the Site in the above described manner does not relieve the '*Contractor* Giving Access' of any of his obligations in terms of his contract with the *Employer*. No unauthorised person(s) enters into any prohibited/restricted area. Daily dairies/logs/data books are kept and signed by the *Contractor* and are also signed off daily by the *Supervisor*.

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The following is to be recorded (as a minimum) in the daily diaries:

- Manpower and Equipment used,
- Weather conditions,
- Description of any unique occurrences, incidents or accidents,
- Delays and reasons for the delays,
- Industrial relations abnormalities,
- Interface and access problems,
- Description of activities to be performed,
- Recording of on-site tests, for example a concrete slump test.

In addition to the aforementioned, the *Contractor* adheres to the following:

- The *Contractor* is restricted to the Site;
- The *Contractor* is not to enter any other areas and ensures that his employees abide by the regulations;
- The *Contractor* performs all hoisting and lifting by qualified riggers;
- The *Contractor's* Equipment does not impair the operation or access to the plant;
- The *Contractor* provides any temporary or expendable materials required for the storage of material;
- The *Contractor* safeguards and secures all items whilst in the *Contractor's* custody and control, until completion of the *works*;
- The adjacent plant and equipment are not modified without written permission from the *Project Manager*. Modification in this sense includes, but is not limited to the following:
 - Welding onto existing plant,
 - Drilling into structural steel or concrete,
 - Cutting or removing
 - Loading adjacent structures.

The *Contractor* ensures that a complete QCP, risk assessment, method statement, ITP and temporary works calculations accompanied by a rigging study, where applicable are submitted to the *Project Manager* for review and acceptance before the *works* can commence. During reviews of the ITPs, the *Employer* provides the necessary intervention points.

All items that are assembled and constructed off site are listed and provided to the *Project Manager*. From this an ITP is developed between the *Project Manager* and the *Contractor* to determine the intervention points.

8.1.3 Work Method Statement

The *Contractor* provides a detailed work Method Statement for each activity of his work, together with activity durations. In addition to a description of the method of constructing the *works*, the *Contractor*, in his work Method Statement, includes the following as a minimum:

- The scope of the particular Method Statement;
- A comprehensive description of the activity;
- Construction methodology and sequence of construction taking into consideration access restrictions and safety requirements;
- How the *Contractor* has taken into account the constraints for constructing the *works*;
- A clear description of the responsibilities of the *Contractor's* personnel involved in the activity, including (where applicable) his Project Manager, Site Quality Manager, Site Engineer, Health and Safety Manager, Technical Office Manager, Production Manager, Supervisor, Environmental Officer and other personnel required for the activity work;
- Reference to applicable statutory requirements and how the requirements have been taken into account;
- Health, safety and quality control for the activity;
- All plant, equipment and machinery required to complete activity;
- Quality control points as accepted by the *Project Manager*;
- Temporary works to be used including *Project Manager's* acceptance where such is supported off existing structures.
- Rigging studies and design calculations where applicable;
- Manufacturer's literature/ Technical Data Sheets for all materials used including product description, composition, material and performance properties, installation and application procedures, use limitations and recommendations;

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- Plan for confining, collecting and disposing of broken concrete and other waste materials as a result of removal operations, where applicable;
- Works required to safeguard existing infrastructure and services; and
- Risk assessments associated with shutdown of plant/ equipment where deemed necessary, in order to execute the works.

All Method Statements are reviewed and accepted by *Project Manager* prior to starting any work.

8.1.4 Operating Manuals and Maintenance schedules

- The operation and maintenance manuals are to consist of the following:
 - List of Contents (Index)
 - Introduction
 - General description of the functions of each of the systems including detailed description of each element of each system, how it functions, how it operates and how to maintain it and what attic stock or tools to carry.
 - Full as-built drawings and detailed drawings, brochures and catalogues for each system and each element of each system.
 - The format of the O & M documentation is to be A4 and are to be a specially bound document with hard cover and with metal ring binding. (All drawings and details are to be reduced to A3 format and folded into A4 format.)
 - The names, addresses and telephone/fax numbers/email addresses of all responsible persons and manufacturers/suppliers are to be listed in the O& M document.
 - A full list with reference numbers are to be included to enable the O&M staff to order materials and equipment.
 - Colour diagrams are to be provided to illustrate the operation and function of each system with reference to the relevant as-built drawings or brochures of equipment. These diagrammatic drawings are to also indicate the locations of valves with their numbers.
 - Instruction Manuals are to be submitted in accordance with Eskom Standard GGSS 1423 Standard for OM Manuals

8.1.5 As-built Drawings

- The *Contractor* provides “As Built” drawings for all his designs based on the shop drawings embodying all modifications made during construction.
- The “As-Built” drawings are to include general arrangement and sections of all plant and equipment including isometrics and P&ID's. Safety, instrumentation, control and operation drawings are to also be included “As Built” drawings indicating the intended functioning, capacity data and control functioning of all systems.
- The As-Built drawing will indicate all relevant plant coding and labelling. The determination of these codes and labels will be done in accordance the documents listed in Works Information.
- The Contractor to provide all “As Built’ documentation for the entire Electrical scope of this project. Where the Employer did the detailed design, the Contractor to redline the Employers design.

Any and all changes required for construction or manufacturing, that impact or change the Employer's design is redlined on drawings by the Contractor. The redline drawings include notes for clarification purposes. The engineering change process will be used in the case of any design changes. The Contractor submits the redlined drawings to the Project Manager for his acceptance and includes the final redlined and blacklined drawings in the data books.

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8.2 Temporary works

The *Contractor* is responsible for all temporary works that is used by the *Contractor* to complete the *works*. The *Contractor* submits all designs or proposals for temporary works to the *Project Manager*. The *Project Manager* reviews but does not accept the temporary works. The *Project Manager* comments on the effectiveness, necessity or risk of the temporary works or Equipment, to allow the *Contractor* to Provide the Works efficiently and without delay.

The *Contractor* designs, procures, manufactures and constructs all temporary works required for the execution of the *works*. The *Contractor* dismantles/demolishes temporary works when such works are no longer required.

The *Contractor* designs all temporary *works* necessary to execute the *works* in accordance with the applicable codes and standards stated in *Table* .

The *Contractor's* appointed ECSA professionally registered structural engineer:

- Reviews and approves (by signature) the designs and drawings of all temporary works and additional supports and method statements produced by the *Contractor*; and
- Supervises, inspects and approves the works as per such.

All temporary works designs where supported from the existing structure are submitted to the *Project Manager* for review and acceptance, to prove that the members of the existing structure can withstand the induced load. The *Contractor* submits all design calculations, in a design report which includes, but is not limited to, all inspection reports, survey data, structural analysis models, assumptions, drawings/sketches, rigging studies etc.

The *Contractor* takes note that review and acceptance of any document/ drawing/ design calculations by the *Employer* in no way relieves the *Contractor* of his liability for the *works*. The *Contractor* remains liable for all *works* conducted as per this Scope of *works*.

8.3 Document Management

The documentation requirements cover the various engineering stages, from the design stage through fabrication, installation, testing and commissioning and most importantly for the operating, maintenance and training stage of the project. The *Contractor* ensures that the Technical Documents and Records Management Work Instruction (240-76992014) is used for any documentation requirements.

The *Contractor* is responsible for the compilation and the supply of the documentation during the various project stages and to provide the documentation programme to link with the milestone dates. Documentation and drawings are programmed for delivery to meet the milestone dates and in accordance with the agreed VDSS.

8.3.1 Document Identification

8.3.1.1 Identification of the Documentation

The *Contractor* ensures that a document has the following minimum attribute on the cover page:

- Title of the document
- Document Unique Identification number (Eskom number)
- *Contractor* Document number, if applicable
- Document status
- Revision number
- Document Type
- Document security level
- Document revision table/history
- Page number on the footer
- Document Author/Authoriser/
- Document Originator *Contractor*

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The following additional attributes are important for technical documents:

- Package/System name, sub-system if applicable
- Unit/s number
- *Contractor* name
- *Contractor* number
- Plant Identification Codes

8.3.1.2 Format and Layout of Documents

For consistency it is important that all documents used within a specific domain follow the same layout, style and formatting standard.

8.3.1.3 Layout and Typography

Every document should comply with the following font specifications:

- Font Colour: Black
- Main Headings Font Type: Arial, Bold, Capital Letters
- Main Heading Font Size: 12pt
- Sub Headings Font Type: Arial, Bold, Title Case
- Sub Headings Font Size: 11pt
- Body Font Type: Arial, Sentence Case i.e., only the first letter of the first word is a capital letter.
- Body Text Font size: 11pt
- Line Spacing: 1.5 line spacing
- Margins: standard
- Alignment: full justification to be used
- Paragraphing: one line skip between paragraphs
- Pagination: centred page numbers (about 0.5 inches from bottom)
- Indentations: standard tab for all paragraphs (about 0.4 to 0.5 inches)

8.3.1.4 Document Headers

The header should include the project name, document title, document number, revision number and page number.

8.3.1.5 Naming of files

The *Contractor* to comply with the Eskom standard for naming documentation files. The standard is as follows:

For documents that have approval date and signature

- (YYYYMMDD_DocType_DocumentTitle_UniqueIdentifier_Revision.FileExtention)

For documents that do not necessarily require the 'Approved Date' and 'Revision & Versioning', use the date of update

- (YYYYMMDD_DocType_DocumentTitle_UniqueIdentifier_Revision.FileExtention)

All further requirements will be according to IEC 61355 – 1:2008 (Edition) Classification and designation of documents for plants, systems and equipment – Part 1: Rules and classification tables.

8.3.2 Document Submission

The *Contractor* engineering program to allow a minimum of 21 days for mailing, processing, and review of drawings and data by *Employer*. The *Contractor* is responsible for the compilation and the supply of all the documentation required during the various project stages and to provide the documentation programmed to link with the milestone dates. Documentation and drawings are programmed for delivery to meet the milestone dates and in accordance with the agreed VDSS. The VDSS is revisable and changes shall be discussed and agreed upon by all parties and properly documented.

Contractor documents submittals are provided in accordance with the Vendor Document Submittal Schedule (VDSS) which is included in Appendix 7.9. The VDSS to indicate the format of documents to be submitted.

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The *Employer* is responsible for the management of the schedule i.e. to create a document register that shall be used to track submission progress of documentation by the *Contractor* as per the committed dates on the VDSS.

Contractor documents all documentation that will be sent to the *Employer* in the Master Document List (MDL) as provided by the *Employer* in Appendix 7.7. All documentation, including reports, manuals, etc. is in the English language.

If the *Contractor* makes further changes to the equipment and materials shown on submittals that have been reviewed by the *Employer*, the changes will be clearly marked on the submittal by the *Contractor* and the submittal process will be repeated. If changes are made by *Contractor* after delivery to the Plant, as-built drawings indicating the changes would be prepared by *Contractor* and submitted to *Employer* for review. Any resubmittal of information to clearly identify the revisions by footnote or by a form of back-circle, with revision block update, as appropriate.

8.3.2.1 Transmittals

All document exchange shall be done using formal Transmittals. The following is the minimum information required for sending transmittals:

- Title of the document
- Reason for issuing/submission
- Transmittal Number
- Transmittal Name
- Transmittal Description
- Contract Number:
- Package Number
- Transmittal purpose
- Sender Name
- Sender E-Mail
- Sender Organisation
- Recipient Name
- Recipient E-Mail
- Recipient Organisation
- Disclosure Classification
- Date received
- Quantity of documentation referenced on the transmittal
- Number of copies
- Format/medium submitted (e.g. paper, External Hard Drives, etc.)
- Sender signature
- Recipient signature, once submitted, to acknowledge receipt

If a transmittal is in response to an Eskom communication via transmittal, the Eskom Transmittal Number will be referenced in the transmittal response and will be provided in addition to the meta-data required in 1.4.

The *Contractor* to follow a structured and standard definition for Transmittal Descriptions, i.e. subject line convention of **YYYYMMDD – <Contract & Package Number> – <Vendor> – <Short Description> – <Sender Initials>**.

The *Contractor* to follow a structured method of communication as defined within Communication Interface Memorandum (CIM) for any correspondence

The *Contractor* to follow a structured and standard definition for email subjects i.e. a subject line convention of **YYYYMMDD – < Package File Number> – > – <Email Subject line>**.

The *Contractor* to select the purpose for transmittal in line with the standard Eskom Selection Criteria:

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- Issued for Approval
- Issued for Award
- Issued for Basic Design
- Issued for Commissioning
- Issued for Concept Design
- Issued for Consideration
- Issued for Construction
- Issued for Detail Design
- Issued for Document Review
- Issued for Handover
- Issued for Information
- Issued for Installation
- Issued for Manufacturing
- Issued for Procurement
- Issued for Review
- Issued for Tender

Issuing of documents with different transmittal purposes is to be done separately and not combined into one transmittal. This would ensure fast and efficient processing of incoming and outgoing transmittals and information exchange.

Electronic technical data submittals is processed using the Eskom Document Control email address (KusileDocControl@eskom.co.za) and Zendto, a Web-based file transfer service. If *Contractor* does not already have Zendto transmittal capability, information is available at <https://zendto.eskom.co.za/>. (The Uniform Resource Locator [URL] to be used for electronic file submittals will be made available upon Contract award.)

In case of email submission, the Contractor should note that if a single file to be transmitted is over 20MB in size, then the document shall be uploaded on Zendto portal.

Notification to *Employer* that submittals have been posted to Zendto should be in accordance with the correspondence requirements of this Contract. *For the Zendto submission, a transmittal record must be submitted to the project email document control address information and notify the Employer of such submission.*

The hard copy prints is to be submitted to the address indicated for Technical Documents in the Supplementary Terms and Conditions of this Contract. The following number of prints is submitted unless otherwise indicated in the Schedule of Submittals:

Submittal Description	Copies Required
Performance Curves	2
Design Data	2
Test and Inspection Data	2
Drawings	2

The *Contractor* submits documentation to the *Employer* as well as the Project's Documentation Centre in the following media:

- Electronic copies can be submitted to Eskom Documentation Centre through generic email address agreed to by the project. Electronic copies large for email will be delivered on external drives/USBs, large file transfer protocol and/or hard drives to the Project Documentation Centre. A notification email,

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with the transmittal note attached, shall be sent to the project generic email address. The *Employer* will be copied on the email as well.

- Hard copies would be submitted to the *Employer* accompanied by the Transmittal Note.

8.3.2.2 Drawings

The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of 240-86973501 (Engineering Drawing Standards – Common Requirements) to be supplied as part of the enquiry documents. All drawings must be issued to Eskom in both native CADD format and PDF format as per 240-86973501 (Engineering Drawing Standards – Common Requirements).

Drawings shall be in sufficient detail to indicate the kind, size, arrangement, component weight, breakdown for shipment, and operation of component materials and devices; the external connections, anchorages, and supports required; the dimensions needed for installation and correlation with other materials and equipment; and the information specifically requested in the Schedule of Submittals.

Contractor to fully complete and certify drawings for compliance with the Contract requirements. Drawings to have title block entries that clearly indicate the drawing is certified.

Each submitted drawing to be project unique and clearly marked with the name of the project, unit designation, *Employer's* Contract title, *Employer's* Contract file number, project equipment or structure nomenclature, component identification numbers, and *Employer's* name. Equipment, instrumentation, and other components requiring Engineer-assigned identification tag numbers is be clearly identified on the drawings. If standard drawings are submitted, the applicable equipment and devices furnished for the project would be clearly marked.

Transmittal letters to identify which Schedule of Submittals item (by item number) is satisfied by each drawing or group of drawings. The transmittal letter to include the manufacturer's drawing number, revision number, and title for each drawing attached. Each drawing title to be unique and be descriptive of the specific drawing content. Transmittal letters for resubmitted drawings to include the *Employer's* drawing numbers.

The *Contractor* includes the *Employer's* drawing number in the drawing title block. This requirement only applies to design drawings developed by the *Contractor* and his Subcontractors. It does not apply to drawings developed by manufacturers for equipment and material such as valves, instruments, etc. Drawing numbers will be assigned by the *Employer* as drawings are developed.

The project name to be listed on all drawings, including manufacturers' drawings. Tag numbers and equipment names to be listed on all manufacturers' drawings. A separate sheet may be attached to the submittal if needed to adequately list all tag numbers associated with the drawings such as valves or instruments which may have numerous tag numbers associated with it.

The language of all documentation would be in the English language. The units of measure to be metric.

The *Contractor* retains project design calculations and information for the entire life cycle of the plant and provides these to the *Employer* on prior written notice at any time notwithstanding the expiry or termination of the contract.

8.3.2.2.1 Drawing Submittal

All documents and records management will be performed according to Project/Plant Specific Documents and Records Process. Any uncertainty regarding this should be clarified with the *Employer*. The *Contractor* to comply with all minimum document metadata as specified in Technical Documentation Classification and Designation Standard (240-54179170).

The *Employer* uses Smartplant Owner Operator (SPO) for documents and records management. The *Contractor* is to submit electronic copies of the documents using a fully secure web based solution providing carefully controlled access to appropriate project information for authorized personnel. All electronic design data and documents shall be in such a form which will enable importing such data, documents and drawings, including 3-dimensional drawings, seamlessly into the Intergraph SPF (Smart Plant Foundation) system. Hard copy submittals will only be required for the IOM Manuals and final as-built submittals.

Transmittal letters would be provided with each document submittal. The transmittal letter to include the *Contractor* drawing number, revision number, and title for each drawing attached. Each drawing title is to be unique and descriptive of the specific drawing content.

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Catalog pages are not acceptable, except as drawings for standard non engineered products and when the catalog pages provide all dimensional data, all external termination data, and mounting data. The catalog page to be submitted with a typed cover page clearly indicating the name of the project, unit designation, specification title, specification number, component identification numbers, model number, *Contractor* drawing number, and *Employer's* name. Drawings to be submitted with all numerical values in metric units.

8.3.2.2.2 Information Requirements

The *Employer* requires drawings, documentation, plans, information and data (collectively "Information") from the *Contractor* for two fundamental purposes; namely for the management and execution of the Contract and for the operation, maintenance and support of the *works* during its entire operational phase until disposal and decommissioning.

The *Contractor* to, during the progress of and upon completion of the *works*, supply the Information required in terms of the Contract and all such Information as may usually be supplied in connection with similar *works*, including, whether or not specified in the Contract, all Information necessary or useful for:

1. Design reviews and the interface management of the *works* with the Project *works*;
2. Quality assurance and control; and
3. The operation, maintenance, support, inspection, integrity management, training and technical optimization of the *works*, over the lifecycle thereof.

The scope of supply of Information from the *Contractor* to include drawings, documents, lists and data according to the types defined in Table 5 below:

Table 5: Typical Document Requirement List	
Document Group	Description of document type (includes information data sets)
General	Equipment arrangement drawings Piping & Instrument Diagrams (P&ID's) Material handling flow diagrams Engineering and procurement schedule Equipment list Isometric Drawings Valve list Pipeline list Hanger list 3D model Interface list Equipment specifications & data sheets Drawings and data for all equipment and material Installation, Operation, and Maintenance (IOM) Manuals Spare parts list Factory Acceptance Test (FAT) report

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Table 5: Typical Document Requirement List	
Document Group	Description of document type (includes information data sets)
Quality Assurance	Quality assurance manual Quality control plans Quality control reports Weld summary index Material traceability certificates Manufacturing test reports Manufacturing Non-Conformance Reports (NCR's)
Civils & Structures	Site Layout Geotechnical Investigation Report Building arrangement and floor layouts Structural drawings Architectural drawings Structural analysis and design report Foundation drawings Structural support drawings Access Platform/Walkway Drawings
Construction	Transportability study/report (including heavy haul study) Site management plan (QA, Safety, Environmental etc.) Construction schedule Site storage requirements for major equipment Construction test records (hydrotest, concrete strength, pile integrity test, etc.) Maintenance records for all equipment while stored on site Constructability report
Commissioning	Commissioning schedule Test & Evaluation Master Plan (TEMP) Commissioning procedures Commissioning database Performance test procedure Performance test reports Field test reports and certificates

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Table 5: Typical Document Requirement List	
Document Group	Description of document type (includes information data sets)
Operations	Operating procedures Plant operational documentation Plant tech specs Incident & upset mitigation procedures Operating scenarios (for C&I control purposes)
Logistic Support	Maintenance concept Plant maintenance documentation ISI plan/program Spare parts assessment Plant RAM analysis Equipment access and removal paths assessment Fault finding diagrams
Training	Training plan Training manuals and instructions
Safety & Protection	Fire hazard analysis Waste management plan
Design Analyses	Reliability model and analysis Transient / Transition Analysis Flow dynamics analysis Thermo-hydraulic analysis Pipe Stress Analysis Maintainability analysis FMECA / FMEA analysis HAZOP analysis 3D model interference checks

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Table 5: Typical Document Requirement List

Document Group	Description of document type (includes information data sets)
Electrical	Motor list Electrical load list Circuit list Raceway list Single line diagram Protection schematic diagram Electrical load flow and fault studies report Cable block diagrams Cable schedule Cabling routing and cable racking layout diagrams Cable termination diagrams EMC and earthing standards report Earthing layout drawings Lighting layout drawings
C&I	Alarm and set-point schedule Instrument schedule Instrument data sheets Mechanical hook-up drawings Electrical hook-up drawings Cable Schedule Termination Schedules Junction Box GA and Internal Layout Junction Box and Instrument location drawings Instrument Stand GA Maintenance Manuals and procedures Operating and Control Philosophies Functional Logic diagrams Field device calibration certificates Level measurement installation report

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Table 5: Typical Document Requirement List

Document Group	Description of document type (includes information data sets)
CBMS	Alarm and set-point schedule Instrument schedule Instrument data sheets Equipment layout drawings Routing layout drawings Cable schedules Termination schedules Junction Box GA and Internal Layout Instrument Stand GA Maintenance Manuals and procedures Operating and Control Philosophies Field device calibration certificates Network architecture Fire risk assessments

In addition to the official documentation submittals, the *Contractor* is to provide additional information for review and design coordination as requested by the *Employer* from time to time.

The *Contractor* to use the *Employer's* SmartPlant Environment and all design tools as the delivery mechanism for all project data and document deliverables. The EDMS and design tools will be provided to the *Contractor* pre-configured based on *Employer's* data handover requirements. Any project data and document deliverables not generated from design tools provided by the *Employer* shall be supplied in a format specified by the *Employer*.

The *Employer* reviews the *Contractor's* submitted documents. The *Contractor* ensures adherence to the contract and that a technically sound design approach is incorporated. Specific information required from the *Contractor* during tender phase and as part of the *works* is as set-out in the VDSS, in Appendix 7.9. Each document submitted to the *Employer* requires a transmittal note (refer to *Employer's* template 240-71448626 for minimum metadata requirements) from the *Contractor*. The *Contractor* includes interpretation of results in every report compiled. All project documents shall be submitted to the *Employer* in accordance with Project / Plant Specific Technical Documents and Records Management Work Instruction (240-76992014). The *Contractor* is required to submit documents in electronic and hard copies and both copies must be delivered to the *Employer* with a transmittal note.

8.3.3 Documentation Recording

The *Contractor* develops, document and maintain the Master Document List (MDL) with all the required metadata which will be submitted to the *Employer* in the monthly basis for tracking purposes irrespective of whether there are updates or not. The MDL to include a list of drawings and documents and shall contain the following minimum information for each document:

- Date of submission
- Transmittal number
- Transmittal title
- Document description

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I. Document number (both *Contractor* and *Employer*)

- Document Type
- Revision number
- Document Approval Status
- Document Authorisation Status (i.e. Accepted With Comments, Not Accepted with Comments, Accepted)
- Transmittal Reason for Issue

In addition, the *Contractor* to adhere to the following standards:

- Project / Plant Specific Technical Documents and Records Management Procedure (240-53114186).
- SmartPlant for Owner Operators (SPO) Documentation Metadata Standard (240-58552870)
- SmartPlant Data Take-On Standard (240-107305502)

8.3.4 Documentation Requirements

All documents supplied by the *Contractor* are subject to *Employer's* approval. For consistency, it is important that all documents used within the project follow the same layout, style and formatting as described in the Technical Documents and Records Management Work Instruction (240-76992014). Documents such as QCP's, Method Statements and other documents impacting the work are approved by the *Employer* at least 3 working days prior to commencement of the *works*.

Each revision of a document or drawing is accompanied with a list of the comments made by the *Employer* on the previous revision if applicable and the response/corrective action taken by the *Contractor*. Changes are recorded in a revision table contained in each drawing/document.

Documents and drawings to indicate the *Employer's* number as allocated by the *Employer*. The *Contractor* may have his own internal document or drawing number on the document or drawing, but where reference is made among documents, the *Employer's* number is used as the reference number.

The *Contractor* compiles a complete data book for all work done during manufacturing, construction and commission containing the following as a minimum if applicable:

- 1 Scope of work
- 2 Approved "As built" drawings
- 3 Design calculations
- 4 Approved QCP / ITP
- 5 Inspection reports
- 6 Pipe ovality reports if applicable
- 7 As built drawings (isometric drawings and P&IDs)
- 8 Material summary that gives full traceability between components used, drawings and material certificates
- 9 All material certificates for pipes, fittings and all components used.
- 10 Pressure test certificate and the calibration certificates of the gauges used.
- 11 Pressure test procedures
- 12 Test reports
- 13 Calibration certificates
- 14 CoCs
- 15 The manufacturer's/repairer's certificate as defined in PER.
- 16 All CAR's and corrective actions

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- 17 Operating Philosophy including all alarm and trip values
- 18 Parts catalogue
- 19 Maintenance manual
- 20 Storage, packing and transportation instructions

8.3.5 General Requirements

The *Contractor* includes the *Employer's* drawing number in the drawing title block. This requirement only applies to design drawings developed by the *Contractor* and his Sub-*Contractors*. It shall not apply to drawings developed by manufacturers for equipment and material such as valves, instruments, etc. Drawing numbers shall be assigned by the *Employer* as drawings are developed.

The project name is to be listed on all drawings, including manufacturers' drawings. A separate sheet may be attached to the submittal if needed to adequately list all tag numbers associated with the drawings such as valves or instruments which may have numerous tag numbers associated with it.

The language of all documentation shall be in the English language. The units of measure shall be metric.

The *Contractor* to retain project design calculations and information for the entire life cycle of the plant and shall provide these to the *Employer* on prior written notice at any time notwithstanding the expiry or termination of the contract.

8.4 Configuration Management

The *Contractor* supplies a comprehensive configuration management program according to ISO 10007 (2nd Edition) to ensure that plant structures, components and computer software conform to approved design requirements. However, a project specific Configuration Management Plan document shall be developed and be aligned to ISO 10007. In addition, the *works* as-built physical and functional characteristics shall be accurately reflected in selected documents and databases, including those for design, procurement, construction, operation, testing and training. The configuration program shall be applicable for use throughout all phases of the project life cycle, including management of spare parts, replacement parts and product upgrades, and shall form part of deliverables for hand-over to the *Employer* for use during the operation and maintenance phases of the plant.

8.4.1 Plant Identification

8.4.1.1 Plant Coding

Plant Coding is undertaken by the *Contractor*, the *Employer* will review all the codes and as such the *Contractor* make available of the following documentation to code:

1.1.1.1.1.1 Mechanical

- general arrangements (GA)
- Piping and Instrumentation Diagrams (P&IDs)
- interface list
- process flow diagrams (PFDs)

1.1.1.1.1.2 Electrical

- single line diagrams
- electrical board general arrangements (GA)
- cable schedule

The *Employer* may only code the KKS code defining Documentation listed above. The *Employer* assign a coding practitioner who shall interact with the *Contractor* in coding the plant as listed above. It may be required that the person be based at the *Contractor's* offices full time. The *Contractor* is then required to include allocated codes to all other designs and related documentation. It is also the responsibility of the *Contractor* to

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consistently apply the KKS codes throughout the rest of the technical documentation which includes, but not limited to:

- load schedules
- board parts lists
- cable block diagram
- termination diagram
- drive & actuator schedules
- instrument schedules
- alarm lists, loop diagrams
- signal lists
- schematic diagrams
- termination diagrams
- Logic diagrams, etc.

The *Contractor* ensures that all documentation is coded (as per the codes assigned by the Practitioner) prior submission to *Employer* for review.

8.4.1.2 Plant Codification

The KKS system is used by the *Contractor* for classifying and designating both plant and their associated documents. All technical documentation as per "Technical documentation classification and designation standard – 240-54179170" shall contain a KKS code as part of the documentation identification relevant to the plant equipment. All plant (Process, electrical, C&I, CBMS, and Civil) are coded to KKS breakdown level 3. The KKS code shall contain break down level 1, break down level 2 and breakdown level 3. Omission of any break down level shall not be permitted. The system shall be applied from the concept stage until project closeout. The rules specified in the VGB guidelines are used but all rules specified in the *Employer's* documents would take precedence.

Detailed nameplate or label list with the service legends and including the KKS Code shall be prepared by the *Contractor* and submitted to the *Employer* for review and comment before commencing manufacture of the labels. All maintainable plant equipment and components shall be labelled including pipework.

The rules for applying the KKS and the KKS codes are contained in the Eskom Standard 240-93576498 and in the publication KKS power plant classification (B105e) 5th Edition 2003 published by Verlag VGB PowerTech Service GmbH (Essen), and the KKS Applications: Guideline and explanations A, B1-4 (B106e).

The *Contractor* shall use Eskom –specific interpretations of the KKS standards, which will be reviewed and agreed on after Contract Award. The following variations relating to 240-93576498 are noted.

- Breakdown level 3 component code -> not used in P&ID's and PFUP's, only used by control hardware supplier
- Breakdown level 0: will be shown as a general remark on the P&ID not on the individual KKS number
- F0-level is not used; FN level is free -> no general decoding system

The *Contractor* codes all plant within scope of supply according to the KKS Classification System to Breakdown Level 3 where possible. The relevant KKS codes thus allocated shall appear on all plant related documentation, drawings, lists and correspondence.

The *Contractor* is responsible for ensuring the accuracy, completeness and consistency of the designations in all documents. This applies both to designations within documents (plant designations) and of Documents (documents designations). The *Contractor* submits these for the *Employer's* approval.

A list of the KKS designations allocated shall be drawn up by the *Contractor* for each scope of delivery. Methods of KKS designation, list formulation and submission format shall be proposed by the *Contractor* and agreed by the *Employer*.

As soon as the contract is place, the *Contractor* provides the *Employer* with the following: -

- Outline drawings or diagrams showing the *Contractor* reference
- Coding for systems and equipment.
- In respect of items procured by the *Contractor* from another
- Manufacture or vendor, the *Contractor* shall provide the name of
- The actual manufacturer and his coded drawing or reference
- Numbers and relevant technical data for identification purposes.

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8.4.1.3 Plant Labelling

1. New labels are provided for all plant, material and equipment provided as part of the *works*. It is the responsibility of the *Contractor* to manufacture and install labels according to station based labelling standard. The *Employer* provides the labelling standard.
2. All labels are made from anodised aluminium and are pop riveted in place.
3. Coding and labelling of components inside electrical and C&I panels shall be done by the *Contractor*.
4. The Coding practitioner facilitate the base-lining of all equipment lists from the *Contractor*, and only baseline equipment lists shall be used as a basis for the production of labels.
5. The abbreviations are in accordance with the Kusile's abbreviation standard, 240-109607332 – Kusile Power Station Project – Standard Abbreviations provided Design Reviews and Change Management

8.4.1.4 Design Reviews: Procedure for submission and acceptance of *Contractor's* design

Specific information required from the *Contractor* during the tender phase and as part of the *works* are as set out in the Vendor Document Submittal Schedule (VDSS).

Each document submitted to the *Project Manager* requires a transmittal note (refer to *Employer's* template 240-71448626 for minimum metadata requirements) from the *Contractor*.

The *Contractor* includes interpretation of results in every report compiled and submitted.

8.4.1.4.1 Review of design documentation

The *Contractor* submits all documentation to the *Project Manager* for acceptance. The *Project Manager* reviews the *Contractor's* submitted documents in accordance to the *Employer's* Design Review Procedure (240-53113685).

The *Contractor* conducts design reviews of the *Contractor's* design as per the *Contractor's* official design review procedure. The *Contractor* ensures adherence to the Works Information and that a technically sound design approach is followed in carrying out the designs.

The designs submitted are complete packages with all elements (all related drawings and detailed design report) included in order for the *Employer* to review as a whole.

The *Contractor* takes note of the *Employer's* Design Review Procedure (240-53113685) and participates in all design reviews as specified by the *Employer*. The *Employer* may "Accept"; "Accepted with Comments" or "Not Accepted with Comments". If required, the *Contractor* makes the necessary revisions on the documentation and ensures acceptance is obtained from the *Project Manager*. The *Contractor* includes these design reviews as part of the schedule. All designs must be reviewed, accepted and frozen before manufacturing and construction of the relevant plant item starts.

In terms of the Construction Regulations, the *Employer's* review of the *Contractor's* design does not influence the design as only the *Contractor* can amend, update and revise the design. The *Contractor* remains the "Designer" as per the Construction Regulations, the *Employer* is not the "Designer".

The *Employer*, as per the design review procedure (240-53113685), conducts the following design reviews below:

- Contract Award Review,
- Design Freeze Review(s) (Detail Design),
- System Integrated Design Review (Detail Design),
- Pre-Commissioning Review (per unit),
- Hand-over Review,
- Further reviews as specified in this Works Information.

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Design Freeze reviews can be conducted as End-of-Phase Design Reviews or as a series of Interim Design Reviews with the aim to design freeze a system or subsystem/asset in order to enable subsequent designs to progress. The number of design freeze reviews is proposed by the *Contractor* and accepted by the *Employer*.

8.4.1.4.2 *Contractor's responsibilities during the Employer's Design Review Process*

The *Project Manager* conducts Design Reviews as per the *Employer's* design review procedure; Participation of the *Contractor* in the *Employer's* Design Reviews consists of:

- The *Project Manager* conducts design reviews as per the *Employer's* design review procedure and the *Contractor* presents (the design developed by him) and participates in the design review.
- If any fundamental errors are found in the designs or further actions are required, the *Contractor* addresses all concerns raised and revises the designs.
- The *Contractor* submits the documents for another design review once all designs are revised according to the concerns raised by the *Project Manager*.
- If no fundamental errors are found in the designs during the design review session, the *Project Manager* compiles the design review minutes and report.
- The *Contractor* reviews the report and minutes. If the report/minutes are not acceptable, the *Contractor* submits comments to the *Project Manager*.

The *Project Manager* accepts the *Contractor's* design once the report is accepted and signed by the *Employer's* project team.

8.4.1.5 *Change Management*

All Design change management are performed in accordance to the latest revision of the Eskom Project Change Management Procedure (240-53114026) and the Kusile Engineering Change Management Work Instruction (240-132735850). The *Employer* ensures that *Contractor* is provided with latest revisions of this procedure. Any uncertainty regarding this procedure should be clarified with the *Employer* and clarification updates should be reflected in updated versions of this procedure.

8.4.2 *Handover*

Apart from any statutory data packages required, the *Contractor* also compiles and supplies a data package of the relevant drawings, test certificates etc. to the *Employer* for acceptance.

- All documentation or requirements as per the VDSS.

Detailed handover requirements are as per the requirements defined in the Kusile Project "240-128515850 - Documentation Handover Specification". As a minimum the *Contractor* provides the *Employer* with the back-ups and information to completely replicate the *Contractor's* SmartPlant instance on the *Employer's* environment. Any uncertainty regarding this process should be clarified with the *Employer*.

SPEL and SPI Data are captured as defined by the both the Electrical and Control & Instrumentation Centre of Excellence, respectively, during contracting phase. All terminations shall be captured as per the *Employer's* data template.

8.4.3 *System Interface*

The *Contractor* is responsible for all system interfaces which forms part of the *works*. The *Employer* shall provide the relevant information defining the system interfaces The *Contractor* caters for all the identified interfaces, taking into consideration all Packages required.

8.5 *List of drawings*

8.5.1 *Drawings issued by the Employer*

The following drawings are issued to the *Contractor* to be used for tender. The *Employer* provides the *Contractor* with drawings issued for construction after contract award. Drawings for Tender are not used for procurement, fabrication or construction.

The *Employer* provides additional concrete reinforcement drawings and bending schedules, for the Civil & Structural drawings indicated below, issued for construction to the *Contractor* after contract award.

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Some drawings may contain both Works Information and Site Information.

Table 6: Employer's Detailed Design Drawings

Drawing number	Revision	Title	Status
Architectural Drawings			
0.90/366-231152	A	Elevations	For Tender
0.90/366-231147	A	Ground Floor Plan, Workshop top window plan	For Tender
0.90/366-231170	A	Section AA & CC	For Tender
0.90/366-231171	A	Section BB & DD	For Tender
0.90/366-231175	A	Construction Details	For Tender
Structural Drawings			
366-232099	A	Foundation Plan Layout & Section	For Tender
366-232100	A	Surface Bed Layout & Details	For Tender
366-232101	A	Plan Layout Ring Beam Level 1	For Tender
366-232102	A	Plan Layout Ring Beam Level 2 & 3	For Tender
366-232103	A	3D Views	For Tender
366-232108	A	Higher Roof Layout Section & Details	For Tender
366-232109	A	Higher Roof Sections	For Tender
366-232110	A	Lower Roof Layout Section & Details	For Tender
366-232111	A	Steel Roof Details 1	For Tender
366-232112	A	Steel Roof Details 2	For Tender
366-232113	A	Steel Roof Details 3	For Tender
366-232114	A	Steel Roof Details 4	For Tender
366-232115	A	5T Gantry Crane Diagram Plan Layout & Sections	For Tender
366-232116	A	Steel Roof Details 1	For Tender
Site Layout & Storm Water Drawing			
366-232098	01	Site Layout	For Tender
Plumbing Drawings			

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Drawing number	Revision	Title	Status
0.90/366-231184	A	Drainage & Water Reticulation	For Tender
Mechanical Drawings			
HVAC Drawings			
0.90 366-231147	00	HVAC Layout Ground Floor	For Tender
Fire Protection/ Detection Drawings			
0.90/24116	Sh1 Rev 01	Ground Floor Fire Protection Layout	For Tender
0.90/24116	Sh2 Rev 01	Ground Floor Fire Water Layout	For Tender
0.90/24116	Sh2 Rev 01	Ground Floor Smoke Detection Layout	For Tender
Electrical Drawings			
0.90/24777	Sh 1 Rev 0	Lighting Small Power & Lightning Protection	For Tender
0.90/24777	Sh2 Rev 0	SCHEMATIC DIAGRAM DB-MM	For Tender
CBMS Drawings			
0.90/88396	3	Mill Maintenance Workshop Fire Detection System Monitoring Layout	For Tender
0.90/87673	1	Mill Maintenance Workshop CBMS Rack Details	For Tender

The following drawings and documents are issued to the *Contractor* to be used for information. Drawings and documents for Information are not used for procurement, fabrication or construction.

Table 7: Employer's Drawings and Documents for Information

Document number	Revision	Title	Status
366-231138	00	Baseline Report of HVAC for Mill Maintenance Worksop	For Information

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8.6 Employer's Standards

Number	Title
240-105020315	Standard for Low Pressure Valves
240-109607332	Eskom plant Labelling Abbreviation Standard
240-123801640	Standard for Low Pressure Pipelines
240-40643427	Coding and Labelling Standard
240-53113685	Design Review Procedure
240-54937439	Fire Protection & Detection Assessment Standard
240-54937450	Fire Protection and Life Safety Design Standard.
240 – 56737448	Fire Detection and Life Safety Design Standard
240-55714363	Eskom Generation Power Station Lighting and Small Power Installation Standard
240-56227443	Requirements for Control and Power Cables for Power Stations Standard
474-11542	Generation Plant Electrical Specification
240-56355754	Field Instrumentation Installation Standard
240-56355815	Field Instrument Installation Standard - Junction Boxes and Cable Termination
240-56355888	Temperature Measurement Systems Installation Standard
240-56356376	On-Site Commissioning for Low Pressure Systems Standards
240-56356396	Earthing and Lightning Protection Standard
240-56364535	Architectural Design and Green Building Compliance Manual
240-56364545	Structural Design and Engineering Standard
240-66920003	Documentation Management Review and Handover Procedure for Gx Coal Projects
240-71432150	Plant Labelling Standard
240-76992014	Project / Plant Specific Technical Documents and Records Management Work Instruction
240-77302094	Cable Termination Schedules
240-85065548	Project Controls Specification for <i>Contractor</i> Integration
240-85549846	Standard for Design of Drainage and Sewerage Infrastructure
240-86973501	Engineering drawing Standard
240-93576498	KKS Coding Standard
VGB B 105e	KKS Identification System for Power Stations
VGB B 106e	KKS Application Explanations
Alpha KKS 01	KKS Plant Labelling and Equipment Descriptions Standard
Alpha KKS 02	Medupi Power Station Project – Standard Abbreviations
SPF 200-3340	KKS Coding and Labelling Procedure
N.PSZ 45-45	KKS Key Part Fossil Power Station

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SPF 200-4190	The Application of KKS Plant Coding Standard
4011	Plant Labelling & Coding Procedure
IEC 62381	Automation Systems in the Process Industry – Factory Acceptance Test (FAT), Site Acceptance Test (SAT), and Site Integration Test (SIT)
240-106628253	Standard for Welding Requirements on Eskom Plant
240-145581571	Specification for the Identification of the Contents of Pipelines and Vessels
240-108079430	Power Plant Water Systems Design Guideline
240-101712128	Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings
240-106365693	Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings
240-106628253	Standard for Welding Requirements on Eskom Plant
240-49230046	Failure Mode and Effects Analysis Guideline
240-49230111	Hazard and Operability Analysis Guideline
240-49230030	Reliability Engineering Analysis Guideline
240-52844017	RAM Analysis Guideline
240-53113685	Design Review Procedure
240-76992014	Technical Documents and Records Management Work Instruction
240-53114186	Document and Record Management Procedure
IEC 61355 – 1:2008 (Edition)	Classification and designation of documents for plants, systems and equipment – Part 1: Rules and classification tables
240-54179170	Technical Documentation Classification and Designation Standard
240-86973501	Engineering Drawing Standard Common Requirements
240-71448626	minimum metadata requirements
240-76992014	Project / Plant Specific Technical Documents and Records Management Work Instruction
240-53114186	Project / Plant Specific Technical Documents and Records Management Procedure
240-58552870	SmartPlant for Owner Operators (SPO) Documentation Metadata Standard
240-107305502	SmartPlant Data Take-On Standard
240-53114026	Eskom Project Change Management Procedure
240-133557442	Mechanical Terminal Point Datasheet Template
240-132735850	Kusile Engineering Change Management Procedure
240-128515850	Documentation Handover Specification

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ISO 9906	Hydraulic performance acceptance tests
240-56361435	Transport of Power Station Electric Motors Standard
240-56360387	Storage and Preservation of Power Station Electric Motors Standard
240-57617975	New Low Voltage Motors Procurement Standard
0.54/393	Earthing Standards

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8.7 Master Document List (MDL)

Kusile Power Station									
DRAWINGS AND SPECIFICATION SCHEDULE									
Doc Code	Rev.	Cust. Doc No.	Title	Action	Actual date	Client receipt date	Client Document status	Client ref letter for doc status	Document status

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8.8 Documentation Requirements for Final Handover

Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
Engineering Documentation	1.6	1.6	Risk Assessments
	1.7	1.7	Non-Conformance Management
Final System Design Package	2C	2.38	Functional Descriptions (Control)
	2A	2.39	Alarm Response Procedures
	2C	2.40	Control System Functional Specification/Design
	2B, 2C, 2D, 2E, 2F	2.41	Design Philosophy
	2A	2.42	Material, Mass & Energy Balance Diagrams
	2C	2.43	Control System IT Architecture
	2C	2.44	Plant Protection Logics
	2B	2.45	Safety Studies
	2B	2.47	Plant System/Process Description
			Technical Tender Evaluation Reports
			Functional Descriptions (Control)
Operating and Maintenance Documentation	3.6	3.6	Maintenance Instructions
	3.7	3.7	Operating Instructions
	3.8	3.8	Commissioning/Shutdown Procedures
	3.9	3.9	Storage and Handling Instructions
	3.10	3.10	Installation, Operating & Maintenance Manuals (IOM's)
	3.11	3.11	Datasheets and Product Brochures
	3.12	3.12	Licences & Approvals (Regulatory, Statutory)
Commissioning Documentation	4.1	4.1	Commissioning Procedure / Manual
	4.2	4.2	Handover Certificate

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Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
	4.3	4.3	Commissioning Certificate
Project Execution	Mechanical	5.1.1	Contractor Application for Eskom's Inspection of the Works/Part of the Works
		5.1.2	Data Pack (e.g. Material Certificates, Qualifications, NDE and Welding Documentation, Isometric Drawings, Cutting Instructions, Factory Design Review Reports, C&I Loop checks, etc.)
		5.1.3	Partial/final Inspection certificate
		5.1.4	Defects Notification Certificate/Clearance
		5.1.5	Safety and Housekeeping Certificate
		5.1.6	Safety Clearance Certificate
		5.1.7	Completion Certificate
		5.1.8	Defects Certificate
		5.1.9	Take over Certificate
		5.1.10	Specific Requirements
		5.1.11	KKS and Labelling Certificate
	C&I	5.2.1	Contractor Application for Eskom's Inspection of the Works/Part of the Works
		5.2.2	Data Pack (e.g. Material Certificates, Qualifications, NDE and Welding Documentation, Isometric Drawings, Cutting Instructions, Factory Design Review Reports, C&I Loop checks, etc.)
		5.2.3	Partial/final Inspection certificate
		5.2.4	Defects Notification Certificate/Clearance
		5.2.5	Safety and Housekeeping Certificate
		5.2.6	Safety Clearance Certificate
		5.2.7	Completion Certificate
		5.2.8	Defects Certificate
		5.2.9	Take over Certificate
		5.2.10	Specific Requirements
		5.2.11	KKS and Labelling Certificate
	Electrical	5.3.1	Contractor Application for Eskom's Inspection of the Works/Part of the Works

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Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
		5.3.2	Data Pack (e.g. Material Certificates, Qualifications, NDE and Welding Documentation, Isometric Drawings, Cutting Instructions, Factory Design Review Reports, C&I Loop checks, etc.)
		5.3.3	Partial/final Inspection certificate
		5.3.4	Defects Notification Certificate/Clearance
		5.3.5	Safety and Housekeeping Certificate
		5.3.6	Safety Clearance Certificate
		5.3.7	Completion Certificate
		5.3.8	Defects Certificate
		5.3.9	Take over Certificate
		5.3.10	Specific Requirements
		5.3.11	KKS and Labelling Certificate
	Civil and Structural	5.4.1	Contractor Application for Eskom's Inspection of the Works/Part of the Works
		5.4.2	Data Pack (e.g. Material Certificates, Qualifications, NDE and Welding Documentation, Isometric Drawings, Cutting Instructions, Factory Design Review Reports, C&I Loop checks, etc.)
		5.4.3	Partial/final Inspection certificate
		5.4.4	Defects Notification Certificate/Clearance
		5.4.5	Safety and Housekeeping Certificate
		5.4.6	Safety Clearance Certificate
		5.4.7	Completion Certificate
		5.4.8	Defects Certificate
		5.4.9	Take over Certificate
		5.4.10	Specific Requirements
		5.4.11	KKS and Labelling Certificate
Test and Statutory Certificates	6.1	6.1	Factory Acceptance Test (FAT)
	6.2	6.2	Site Acceptance Test (SAT)
	6.3	6.3	Inspection Test Procedures (ITP's)
	6.4	6.4	QCP's / QIP's (signed off)
	6.5	6.5	COC (Domestic Circuits)

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Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
	6.6	6.6	Electrical Tests - Motors
	6.7	6.7	Calibration Certificate
	6.8	6.8	Erection Check Sheet
	6.9	6.9	Protection and Optimising Test Certificates
	6.10	6.10	Fire Protection Certificate
	6.11	6.11	Other Safety Valves, Ventilation, Boiler Statutory Tests, Transformer Impact Recording, Boiler Registration Certificate, Type Test Certificates)
	6.12	6.12	Synchronisation Tests
	6.13	6.13	Grid Code Compliance Certificate
	6.14	6.14	Defect List
Safety Requirements	7.1	7.1	Safety Signs, Labels and Colour Coding
	7.2	7.2	Demarcation of Hazardous Area (Certificate & Reports)
	7.3	7.3	Lighting
	7.4	7.4	Safety and Housekeeping Certificate
Guarantees & Warrantees	8.1	8.1	Related Extract from SOW of Technical Specification Indicating Plant area / Component
	8.2	8.2	Certificate from Supplier indicating validity of the guarantee / Warrantees Period
		9	Special Tool List
		10	Insurance Cover (90 Days Notification Period)
Plant out of Normal Status Approved	11.1	11.1	Approved Out of Normal Status
	11.2	11.2	Out of Normal Status (Pending Approval)
Training	Competency Declarations	12.1	Training Manual
		12.2	Proof of Training

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Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
		12.3.1	Plant Safety Regulations
		12.3.2	High Voltage (HV) Regulations
		12.3.3	PFFR
		12.3.4	Other
Provisional Hand over Certificate	13.1	13.1	Provisional
	13.2	13.2	Pending Approval
	13.3	13.3	Approved
Final Hand over Certificate	14.1	14.1	Provisional
	14.2	14.2	Pending Approval
	14.3	14.3	Approved
Other	15.1	15.1	Factory Acceptance Tests • Signed Protocol Release Report
	15.2	15.2	Shipment and Transportation - • Transportation test results • Transportation PQP
	15.3	15.3	Other Documentation and Reports • Design assumptions • Trade-offs
	15.4	15.4	Design Software • Software listing • Load Flows • Fault studies • Cable Routing software • CAD software data files • Simulations
	15.5	15.5	Correspondences • Engineering Instructions (EI's)

8.9 VDSS

Please see the attached VDSS schedule of all applicable submissions.

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