
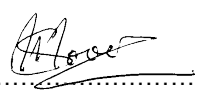
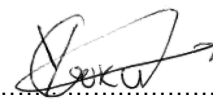
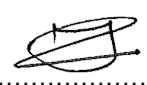
	<b>Scope of Work</b>	<b>Kusile P.S.</b>
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## **1 INTRODUCTION**

The objective of the work is to provide an Emergency Preparedness and Public Address (EPPA) System compliant with Eskom standards for the purpose of managing safety at the Kusile Power Station.

The system shall cater for broadcasts to all or selected sections/ zones from microphones located in four key locations across site.

## **2 SUPPORTING CLAUSES**

### **2.1 SCOPE**

#### **2.1.1 Purpose**

The purpose of this Scope of Works is to provide the requirements and information needed to enable complete construction and commissioning of the Emergency Preparedness and Public Address (EPPA) System of Kusile Power Station.

#### **2.1.2 Applicability**

This document shall apply throughout Eskom Holdings Limited Divisions with particular reference to Kusile Power Station.

### **2.2 NORMATIVE/INFORMATIVE REFERENCES**

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

#### **2.2.1 Normative**

- [1] AB-Z-Z-AN-0001 - Project Bravo: User Requirement Specification, Rev. 0
- [2] 240-64720986 - EPPA for Large Area Deployment
- [3] 240-125815990 Commissioning and Completion of the Kusile Power Station Project
- [4] EN54-4 European Norm: Voice Alarm Power Supply Equipment
- [5] EN54-16 European Norm: Voice Alarm and Indicating Equipment
- [6] EN54-24 European Norm: Loudspeaker Equipment
- [7] BS-5839-8 British Standard: Emergency Voice Communication Systems
- [8] ISO 7240 Voice Alarm Standards
- [9] SANS 7240-19: 2008 - Design, installation, commissioning and service of sound systems for emergency purposes
- [10] SANS 60849 South African National Standard for Voice Alarm Systems
- [11] 240-53114248 - Thyristor and switch mode chargers, AC/DC TO DC/AC converters and inverter/uninterruptible power supplies standard
- [12] 240-51999453 – Standard Specification for Valve-Regulated Lead-Acid Cells
- [13] 240-53114234 – Battery Cabinet Standard
- [14] 240-105658000 “Supplier Quality Management: Specification” (QM 58)

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- [15] ISO9001:2015 “Quality Management Systems – Requirements”
- [16] ISO10006:2003 “Quality Management Systems – Guidelines for Quality Management in Projects”
- [17] 240-132155951 “Kusile Project RFI/PA001 Process”
- [18] 240-150475305 “Kusile Defects Management Process Work Instruction”
- [19] 240-132156363 “Kusile NC Process”
- [20] 240-43921898 “Kusile Project Audit Process Flow”
- [21] 240-134232676 “Data book Review and Final Submission Process
- [22] 240-56356396 “Earthing and Lighting Protection”
- [23] 240-55714363 “Coal Fired Power Stations Lightning and Small Power Installation”
- [24] 240-56227443 “Requirements for Control and Power Cables for Power stations”

### **2.2.2 Informative**

- [25] 240-53113685 Eskom Design Review procedure
- [26] 240 – 132735850 Kusile Engineering Change Management Work Instruction
- [27] SANS 7240-16: 2008 - Sound system control and indicating equipment
- [28] SANS 10108 :2005 - Classification of Hazardous Location (Electrical Plant)
- [29] SANS 10142 - The Code of Practice for the Wiring of Premises
- [30] SANS 10400, 1990: The application of the national building regulations
- [31] Occupational Health and Safety Act (Act No 85 of 1993)
- [32] ISO 9001 Quality Management Systems.

## **2.3 DEFINITIONS**

Definition	Description
Contractor	The appointed person to perform the Works as set out in this document.
Employer	Eskom Holdings SOC Ltd
Island	A demarcated EPPA area with a cabinet and amplifiers which serves as an EPPA hub.

**Table 1: Definitions**

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### 2.3.1 Disclosure Classification

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

## 2.4 ABBREVIATIONS

Abbreviation	Description
STI	Speech Transmission Index
STIPA	Speech Transmission Index for Public Address Systems
EN	European Norm
BOQ	Bill of Quantities
C&I	Control and Instrumentation
CBMS	Consolidated Building Management System
CoE	Centre of Excellence
dB	Decibel
DFR	Design Freeze Review
DMS	Document Management System
ECN	Engineering Change Notification
ECP	Engineering Change Procedure
EDWL	Engineering Design Work Lead
EPC	Emergency Preparedness Centre
ER	Employer's Requirements
FAT	Factory Acceptance Test
FIDIC	Fédération Internationale Des Ingénieurs-Conseils
SNR	Signal to Noise Ratio
IDR	Integrated Design Review
IM	Information Management
SPL	Sound Pressure Level
IT	Information Technology
KPI	Key Performance Indicator
LOSS	Limits of Supply and Services
NCP	Network Control Panel
NKP	National Key Point
O&M	Operation & Maintenance
PI	Power Island
PICS	Power Island Control Suite
QC	Quality Control
QCP	Quality Control Plan
VDC	Direct Current

### CONTROLLED DISCLOSURE

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Abbreviation	Description
SAT	Site Acceptance Test
SIT	Site Integration Test
IDA 8C	Control and Indicating Equipment
UPS	Uninterrupted Power Supply
URS	User Requirements Specification
VDSS	Vendor Document Submittal Schedule
VAC	Alternating Current
Abbreviation	Description
STI	Speech Transmission Index
STIPA	Speech Transmission Index for Public Address Systems
EN	European Norm
BOQ	Bill of Quantities
C&I	Control and Instrumentation
CBMS	Consolidated Building Management System
CoE	Centre of Excellence
dB	Decibel
DFR	Design Freeze Review
DMS	Document Management System
ECN	Engineering Change Notification
ECP	Engineering Change Procedure
EDWL	Engineering Design Work Lead
EPC	Emergency Preparedness Centre
ER	Employer's Requirements
FAT	Factory Acceptance Test
FIDIC	Fédération Internationale Des Ingénieurs-Conseils
SNR	Signal to Noise Ratio
IDR	Integrated Design Review
IM	Information Management
SPL	Sound Pressure Level
IT	Information Technology
KPI	Key Performance Indicator
LOSS	Limits of Supply and Services
NCP	Network Control Panel
NKP	Nation Key Point
O&M	Operation & Maintenance
QC	Quality Control
QCP	Quality Control Plan
VDC	Direct Current

**Table 2: Abbreviations**

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## **2.5 ROLES AND RESPONSIBILITIES**

The following sections may contain specific functions within each of the following roles and responsibilities related to the execution of the works

**The Contractor** constructs and commissions the plant as per the requirements provided.

**The Employer** provides the Eskom Standards and Procedures for the design, construction and commissioning of the plant.

## **3 CODES AND STANDARDS**

Work performed under these specifications shall be done in accordance with the following codes and standards or equivalent International codes and standards approved by the Engineer. SANS standards where applicable, shall take precedence over other standards in the table below and all technical sections. In the event codes and standards are listed in the table below but not listed in technical sections, Contractor shall comply with the codes and standards in the table below. In the event codes and standards are listed in the technical sections but not listed in the table below, Contractor shall comply with the codes and standards listed in the technical sections.

Refer to Section **2.2**

## **4 SCOPE OF WORK**

### **4.1 THE WORKS**

The Kusile Power Station currently has a partially installed EPPA system that requires completion.

The Works includes the supply, installation and commissioning of the EPPA system, that has been partially completed on site.

The Contractor shall be responsible for the Works, that includes, procurement, quality control, handling, shipment and transport to/from site, all storage requirements, unloading, preservation, construction and erection, installation, commissioning, testing, training, optimization and handover of the works of a fully operational and fully functional EPPA System.

#### **4.1.1 Battery Limits**

The battery limits will be as follows:

- The battery limits for the power distribution are as per the provided LOSS diagrams located in Appendix 17.5.
- The battery limits for the network installations are as per the provided LOSS diagrams located in Appendix 17.5.

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<b>System</b>	<b>Interface</b>
Electrical	As per Appendix 17.5
Fire Detection	As per Appendix 17.5
Civil and Structural	As per Appendix 17.5
Fibre Network	As per Appendix 17.5

**Table 3: Summary of Interfaces**

#### **4.1.2 Detail Scope of Work**

The scope requirements to be performed by the Contractor should be read in conjunction with the following Appendices:

<b>Appendix Title</b>
Appendix 17.1 – Vendor Document Submittal Schedule (VDSS)
Appendix 17.2 – Master Document Schedule (MDL)
Appendix 17.3 – Documentation Requirements for Handover
Appendix 17.4 – Drawings and Cable Schedules
Appendix 17.5 – Limits of Scope and Supply (Loss)
Appendix 17.6 – Eskom Standards
Appendix 17.7 – Databooks & Commissioning Documentation
Appendix 17.8 – Technical Datasheets
Appendix 17.9 – Installed Quantities and Free Issue Equipment
Appendix 17.10 – Electrical Load List

**Table 4: List of Appendices**

#### **4.1.3 Employers Design**

The following designs have been provided to the Contractor and the Contractor shall record all deviations to the below as agreed with the Employer.

- Overall Architecture
- Speaker locations
- Hardware Datasheets
- Cabinet Drawings
- Electrical Load Lists

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#### 4.1.4 Project Specific Requirements

Requirement is to provide a fully functional Emergency Preparedness Public Address (EPPA) System inclusive of all speakers, cabling, power installations, racking, batteries and chargers.

#### 4.1.5 System Breakdown

The Emergency Preparedness and Public Address System makes use of a ring topology. Islands are demarcated EPPA areas which house cabinets and amplifiers and which serves as a hub. Islands are connected to each other in a ring topology with single mode fibre. Speakers in buildings in close proximity to these islands are connected directly to the islands with PH30 cable.

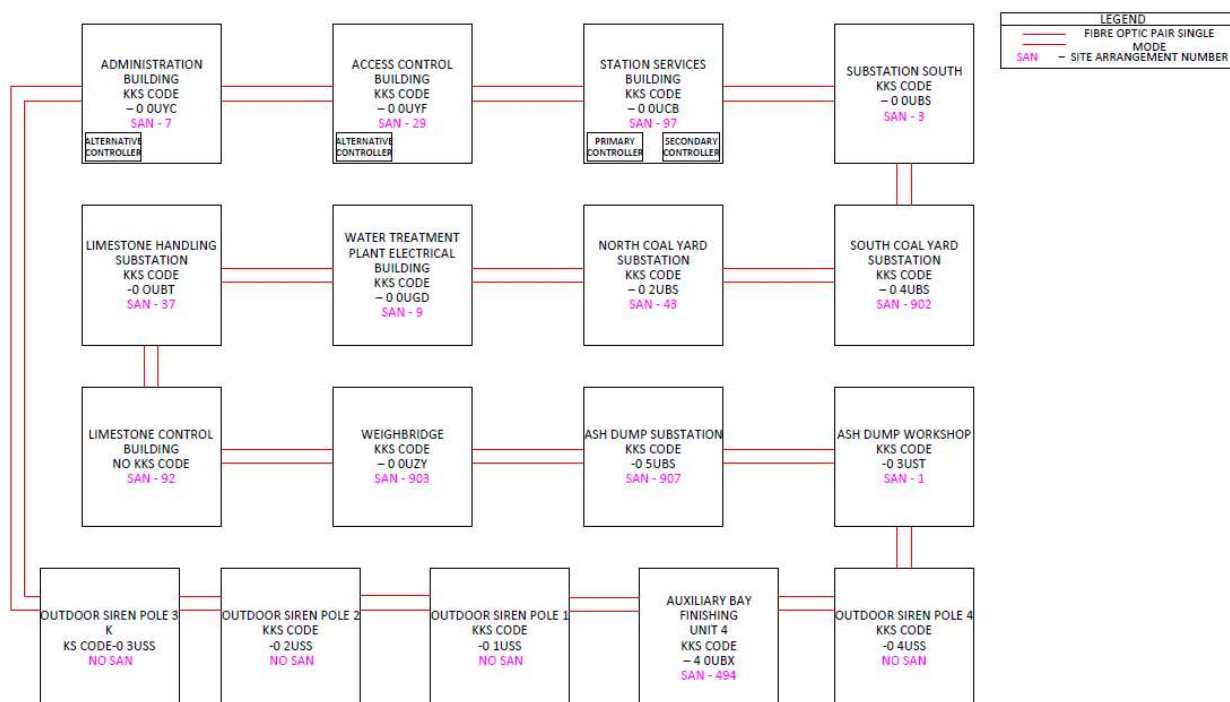


Fig. 1.1 EPPA Network Topology

The System is designed to provide an audible notification in all occupied buildings across the Kusile site.

The System makes use of a microphone (paging console) as the main interface point which allows users to broadcast messages and the paging console also serves to inform network health status.

The EPPA system has 13 islands and 4 outdoor siren poles interconnected with fibre.

#### 4.1.6 Technical Specification

The following technical specification must be read in conjunction with the EPPA standards document (240-64720986).

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#### 4.1.6.1 System Architecture

The EPPA system installation will be installed in the following buildings:

Building Description	Island – Cabinet KKS Code	Drawing
U0 Wastewater Treatment Building		0.90/68048
U0 Hydrogen Plant Substation		0.90/68030
U1 Auxiliary Bay Finishing (16m)		0.90/67986
U1 Auxiliary Bay Finishing (9m)		0.90/67988
U1 Air Cooled Condenser Substation		0.90/67998
U0 Water Treatment Substation	0 0CYW58 GY001	0.90/68027
U0 Water Treatment Laboratory		
U0 Auxiliary Substation A		0.90/67974
U0 Station Services Building	0 0CYW50 GY001	0.90/67984
U0 Ash Dump Substation	0 0CYW05 GY001	0.90/68034
U0 Auxiliary Substation B		0.90/68004
U0 Limestone Handling Substation	To be confirmed	0.90/67727
U0 North Coal Yard Substation	0 0CYW43 GY001	0.90/67890
U1 Condensate Polisher Plant		0.90/67984
U0 South Coal Yard Substation	0 0CYW48 GY001	0.90/67990
U0 Substation South	0 0CYW53 GY001	0.90/67972
U1 FGD Substation		0.90/68000
U1 Fabric Filter Substation		0.90/67996
U1-3 Compressor Building		0.90/68040
U0 Coal Stock Yard Offices		0.90/67982
U1 Boiler Building		0.90/68074
U1 Turbine Hall Building		0.90/67902
U0 Access Control Building	0 0CYW01 GY001	0.90/68046
U0 Ash Dump Workshop	0 0CYW06 GY001	Design work required
U0 Radio Tower Office Building		0.90/68008
U0 Limestone Control Building	0 0CYW40 GY001	0.90/68038
U0 Weigh Bridge Building		0.90/163394
U2 Auxiliary Bay Finishing (16m)		0.90/68116
U2 Auxiliary Bay Finishing (9m)		0.90/68118
U2 Air Cooled Condenser Substation		0.90/68120
U2 Condensate Polisher Plant		0.90/68122
U2 FGD Substation		0.90/68124
U2 Fabric Filter Substation		0.90/68126
U0 Substation East		0.90/68080
U2 Workshop and Stores		0.90/68082
U2 Boiler Building		0.90/68130
U2 Turbine Hal Building		0.90/68132
U0 Fire Station		0.90/20152
U0 Medical Centre		0.90/163401
U0 Canteen		0.90/68096
U0 Administration Building	0 0CYW02 GY001	0.90/68098
U0 Mill Maintenance Workshop		0.90/68100
U0 Sandblast Workshop		0.90/68102
U3 Auxiliary Bay Finishing (16m)		0.90/68140
U3 Auxiliary Bay Finishing (9m)		0.90/68142
U3 Air Cooled Condenser Substation		0.90/68144
U3 Condensate Polisher Plant		0.90/68146

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U3 FGD Substation		0.90/68148
U3 Fabric Filter Substation		0.90/68150
U3 Boiler Building		0.90/68154
U3 Turbine Hal Building		0.90/68156
U4 Auxiliary Bay Finishing (16m)	4 0CYW09 GY001	0.90/68166
U4 Auxiliary Bay Finishing (9m)		0.90/68168
U4 Air Cooled Condenser Substation		0.90/68170
U4 Condensate Polisher Plant		0.90/68172
U4 FGD Substation		0.90/68176
U4 Fabric Filter Substation		0.90/68178
U4-6 Compressor Building		0.90/68182
U4 Boiler Hall Building		0.90/68188
U4 Turbine Hal Building		0.90/68190
U5 Auxiliary Bay Finishing (16m)		0.90/68200
U5 Auxiliary Bay Finishing (9m)		0.90/68202
U5 Air Cooled Condenser Substation		0.90/68204
U5 Condensate Polisher Building		0.90/68206
U5 FGD Substation		0.90/68208
U5 Fabric Filter Substation		0.90/68210
U5 Boiler Building		0.90/68216
U5 Turbine Hal Building		0.90/68218
U6 Auxiliary Bay Finishing (16m)		0.90/68228
U6 Auxiliary Bay Finishing (9m)		0.90/68202
U6 Air Cooled Condenser Substation		0.90/68230
U6 Condensate Polisher Plant		0.90/68232
U6 FGD Substation		0.90/68234
U6 Fabric Filter Substation		0.90/68236
U6 Boiler Building		0.90/68240
U6 Turbine Hal Building		0.90/68242
Coal Offloading Facility		Design Work Required
60 Year Ash Dump		Design Work Required
Evacuation Points		Design Work Required
Sewage Treatment Plant		Design Work Required
Hydrogen Plant Building		Design Work Required

**Table 5: EPPA Building List**

The system shall cater for four microphones in the below locations:

- Electrical Operator Desk located in the Main Unit Control Room
- Administration Building (Emergency Preparedness Centre)
- Access Control Building
- General Manager Secretary located in the Admin building

Installed Hardware consists of the following:

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INDEX NO.	DESCRIPTION	MANUAL	DATA SHEET
1	PUBLIC ADDRESS VOICE ALARM	✓	
2	CROWN CTs SERIES 1200		✓
3	CROWN CTs SERIES 2000		✓
4	ATEIS ISA8 NETWORKABLE PAVA SYSTEM SLAVE UNIT A/B ZONING		✓
5	ATEIS COLOR TOUGH SCREEN SECURE PAGING CONSOLE		✓
6	ATEIS CHARGER AND MONITORING UNIT – EN 54-4		✓
7	ATEIS DPA FOUR DIGITAL POWER AMPLIFIERS		✓
8	ATEIS IDA8C NETWORKABLE PAVA SYSTEM		✓
9	PENTON WEATHERPROOF HORN LOUDSPEAKERS		✓
10	PENTON ROUND METAL CEILING LOUDSPEAKERS		✓
11	PENTON MOULDED CABINET LOUDSPEAKERS		✓
12	JBL VERY HIGH OUTPUT MID HIGH LOUDSPEAKER SYSTE PD764		✓
13	KAMA INDUSTRIES SIRENCO BEACONS		✓
14	ROHS FIRE FORCE FIRE PROTECTION CABLE PH30 BS6387		✓
15	SERVER RACKING SOLUTIONS (CABINET)		✓
16	EQUIPMENT SHELTER SPECIFICATIONS (EPPA HUT)		✓
17	DELTA Siren pole UPS Manual-UPS-RT-5-10kVA	✓	
18	B400 series beacon light		✓
19	MK1 Strobe Lights Controller		✓

**Table 6: Hardware Datasheets Island Cabinet Layout:**

- a) All hardware used is from ATEIS,
- b) The system used by ATEIS is the IDA8 system, the System Brochure also forms part of the Datasheets index in Appendix 17.8
- ATEIS IDA 8 C
    - The IDA8C Controller unit houses advanced audio digital signal processing (DSP), matrix control functions and a digital message player, with front panel access for a fully monitored fireman's microphone and emergency message trigger buttons.
  - ATEIS IDA 8 SAB
    - The IDA8SAB is a slave unit which houses advanced audio digital signal processing (DSP), matrix control functions and a digital message player, along with amplifier monitoring with hot-swap amplifiers and loudspeaker line-impedance line monitoring.
  - ATEIS DPA 4 250
    - The DPA *four* amplifiers are primarily designed for integration into Voice Alarm systems, but thanks to its flexibility, it can also be used for any Public Address or Commercial application. The DPA *four* amplifiers are certified to the EN 54-16 standard.

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**Speakers:**

- a) The speakers currently installed are:
  - Penton Ceiling Speakers
  - Penton Horn Speakers
  - Penton Moulded Cabinet Speakers
- b) For the remaining scope the contractor does not have to adhere to the above speaker specification however the speakers needs to be EN54 compliant.
- c) All speakers to be permanently mounted and to have KKS labelling
- d) All areas to adhere to (240-64720986, EPPA for Large Area Deployment) where the speakers are in A-B wiring configuration

**Strobe Lights:**

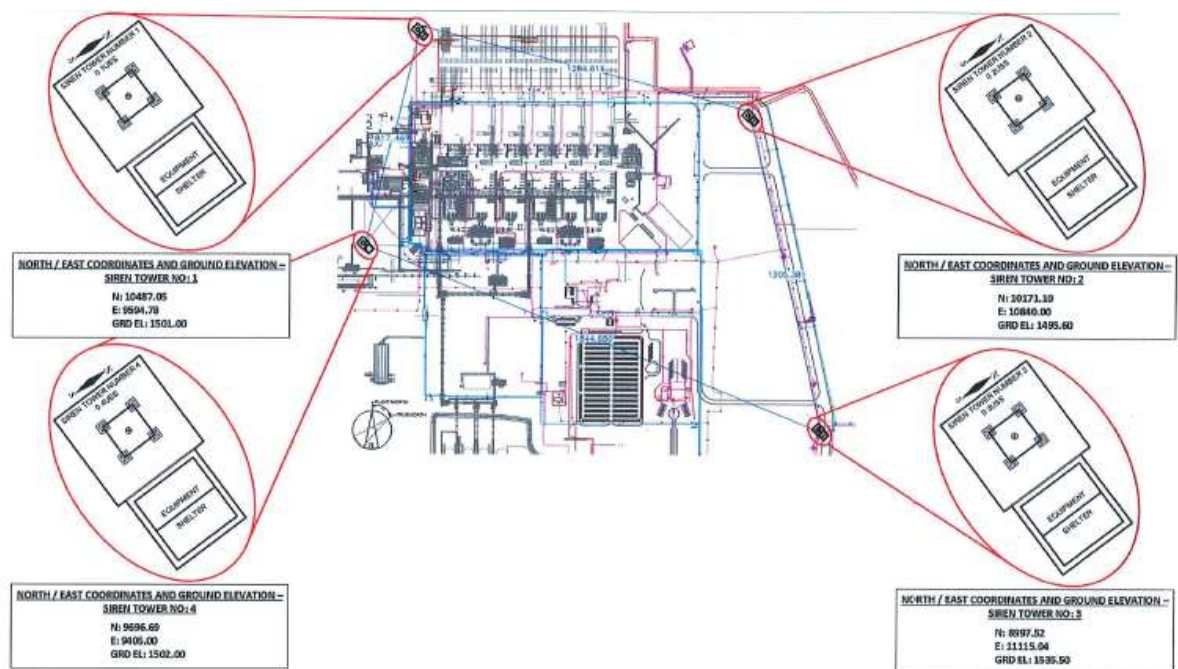
- a) In areas with high ambient noise levels the EPPA speakers shall be supplemented with red strobe lights
- b) In areas with high ambient noise levels intelligibility is not a requirement
- c) The strobe lights will adhere to A-B wiring configuration
- d) Strobe lights to be EN54 compliant
- e) The areas where strobe lights are required are:
  - a. Boiler Building Units 1-6
  - b. Turbine Hall Units 1 - 6
  - c. Fabric Filter Substation Units 1 – 6
  - d. Compressor Buildings
- f) Power requirements for Strobe Lights to be confirmed by the Contractor
- g) All associated cabling required for the Strobe Lights is the responsibility of the Contractor
- h) UPS power for the strobe lights will be supplied by Others
- i) Strobe Light MK1 power controller (Datasheet included in Appendix 17.8) will be used for powering Strobe lights

**Siren Towers:**

- a) The siren towers will provide an audible alarm for the exterior of the power station, intelligible speech is not a requirement
- b) Each siren tower will have a strobe light at the top of tower indicating alarm
- c) Each siren tower will have audible sound for a radius of 3km
- d) The plinth for the Siren Towers will be provided by Others
- e) Electrical Cabling to the Siren Tower will be provided by Others

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- f) Fibre Optic to the Siren Tower will be provided by Others
- g) It is the Contractors responsibility to provide cabinet space and all patching of fibre links
- h) The hardware for the Siren Towers are (included in Appendix 17.8):
  - a. CROWN CTs SERIES 1200
  - b. CROWN CTs SERIES 2000
  - c. JBL VERY HIGH OUTPUT MID HIGH LOUDSPEAKER SYSTE PD764
  - d. EQUIPMENT SHELTER SPECIFICATIONS (EPPA HUT)
  - e. DELTA Siren pole UPS\_Manual-UPS-RT-5-10kVA
  - f. KAMA INDUSTRIES SIRENCO BEACONS
- i) The location of the Siren Towers forms part of the drawing pack and is drawings 0.90/163392



#### **4.1.6.2 Alarm Tones and Pre-Recorded Messages**

- a) The Contractor to provide samples of tones and pre-recorded messages for approval before commissioning
- b) Employer and Contractor to agree on level of intelligibility in areas with high ambient noise before commissioning
- c) The following tones are required and to be supplied by the Contractor:
  - o General Alarm Tones

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- Fire Alarm
  - General Evacuation
  - Prerecorded Alarms
    - Incident has occurred please await further instruction
    - All cleared message with continuous tone
    - General evacuation message with intermittent tone
    - System Test message
- d) The siren towers will only require alarm tones which will be finalized during commissioning

#### **4.1.6.3 Power Supply and Standby Batteries**

- a) Adherence to applicable UPS, battery and cabinet standards as detailed in the standards; 240-53114248, 240-51999453, 240-53114234 and 240-64720986.
- b) The power supply equipment shall be EN54 compliant, current charger hardware specified is from ATEIS, (Appendix 17.8)
- a) The power supply equipment shall cater for a minimum stand-by period of 24 hours and a continuous broadcast of 30 minutes at full power.
- b) The Contractor is responsible for sizing of the batteries based on the required standby requirements as outlined in the EPPA standard (240-64720986, EPPA for Large Area Deployment)
- c) The Contractor to provide design, supply, installation, commissioning, COC's and connection of all electrical cables and breakers where power is provided by Others
- d) UPS power will be provided by Others in the below areas:
  - Water Treatment Plant
  - Access Control Building
  - Station Services Building
  - Substation South
  - Auxiliary Bay Unit 4 Station 2 C&I Equipment Room
- e) UPS and Batteries will be required in the below locations:
  - Limestone Handling Substation
  - Ash Dump Substation
  - South Coal Yard Substation
  - Substation South
  - North Coal Yard Substation
  - Administration Building
  - Ash Dump Workshop
  - Limestone Control Building
  - Weighbridge

**CONTROLLED DISCLOSURE**

- 60 Year Ash Dump
- Coal Offloading Facility

#### **4.1.6.4 Field Cabling and Associated Infrastructure**

All cabling and associated infrastructure in the *Contractor's* scope shall comply with the following:

- a) This includes supply, installation, termination, labelling, testing, and commissioning of all speaker cables, power supply cables, control system cables with associated cable racking, trunking, conduits and trenching where required to comply with Eskom standard (240-64720986, EPPA for Large Area Deployment)
- b) All speaker line cabling shall conform to the EPPA standard (240-64720986, EPPA for Large Area Deployment) and the contractor to make provision for PH30 and PH120
- c) The Contractor is to make use of existing cable racks as far as possible, where not possible cables to be installed in galvanised tubing and the contractors own cable racks.
- d) All holes made for cable reticulation shall be closed again using the approved fire retardant-material.
- e) Cables are only to be terminated in instruments, cabinets or other approved equipment
- f) No cable joints permitted
- g) The *Contractor* shall provide all cabling, cable racking, excavations and associated accessories as required to complete the *works*
- h) The *Contractor* shall submit all cable routing and cable trench profile design proposals for the *Engineer's* acceptance, before execution.
- i) All cables and associated cabinets shall be earthed in accordance with the Eskom 240-56356396 standard.
- j) All low voltage installations are shall comply with 240-55714363 standard.
- k) All cabling *works* shall comply with the Eskom 240-56227443 standard.

#### **4.1.6.5 Electrical Power Supplies**

##### **A) Siren Towers**

Siren towers shall be supplied from the nearest miniature substations provided by *Others*. The design, installation, and termination on both ends of the power cabling between the mini substations and siren tower interface panel shall be provided by *Others*. This includes the excavations where required. The *Contractor* shall produce the termination/wiring drawings required to do the required terminations at the Siren Tower interface panel. The *Contractor* provides for all the field cabling and associated installations from the interface panel, including the panel itself.

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## B) EPPA Cabinets, Speakers, Strobe Lights on Existing Buildings

EPPA Cabinets and associated field equipment shall be supplied from the nearest power distribution boards/panels (DB) provided by *Others*. Each of the areas or buildings already have an existing power DB(s). The specific location and schematic drawings for the power DBs will be provided by *Employer* at a later stage. The *Contractor* shall be responsible for the following for each of the affected buildings:

- Sizing, provision of the circuit breakers (CB), and installation onto the existing power DBs.
- Sizing, selection and provision of the of the cables between existing DBs and cabinet interface panels. The contractor shall identify the routing of the cables and provide for the wall mounted conduits, pulls and terminate cables on both sides. The *Contractor* shall test all the cables in accordance with 240-56227443.
- Provision for the rate prices for all the cables and associated installation accessories.

The existing infrastructure loads and estimated loads are provided as Appendix 17.10. The *Contractor* to use this list to size the CB and associated cabling for tender puposes only. The *Contractor* shall update the load list with actuals for equipment procured by the *Contractor*, and use this information for the power supply design.

## C) EPPA Cabinets, Speakers, Strobe Lights on Future Buildings

The scope of work for future buildings is similar to that of the existing buildings, as described above. The *Contractor* shall be responsible for the sizing, design and installation of the cabling, including the provision of CBs. The *Contractor* to handover all the designs to the Employer, once installed or approved for installation (as per VDSS). This applies to all the scope of work , i.e siren towers, cabinets, radio speakers, strobe lights installations.

## D) Electronic Display Screens

Electronic display screen shall be provided by the *Contractor* on both the North and South security Access gates area. Power supply to these display screens shall be obtained from the nearest miniature substations provided by *Others*. The design, installation, and termination on both ends of the power cabling between the mini substations and display screen interface panel shall be done by *Others*. This includes the excavation works required. The *Contractor* shall produce the termination/wiring drawings required to do the required terminations at the Electronic Display Screens interface panel.

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The power supplies to the rest of the Electronic Display Screens, as per described in Section 7, shall be supplied from the nearest power distribution boards/panels (DB) provided by *Others*. Each of the areas or buildings already have an existing power DB(s). The specific location and schematic drawings for the power DBs will be provided by *Employer* at a later stage. The *Contractor* shall be responsible for the following for each of the affected buildings:

- Sizing, provision of the circuit breakers (CB), and installation onto the existing power DBs.
- Sizing, selection and provision of the of the cables between existing DBs and display screen interface panels. The *Contractor* shall identify the routing of the cables and provide for the wall mounted conduits, pulls and terminate cables on both sides. The *Contractor* shall test all the cables in accordance with 240-56227443.
- Provision for the rate prices for all the cables and associated installation accessories.

The existing infrastructure loads and estimated loads are provided as Appendix 17.10. The *Contractor* to use this list to size the CB and associated cabling for tender puposes only. The *Contractor* shall update the load list with actuals for equipment procured by the *Contractor*, and use this information for the power supply design.

#### **4.1.6.6 Fibre Optic**

- a) Single Mode Fibre Optic cabling is required between Islands and will be provided by *Others*
- b) All audio controllers are fitted with capability to use fibre optic cables, NET-C3S, Fiber Optic Single Mode (A) - (B) cards are installed in the Audio controllers
- c) The contractor will be responsible for providing rack space and for patching through fibre links for the following areas:
  - 1. U0 Water Treatment Plant Electrical Building
  - 2. U0 Station Services Building
  - 3. U0 Ash Dump Substation
  - 4. U0 Limestone Handling Substation
  - 5. U0 North Coal Yard Substation
  - 6. U0 South Coal Yard Substation
  - 7. U0 Substation South
  - 8. U0 Access Control Building
  - 9. U0 Ash Dump Workshop
  - 10. U0 Limestone Control Building
  - 11. U0 Administration Building
  - 12. U4 Auxiliary Bay Finishing (16m)
  - 13. U0 Weighbridge

**CONTROLLED DISCLOSURE**

14. Outdoor Siren Poles 1 – 4

15. Coal Offloading Facility

16. 60 Year Ash Dump

#### **4.1.6.7 Warranty and Support**

- a) The Contractor will be the OEM or an Accredited Supplier of the OEM for the product
- b) The Contractor shall be suitably accredited in all aspects for the product.
- c) A valid letter of accreditation is required.
- d) The Contractor shall have a history of no less than 5 years of supplying this product
- e) The Contractor should also have a supply agreement with accredited supplier

#### **4.1.6.8 Training**

- a) The Contractor shall provide comprehensive training for the Employer on the use of the EPPA System
- b) Training shall include use of all microphones, configuration of messages, re-programming of zones, fault finding, speaker replacement, sound level configuration,
- c) Training to be divided into types of users; Operator, Maintenance and Engineering
- d) It is the responsibility of the Contractor to train the Employers representatives in all aspects of usage, fault finding and maintenance
- e) Training to coincide with handover of first building and a refresher to be given at the end of the contract
- f) All software and tools required to perform engineering on the system to be handed over at initial training

#### **4.1.6.9 Interface with Fire System**

- a) The EPPA system should interface with the fire system in so that the EPPA has the functionality to temporarily silence or reduce the volume of the fire alarms to enable clear communication in the event of an emergency
- b) The EPPA will also be interconnected with the Consolidated Building Management System (CBMS) to allow system health status to be displayed at the CBMS control desk
- c) The EPPA system should have the capability to trigger the fire system strobe lights in the Boiler and Turbine Hall when an announcement is made

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#### **4.1.6.10 Commissioning**

- a) The following commissioning procedure has been given to the Contractor, ESK-TSS-P22-203-127780 and can be found in Appendix 17.7
- b) Any deviations to procedure shall be brought to the Employers attention before any changes are made
- c) Sectional Commissioning will be done however at contract end the Contractor to provide EN54 certification for the entire system

#### **4.1.6.11 Assembly points**

- a) Assembly points to have compliant EPPA coverage within a 10m radius of the assembly point
- b) Physical locations of assembly points will be confirmed during contract execution
- c) One assembly point per building should be catered for

### **5 FREE ISSUE EQUIPMENT**

See Appendix 17.9 for equipment available from Employer

### **6 EPPA BUILDING PROGRESS**

- a) All partially complete EPPA databooks have been supplied and is in Appendix 17.7
- b) Construction in the below buildings are complete as per the design's provided in the Table 5: Building list
  - Unit 1 Auxiliary Bay Finishing Unit 1 (9 Meter Level)
  - Unit 1 Auxiliary Bay Finishing Unit 1 (16 Meter Level)
  - Unit 1 Air Cooled Condensor Substation
  - Water Treatment Substation
  - Auxiliary Substation A
  - Station Services Building
  - Unit 1 Condensate Polisher Plant
  - Substation South
  - Unit 1 FGD Substation
  - Coal Stock Yard Offices
- c) It is the Contractor's responsibility to Commission these areas and to ensure EN54 compliancy

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d) The below table shows the quantities installed and included in Appendix 17.9

Building Description	Scope	SIRENS	SPEAKERS	STROBES	DPA250	IDA8 C	IDA8 S
Hydrogen Plant Substation	EPPA	12					
Auxiliary Bay Finishing, Unit 1 (16m)	EPPA	2	64				
Auxiliary Bay Finishing, Unit 1 (9m)	EPPA	30	12				
Air Cooled Condenser Substation, Unit 1	EPPA	24					
Water Treatment Substation	EPPA		20		2	1	
Auxiliary Substation A	EPPA	30					
Station Services Building	EPPA	58	46		6	1	2
Ash Dump Substation	EPPA	22			1	1	
Auxiliary Substation B	EPPA		30				
Limestone Handling Substation	EPPA	18			1	1	
North Coal Yard Substation	EPPA	20			2	1	
Condensate Polisher Plant Unit 1	EPPA	34	34				
South Coal Yard Substation	EPPA	20			1	1	
Substation South	EPPA	12	8		1		
FGD Substation, Unit 1	EPPA	20	6				
Fabric Filter Substation, Unit 1	EPPA	10					
Compressor Building Unit 1-3	EPPA	20					
Coal Stock Yard Offices	EPPA		14				
Access Control Building	EPPA	8	39		1	1	
Boiler Building U1	EPPA	32		20			
Turbine Hall U1	EPPA	20		20			

**Table 7: Installed Quantities**

## 7 POWER STATION ELECTRONIC DISPLAY BOARDS

- The Contractor shall design, supply, install, test and commission electronic display boards at the following locations within the power station to display KPI, safety reports and announcements:
  - Power Station North Gate Entrance
  - Power Station South Gate Entrance
  - Canteen
  - Workshop & Stores
  - Turbine Floor Units 1 – 6
  - Administration Building
- The display boards will be connected in a network capable of being controlled from a minimum of 5 locations
- The Contractor will supply, install, test and commission all hardware required for connecting to the display boards

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- d) The Contractor will supply, install, test and commission all computer hardware, software and licences required for remotely connecting to the display boards
- e) Display boards will be a minimum of IP66 rated and suitable for the environment that they will be operated in

## **8 COMMON REQUIREMENTS**

### **8.1 DOCUMENTATION**

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 shall ensure that the Technical Documents and Records Management Work Instruction (240-53114186) 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 Vendor Document Submission Schedule (VDSS). The VDSS document supplied by the Employer should be updated based on the Contractor's design and should be accepted by the Employer.

#### **8.1.1 Document Identification**

The Contractor shall ensure that 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

The following additional attributes are important for technical documents:

Package/System name, sub-system if applicable

- Unit/s number
- Contractor name

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- Contractor number
- Plant Identification Codes

### **8.1.2 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.

### **8.1.3 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)

### **8.1.4 Document Headers**

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

### **8.1.5 Naming of files**

The Contractor will 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.FileExtension)

### **CONTROLLED DISCLOSURE**

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

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

(YYYYMMDD\_DocType\_DocumentTitle\_UniqueIdentifier\_Revision.FileExtension)

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

#### **8.1.6 Document Submission**

Contractor engineering program shall 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 Vendor Document Submittal Schedule (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 17.1. The VDSS shall indicate the format of documents to be submitted. Eskom shall be 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 17.2. 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 shall be clearly marked on the submittal by the Contractor and the submittal process shall be repeated. If changes are made by Contractor after delivery to the Plant, as-built drawings indicating the changes shall be prepared by Contractor and submitted to Employer for review. Any resubmittal of information shall clearly identify the revisions by footnote or by a form of back-circle, with revision block update, as appropriate.

#### **8.1.7 Transmittals**

1. 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

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- 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, DVD, etc.)
  - Sender signature
  - Recipient signature, once submitted, to acknowledge receipt
2. If a transmittal is in response to an Eskom communication via transmittal, the Eskom Transmittal Number shall be referenced in the transmittal response and shall be provided in addition to the meta-data required in Section 8.1.7.
3. The Contractor shall follow a structured and standard definition for Transmittal Descriptions, i.e. **a** subject line convention of **YYYYMMDD – <Contract & Package Number> – <Vendor> – <Short Description> – <Sender Initials>**.
4. **The Contractor shall follow a structured method of communication as defined within Communication Interface Memorandum (CIM) for any correspondence**
5. The Contractor shall follow a structured and standard definition for email subjects i.e. **a** subject line convention of **YYYYMMDD – < Package File Number> – > – <Email Subject line>**.
6. The Contractor shall select the purpose for transmittal in line with the standard Eskom Selection Criteria:
- 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

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When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

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

Electronic technical data submittals shall be made 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 2MB in size, then the document shall be uploaded on Zendto portal.*

Notification to Engineer that submittals have been posted to Zendto shall 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 the Employer of such a submission.*

The hard copy prints shall be submitted to the address indicated for Technical Documents in the Supplementary Terms and Conditions of this Contract. The following number of prints shall be 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 Eskom Representative 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 CD/DVD, large file transfer protocol and/or hard drives to the Project Documentation Centre. A notification email, with the transmittal note attached, shall be sent to the project generic email address. The Representative will be copied on the email as well.
- Hard copies shall be submitted to the Eskom Representative accompanied by the Transmittal Note.

### **8.1.8 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 (.dwg/.dgn) 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.

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

Each submitted drawing shall be project unique and shall be 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 shall be clearly identified on the drawings. If standard drawings are submitted, the applicable equipment and devices furnished for the project shall be clearly marked.

Transmittal letters shall identify which Schedule of Submittals item (by item number) is satisfied by each drawing or group of drawings. The transmittal letter shall include the manufacturer's drawing number, revision number, and title for each drawing attached. Each drawing title shall be unique and shall be descriptive of the specific drawing content. Transmittal letters for resubmitted drawings shall 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 Sub Contractors. 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 shall be listed on all drawings, including manufacturers' drawings. Tag numbers and equipment names shall 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 shall be in the English language. The units of measure shall 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.

#### **8.1.9 Drawing Submittal**

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

The Contractor shall use Smartplant Owner Operator (SPO) for documents and records management. Contractor shall 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 shall be provided with each document submittal. The transmittal letter shall include the Contractor drawing number, revision number, and title for each drawing attached. Each drawing title shall be unique and shall be descriptive of the specific drawing content.

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 shall 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 shall be submitted with all numerical values in metric units.

#### **CONTROLLED DISCLOSURE**

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#### **8.1.10 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 shall, 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 *Contractor's* Staff will maintain a master set of redlined as-built drawings. The *Contractor* will provide drawing mark-ups as work is completed. The Engineer and the *Contractor* will ensure that all appropriate information is transferred to the field record copy of drawings. Engineer and the *Contractor* will check the "as-builts" for completeness and accuracy. Final "as-builts" will be distributed in accordance with the Project Instructions Manual (PIM). The scope of supply of Information from the Contractor shall include drawings, documents, lists and data according to the types defined in Table 8below (this list is not limited to below and may include additional information):

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**Table 8 Typical Document Requirement List (As-built)**

Document Group	Description of document type (includes information data sets)
General	<p>Equipment arrangement drawings</p> <p>Piping &amp; Instrument Diagrams (P&amp;ID's)</p> <p>Material handling flow diagrams</p> <p>Engineering and procurement schedule</p> <p>Equipment list</p> <p>Isometric Drawings</p> <p>Valve list</p> <p>Pipeline list</p> <p>Hanger list</p> <p>3D model</p> <p>Interface list</p> <p>Equipment specifications &amp; data sheets</p> <p>Drawings and data for all equipment and material</p> <p>Installation, Operation, and Maintenance (IOM) Manuals</p> <p>Spare parts list</p> <p>Factory Acceptance Test (FAT) report etc.</p>
Quality Assurance	<p>Quality assurance manual</p> <p>Quality control plans</p> <p>Quality control reports</p> <p>Weld summary index</p> <p>Material traceability certificates</p> <p>Manufacturing test reports</p> <p>Manufacturing Non-Conformance Reports (NCR's)</p>

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<b>Document Group</b>	<b>Description of document type (includes information data sets)</b>
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 Etc.
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 Etc.
Commissioning	Commissioning schedule Test & Evaluation Master Plan (TEMP) Commissioning procedures Commissioning database Performance test procedure Performance test reports Field test reports and certificates Etc.
Operations	Operating procedures Plant operational documentation Plant tech specs Incident & upset mitigation procedures Operating scenarios (for C&I control purposes) Etc.

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<b>Document Group</b>	<b>Description of document type (includes information data sets)</b>
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 Etc.
Training	Training plan Training manuals and instructions Etc.
Safety & Protection	Fire hazard analysis Waste management plan Etc.
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 Etc.

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Document Group	Description of document type (includes information data sets)
Electrical	<ul style="list-style-type: none"> <li>Motor list</li> <li>Electrical load list</li> <li>Circuit list</li> <li>Raceway list</li> <li>Single line diagram</li> <li>Protection schematic diagram</li> <li>Electrical load flow and fault studies report</li> <li>Cable block diagrams</li> <li>Cabling routing and cable racking layout diagrams</li> <li>Cable termination diagrams</li> <li>EMC and earthing standards report</li> <li>Earthing layout drawings</li> <li>Lighting layout drawings</li> <li>Etc.</li> </ul>
C&I	<ul style="list-style-type: none"> <li>Alarm and set-point schedule</li> <li>Instrument schedule</li> <li>Instrument data sheets</li> <li>Mechanical hook-up drawings</li> <li>Electrical hook-up drawings</li> <li>Cable Schedule</li> <li>Termination Schedules</li> <li>Junction Box GA and Internal Layout</li> <li>Junction Box and Instrument location drawings</li> <li>Instrument Stand GA</li> <li>Maintenance Manuals and procedures</li> <li>Operating and Control Philosophies</li> <li>Functional Logic diagrams</li> <li>Field device calibration certificates</li> <li>Level measurement installation report</li> </ul>

In addition to the official documentation submittals listed in 17.1, the Contractor shall provide additional information for review and design coordination as requested by the Employer from time to time.

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The Contractor shall 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 shall 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 Engineer reviews the Contractor's submitted documents. The Contractor shall ensure adherence to the Works Information and that a technically sound design approach is incorporated. Specific information required from the Contractor during tender phase and as part of the Works are as set-out in the VDSS, in 17.1. Each document submitted to the Engineer 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 Engineer in accordance with Project / Plant Specific Technical Documents and Records Management Work Instruction (240-76992014). The Contractor is required to submit documents as electronic and hard copies and both copies must be delivered to the Engineer with a transmittal note.

#### **8.1.11 Documentation Recording**

The Contractor shall develop, 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 shall 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
- 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 shall 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)

#### **8.1.12 Documentation Requirements**

All documents supplied by the Contractor shall be subject to Eskom'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 (240-53114186). Documents such as QCP's, Method Statements and other documents impacting the work shall be approved by the Employer at least 3 working days prior to commencement of the Works.

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Each revision of a document or drawing shall be 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 shall be recorded in a revision table contained in each drawing/document.

Documents and drawings shall 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 shall be used as the reference number.

The Contractor shall compile 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 The manufacturer's/repairer's certificate as defined in PER.
- 13 All CAR's and corrective actions
- 14 Operating Philosophy including all alarm and trip values
- 15 Parts catalogue
- 16 Maintenance manual
- 17 Storage, packing and transportation instructions

#### **8.1.13 Data Books**

The *Contractor* compiles data Books progressively for all manufacturing and construction/erection inspection, operating manuals and test records and documents for every piece of Plant worked on. The *Contractor* submits data books to the *Engineer* for their review for all Plant and Materials and work undertaken with the applicable requirements and specifications.

## **8.2 GENERAL REQUIREMENTS**

The Contractor shall include 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.

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The project name shall 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 shall 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.

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## **9 CONFIGURATION MANAGEMENT REQUIREMENTS**

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 will be developed which will 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.

### **9.1 PLANT IDENTIFICATION**

#### **9.1.1 Plant Coding**

Plant Coding shall be undertaken by the Contractor and the Employer shall review all the codes; therefore Contractor shall make available the following documentation to code:

Civil

- site layouts
- building layouts
- building sectional layouts
- building floor plans per level
- underground services layouts
- cable rack & support
- building lists (including room equipment lists)

The Contractor shall then be required to include allocated codes to all other designs and related documentation. It is also the responsibility of the Contractor to consistently apply the KKS codes throughout the rest of the technical documentation which shall include, 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

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- Logic diagrams, etc.

The Contractor shall ensure that all documentation is coded prior submission to Employer for review.

### **9.1.2 Plant Labelling**

1. New labels shall be 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. Eskom to provide the labelling standard.
2. All labels shall be made as specified on Eskom Plant Labelling Standard.
3. Coding and labelling of components inside electrical and C&I panels shall be done by the Contractor.
4. The Coding practitioner shall facilitate 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 Abbreviation Standard for Labelling of Plant at Power Stations (240-109607332) shall be provided to the Contractor as a reference for the creation of equipment lists.

### **9.1.3 Plant Coding and Labelling**

Plant coding will be done by the Contractor and the Employer will review all the codes. The KKS system shall be 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 and Civil) shall be 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 will be used but all rules specified in Eskom documents will 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 Project Manager 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

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The Contractor shall code 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 shall be 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 shall submit these for the Engineer'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 engineer.

The Contractor shall, as soon as possible after the contract has been placed, provide the engineer with the following:-

- Outline drawings or diagrams showing the contractor's 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.

The Contractor manufactures and installs labels according to 240-71432150 - KKS Plant Labelling and Equipment Descriptions Standard. Any abbreviations to plant descriptions shall be prepared in accordance to Eskom standard. VGB Detailed nameplate or label lists 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 the manufacture of the labels.

Any abbreviations to plant descriptions shall be prepared in accordance to the Employer's abbreviation standard, 240109607332. Detailed nameplate or label lists 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 the manufacture of the labels.

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## **10 DESIGN REVIEWS AND CHANGE MANAGEMENT**

### **10.1 DESIGN REVIEWS**

The Employer reviews the Contractors submitted documents and ensures adherence to the Works and that a technically sound design approach is incorporated. Specific information required from the vendors during tender phase is set-out in the Vendor Document Submittal Schedule, in 17.1.

After a contract is established, the Contractor proceeds in the detail design phase. Each document requires a transmittal note from the vendor. Employers review cycle is in-line with FIDIC contract requirements and is finalised during contract negotiations with the Contractor. Section 17.1 lays out the specific documents requiring Employers approval before the Contractor can proceed with design, fabrication and construction activities.

The *Contractor* is the Design Authority as defined in the Design Review Procedure (240-53113685). The *Contractor* is responsible for following this design procedure and conducts all the design reviews as specified in this procedure. The *Contractor* is responsible for conducting the following design reviews:

1. Design Freeze Review
2. System Integrated Design Review
3. Pre-Commissioning Review
4. Acceptance testing Review
5. Handover Review

The Contractor conducts design reviews as per the Contractors official design review procedure. Contractor further takes note of the Employers Design Review Procedure (240-53113685) and participates in all design reviews as specified by the Employer. The Employer may “Accepted”; “Accept with Comments” or “Rejected”. If required, the Contractor makes the necessary revisions on the documentation and ensures acceptance is obtained from Employer. The Contractor includes these design reviews as part of the schedule and suggests appropriate timing for such reviews.

### **10.2 ENGINEERING CHANGE PROCEDURE**

All Design change management shall be performed in accordance to the latest revision of the Kusile Engineering Change Management Work Instruction (240 – 132735850) and the Employer shall ensure 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. All design reviews will be conducted according to the Design Review Procedure (240-53113685).

### **10.3 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’s Representative for acceptance.

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- Concrete 7 day and 28 day cube test results
- Slump test results
- Concrete mix designs including all required test results e.g. aggregate test results
- Pile Integrity Test Results (if required)
- Pile Load Test Results (if required)
- Foundation Certificate
- Welding procedure specifications
- Welder qualifications
- Non-destructive weld test results
- Weld test certificates
- Steel grade certificates
- Bolt grade certificates
- Hydrostatic tests of the pipe and tank
- Pre-concrete and post concrete surveys
- As-built data and drawings of the completed Works upon handover. As-built drawings are submitted in PDF and DWG formats
- Structural Certificate signed by the Contractor's Professionally Registered Engineer confirming that structure has been constructed in accordance with the design

Detailed handover requirements will be as per the requirements defined in the Kusile Project "240-128515850 - Documentation Handover Specification". As a minimum the Contractor will provide 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 will be captured as defined by the both the Electrical and Control & Instrumentation Centre of Excellence, respectively, during contracting phase. All terminations will be captured as per the Employer's data template.

Refer to Section 17.3 for complete requirements.

The Contractor shall use the documentation list to compile the VDSS.

## **11 DESIGN TOOLS REQUIREMENTS**

### **11.1 DESIGN ENVIRONMENT**

The Employer requires the *Contractor* to utilize the approved SmartPlant enterprise suite of tools for the execution of this project. The following tools shall be used by the Employer and the *Contractor* as a minimum:

- Smartplant Foundation with Owner Operator (SPO)

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- Smart 3D
- SmartPlant Reference Data (SPRD)

- **Option 1**

The design shall be done in a fully integrated SmartPlant Environment in an Employer's environment. The *Contractor* and Employer shall collaborate and perform design on Employer's SmartPlant Environment. The *Contractor* shall assist Employer in configuring the Employer's Smartplant environment that consists of Employer's Base configuration and the *Contractor* configuration.

- **Option 2**

The *Contractor* shall execute and perform the design on their SmartPlant Environment and handover the agreed project technical data and document deliverables to the Employer's SmartPlant environment at agreed scheduled intervals. Design shall begin in a fully integrated SmartPlant Environment of the *Contractor*

- **Option 3**

The *Contractor* shall execute and perform design on third party design applications of their choice.

## **12 QUALITY REQUIREMENTS**

### **12.1 OVERVIEW**

The fundamental objective of the set of quality requirements stated within this contract is to ensure that the *Contractor* produces goods/products/services that the *Employer* are wholly satisfied with whilst ensuring that work is done right the first time. To achieve this, the *Contractor* shall ensure that three approaches are taken. These are as follows:

- Ensuring that the Contractors Quality Management System is set up and maintained
- Quality Assurance
- Quality Control

These are broad areas each with numerous requirements.

The *Contractor* shall comply with all requirements specified in the Eskom standard, 240-10565800 "Supplier Quality Management: Specification". It is of utmost importance that this standard be complied with.

### **12.2 QUALITY MANAGEMENT SYSTEM REQUIREMENTS**

The *Contractor* shall ensure that their Quality Management System complies with the requirements specified in the relevant category of 240-10565800 "Supplier Quality Management: Specification". This category is determined by the *Employer*.

The *Contractor* shall comply with all requirements specified in section 3.1 of the Supplier Quality Management Specification.

The *Employer* shall conduct formal audits on any or all parts of the Contractor's Quality Management System as well as any documentation, materials, or equipment associated with the work, at any time and at any project work location.

The *Employer* shall also carry out assessments and audits on the Contractor's sub-contractors at planned intervals.

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In the event that the *Employer* is dissatisfied with the *Contractors* work for any reason, the *Employer* has the right to conduct additional audits of the *Contractor*.

The *Contractor* shall address all audit findings to the satisfaction of the *Employer* within a time frame acceptable to the *Employer*.

### **12.3 QUALITY ASSURANCE REQUIREMENTS**

The *Contractor* shall ensure that Quality Assurance is performed at all levels and phases of work carried out for the *Employer*. The *Contractor* shall use processes to ensure that quality is built in to their products/services i.e. its business processes are organized such that quality is built into the process of producing goods and rendering services. The *Contractor* shall ensure that it can be relied on to deliver quality goods and services without the need for the *Employer* to have to inspect all the time.

### **12.4 QUALITY CONTROL REQUIREMENTS**

The *Contractor* shall ensure that Quality Control is performed at all levels and phases of work carried out for the *Employer*. Quality Control is a product oriented set of activities for ensuring quality in products/services. These activities focus on inspection and identifying defects before these reach the *Employer*.

The *Contractor* shall comply with all requirements specified in section 3.4 of the Supplier Quality Management Specification.

The *Contractor* shall complete a Quality Control Plan (QCP) and Inspections and Test Plan (ITP) before contract award. This shall be reviewed and signed off by the *Employer* within 30 days after contract award.

The *Contractor* shall submit the following documents within 30 days after the contract date, prior to the commencement of work, for acceptance by the *Employer*:

- QCP(s) and ITP(s) for review and acceptance by Eskom prior to the commencement of any work, inclusive of subcontracted work, within 30 days after contract award.
- The sub- contractor QCP(s) and ITP(s) shall be submitted for review and comment by the *Contractor* and by the *Employer* within 30 days after the award of the tender. All *Contractor* and *Employer* comments shall be resolved prior to commencing work.

Note: these plans are to be compiled in line with Eskom's requirements and will have to be discussed with, and approved by, the *Employer* prior to any work commencing.

The *Contractor* shall make use of the Kusile Project RFI/PA001 Process to request the *Employers* personnel to perform inspections. The *Contractor* shall ensure that all inspections have been "Passed" by their in house quality control representative prior to requesting the *Employers* personnel to perform any inspection.

In the event of poor quality, re-work or incidents where products inspected by the *Employer* fail to meet requirements, the *Contractor* shall receive an NCR if deemed so by the *Employer*. The *Contractor* shall be liable for the *Employers* costs of re-inspection as well as be liable to pay penalties as specified in this contract in the event of any losses incurred by the *Employer*.

### **12.5 QUALITY PLAN**

The *Contractor* shall submit a Quality Plan within 30 days of contract award for acceptance by the *Employer*.

The *Contractor* shall comply with all requirements specified in sections 3.2, 3.3 and 3.4 of the Supplier Quality Management Specification.

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## **12.6 QUALITY DOCUMENTATION REQUIREMENTS**

For all products and services, the *Contractor* shall submit the following quality documents as a minimum:

- Method statement (describing how work will be executed))
- Equipment list
- Drawings
- ITPs, QCPs and check sheets
- Materials used
- Material certificates
- Data sheets
- Equipment list
- Welding documents (if applicable) include WPS, PQR, welder qualifications, welding consumables and all other documents required by relevant welding standards
- Quality Plan (as earlier described)

The *Contractor* shall submit data books for all work for acceptance by the *Employer* if applicable. These are defined as follows:

H1 – Fabrication

H2 – Construction

H3 - Commissioning

Components may only be released for delivery to site once the H1 data book(s) has been accepted by the *Employer* if applicable.

Commissioning may only commence once the H2 data book(s) has been accepted by the *Employer* if applicable.

The *Contractor* shall ensure that all data books have been submitted to and accepted by the *Employer* as soon as possible and no later than just prior to handover if applicable.

## **12.7 CONTRACT EXECUTION**

Correspondence shall be directed to the project manager, and periodic quality review meetings shall be convened by *Employer* with the *Contractor*.

The mandatory quality review meetings are to be convened by the nominated project quality manager or his/her representative for the *Contractor*.

Monthly quality performance and management reports are to be prepared by the supplier during contract execution. The content of these reports shall be agreed by the *Employer* when submitted to the *Employer* on a monthly basis.

The *Contractor* shall comply with section 5 of the Supplier Quality Management Specification.

## **12.8 SUPPLIER QUALITY PERFORMANCE MONITORING PHASE**

During the contract execution phase, the *Contractor* shall be monitored by the *Employer* for performance on quality-related aspects.

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The outcomes of such monitoring will enable the *Employer* to take any appropriate actions pertaining to the *Contractor*.

The monitoring shall be carried out periodically by the *Employer* or at predetermined intervals during the execution of a contract.

The monitored key performance areas include the following:

- Quality
- Delivery
- Design
- Cost
- Management system

Subsequent key performance indicators associated with these areas will include the following:

- Nonconformity monitoring
- Audit and assessment evaluation scoring
- Management system compliance and accreditation
- Achievement of delivery targets as per contractual agreements
- Process improvements
- Corrective and preventive action response and closure

## **12.9 GENERAL QUALITY REQUIREMENTS**

- The *Contractor* shall comply with all requirements specified in section 6 of the Supplier Quality Management Specification.
- All documents shall be approved by the *Employer*.
- All planning Quality Assurance and Quality Control documents shall be submitted for approval by the *Employer* within 30 days of contract award.
- The *Contractor* shall make use of a qualified and experienced Quality Controller to ensure that products/services are of a high quality prior to inspection by the *Employers* quality representative(s).
- The *Contractor* shall ensure that all defects and NCRs are addressed correctly and timeously.
- Defects and NCRs shall be closed within a time frame or period specified or accepted by the *Employer*
- The *Contractor* shall only be paid subject to meeting and *Employer* approval of all quality requirements and three copies of the data books accepted by the *Employer*.
- The *Contractor* shall provide all information, material and records required to comply with the Eskom Quality Management System and such further information, material and records as may be requested by the *Employer* from time to time.
- The *Contractor* shall ensure that no inspections are missed and all schedules are observed. The *Contractor* shall comply with all relevant Eskom governance documents (codes, standards etc.) whether specified in this scope of work or not.
- The *Contractor* shall make use of an Authorised Certification Authority eg. SABS to certify *Contractor* QMS if applicable.

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The *Contractor* shall make use of Recognised International Accreditations eg. SANAS which accredits the Authorised Certification Authority if applicable.

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### 13 AUTHORISATION

This document has been seen and accepted by:

<b>Name &amp; Surname</b>	<b>Designation</b>
Yuvir Gokul	Engineering Design Work Lead: Kusile Power Station
Shamita Jagjiwan	Technical Lead: Kusile Power Station – System Integration
Thyash Maney	Lead Design Engineer: Kusile Power Station
Preshen Moodley	Package Engineer: Kusile Power Station
Sugan Moodley	Lead Design Engineer: Kusile Power Station

### 14 REVISIONS

<b>Date</b>	<b>Rev.</b>	<b>Compiler</b>	<b>Remarks</b>
June 2002	1	Shawn Cupido	Draft
July 2020	2	Shawn Cupido	MDR Session
July 2020	3	Shawn Cupido	
August 2020	4	Shawn Cupido	Electrical Input

### 15 DEVELOPMENT TEAM

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

- Shawn Cupido
- Sugan Moodley
- Sihle Mbatha
- Sicelokuhle Miya
- Yuvir Gokul

### 16 ACKNOWLEDGEMENTS

- N/A

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## 17 Appendix

### 17.1 VENDOR DOCUMENT SUBMITTAL SCHEDULE

### 17.2 MASTER DOCUMENT LIST

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

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### 17.3 DOCUMENTATION REQUIREMENTS AFTER 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	<i>Contractor</i> 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	<i>Contractor</i> 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

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Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
	Electrical	5.3.1	Contractor Application for Eskom's Inspection of the Works/Part of the Works
		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	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 Certificate s	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)

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Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
	6.4	6.4	QCP's / QIP's (signed off)
	6.5	6.5	COC (Domestic Circuits)
	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 Works Information Indicating Plant area / Component
	8.2	8.2	Certificate from Supplier indicating validity of the guarantee / Warrantees Period
		9	<b>Special Tool List</b>
		10	<b>Insurance Cover (90 Days Notification Period)</b>
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)

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Dossier Chapter	Dossier Sub-Chapter	Dossier Sub-Sub Chapter	Documents for Final Handover
Training	Competency Declarations	12.1	Training Manual
		12.2	Proof of Training
		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)

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## 17.4 DRAWINGS & CABLE SCHEDULE

Building Description	Island – Cabinet KKS Code	Drawing
U0 Wastewater Treatment Building		0.90/68048
U0 Hydrogen Plant Substation		0.90/68030
U1 Auxiliary Bay Finishing (16m)		0.90/67986
U1 Auxiliary Bay Finishing (9m)		0.90/67988
U1 Air Cooled Condenser Substation		0.90/67998
U0 Water Treatment Substation	0 0CYW58 GY001	0.90/68027
U0 Water Treatment Laboratory		
U0 Auxiliary Substation A		0.90/67974
U0 Station Services Building	0 0CYW50 GY001	0.90/67984
U0 Ash Dump Substation	0 0CYW05 GY001	0.90/68034
U0 Auxiliary Substation B		0.90/68004
U0 Limestone Handling Substation	To be confirmed	0.90/67727
U0 North Coal Yard Substation	0 0CYW43 GY001	0.90/67890
U1 Condensate Polisher Plant		0.90/67984
U0 South Coal Yard Substation	0 0CYW48 GY001	0.90/67990
U0 Substation South	0 0CYW53 GY001	0.90/67972
U1 FGD Substation		0.90/68000
U1 Fabric Filter Substation		0.90/67996
U1-3 Compressor Building		0.90/68040
U0 Coal Stock Yard Offices		0.90/67982
U1 Boiler Building		0.90/68074
U1 Turbine Hall Building		0.90/67902
U0 Access Control Building	0 0CYW01 GY001	0.90/68046
U0 Ash Dump Workshop	0 0CYW06 GY001	Design work required
U0 Radio Tower Office Building		0.90/68008
U0 Limestone Control Building	0 0CYW40 GY001	0.90/68038
U0 Weigh Bridge Building		0.90/163394
U2 Auxiliary Bay Finishing (16m)		0.90/68116
U2 Auxiliary Bay Finishing (9m)		0.90/68118
U2 Air Cooled Condenser Substation		0.90/68120
U2 Condensate Polisher Plant		0.90/68122
U2 FGD Substation		0.90/68124
U2 Fabric Filter Substation		0.90/68126
U0 Substation East		0.90/68080
U2 Workshop and Stores		0.90/68082
U2 Boiler Building		0.90/68130
U2 Turbine Hal Building		0.90/68132
U0 Fire Station		0.90/20152
U0 Medical Centre		0.90/163401
U0 Canteen		0.90/68096
U0 Administration Building	0 0CYW02 GY001	0.90/68098
U0 Mill Maintenance Workshop		0.90/68100
U0 Sandblast Workshop		0.90/68102
U3 Auxiliary Bay Finishing (16m)		0.90/68140
U3 Auxiliary Bay Finishing (9m)		0.90/68142
U3 Air Cooled Condenser Substation		0.90/68144
U3 Condensate Polisher Plant		0.90/68146
U3 FGD Substation		0.90/68148
U3 Fabric Filter Substation		0.90/68150

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U3 Boiler Building		0.90/68154
U3 Turbine Hal Building		0.90/68156
U4 Auxiliary Bay Finishing (16m)	4 0CYW09 GY001	0.90/68166
U4 Auxiliary Bay Finishing (9m)		0.90/68168
U4 Air Cooled Condenser Substation		0.90/68170
U4 Condensate Polisher Plant		0.90/68172
U4 FGD Substation		0.90/68176
U4 Fabric Filter Substation		0.90/68178
U4-6 Compressor Building		0.90/68182
U4 Boiler Hall Building		0.90/68188
U4 Turbine Hal Building		0.90/68190
U5 Auxiliary Bay Finishing (16m)		0.90/68200
U5 Auxiliary Bay Finishing (9m)		0.90/68202
U5 Air Cooled Condenser Substation		0.90/68204
U5 Condensate Polisher Building		0.90/68206
U5 FGD Substation		0.90/68208
U5 Fabric Filter Substation		0.90/68210
U5 Boiler Building		0.90/68216
U5 Turbine Hal Building		0.90/68218
U6 Auxiliary Bay Finishing (16m)		0.90/68228
U6 Auxiliary Bay Finishing (9m)		0.90/68202
U6 Air Cooled Condenser Substation		0.90/68230
U6 Condensate Polisher Plant		0.90/68232
U6 FGD Substation		0.90/68234
U6 Fabric Filter Substation		0.90/68236
U6 Boiler Building		0.90/68240
U6 Turbine Hal Building		0.90/68242
Coal Offloading Facility		Design Work Required
60 Year Ash Dump		Design Work Required
Evacuation Points		Design Work Required
Sewage Treatment Plant		Design Work Required
Hydrogen Plant Building		Design Work Required
EPPA SWA PH 30 Cable Schedule		

## 17.5 LIMITS OF SCOPE AND SUPPLY(LOSS)



LOSS Diagrams -  
EPPA Proj.xlsm

## 17.6 ESKOM STANDARDS

Refer to Section 2.2

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## 17.7 DATABOOKS & COMMISSIONING DOCUMENTATION

Databook Number		Building Description
ESK-TSS-P22-	203-73543	004_U0 Hydrogen Plant Substation
ESK-TSS-P22-	203-73690	006_U1 Auxiliary Finishing Bay (9m)
ESK-TSS-P22-	203-73545	006_U1 Auxiliary Finishing Bay (16m)
ESK-TSS-P22-	203-73546	007_U1 Air Cooled Condenser Substation
ESK-TSS-P22-	203-73547	008_U0 Water Treatment Electrical Substation
ESK-TSS-P22-	203-73549	010_U0 Auxiliary Substation A
ESK-TSS-P22-	203-73553	014_U0 Station Services Building
ESK-TSS-P22-	203-73554	015_U0 Ash Dump Substation
ESK-TSS-P22-	203-73555	016_U0 Auxiliary Substation B
ESK-TSS-P22-	203-73556	017_U0 Limestone Handling Substation
ESK-TSS-P22-	203-73557	018_U0 North Coal Yard Substation
ESK-TSS-P22-	203-73558	019_U1 Condensate Polisher Plant
ESK-TSS-P22-	203-73559	020_U0 South Coal Yard Substation
ESK-TSS-P22-	203-73563	024_U0 Substation South
ESK-TSS-P22-	203-73564	025_U1 FGD Substation
ESK-TSS-P22-	203-73568	029_U1 Fabric Filter Substation
ESK-TSS-P22-	203-73569	30_U1-3 Compressor Building
ESK-TSS-P22-	203-73573	034_U0 Coal Stock Yard Offices
ESK-TSS-P22-	203-73581	042_U1 Boiler Building
ESK-TSS-P22-	203-73587	043_U1 Turbine Hall Building
ESK-TSS-P22-	203-73587	049_U0 Access Control Building
ESK-TSS-P22-	203-48060	128_U0 EPPA Siren Pole 2
ESK-TSS-P22-	203-127780	EPPA Sectional_ Building Commissioning Procedure

## 17.8 TECHINCAL DATASHEETS

INDEX NO.	DESCRIPTION	MANUAL	DATA SHEET
1	PUBLIC ADDRESS VOICE ALARM	✓	
2	CROWN CTs SERIES 1200		✓
3	CROWN CTs SERIES 2000		✓
4	ATEIS ISA8 NETWORKABLE PAVA SYSTEM SLAVE UNIT A/B ZONING		✓
5	ATEIS COLOR TOUGH SCREEN SECURE PAGING CONSOLE		✓

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6	ATEIS CHARGER AND MONITORING UNIT – EN 54-4		✓
7	ATEIS DPA FOUR DIGITAL POWER AMPLIFIERS		✓
8	ATEIS IDA8C NETWORKABLE PAVA SYSTEM		✓
9	PENTON WEATHERPROOF HORN LOUDSPEAKERS		✓
10	PENTON ROUND METAL CEILING LOUDSPEAKERS		✓
11	PENTON MOULDED CABINET LOUDSPEAKERS		✓
12	JBL VERY HIGH OUTPUT MID HIGH LOUDSPEAKER SYSTE		✓
13	KAMA INDUSTRIES SIRENCO BEACONS		✓
14	ROHS FIRE FORCE FIRE PROTECTION CABLE PH30 BS6387		✓
15	SERVER RACKING SOLUTIONS (CABINET)		✓
16	EQUIPMENT SHELTER SPECIFICATIONS (EPPA HUT)		✓
17	DELTA Siren pole UPS_Manual-UPS-RT-5-10kVA	✓	
18	B400 SERIES BEACON LIGHT		✓
19	MK1 STROBE LIGHT CONTROLLER		✓

## 17.9 INSTALLED QUANTITIES AND FREE ISSUE EQUIPMENT

### Free Issue Equipment

Item No	Description	TOTAL QUANTITY (LAYDOWN)
1	24 Way Molex Patch Panel Cat 6	15
1	34 U Cabinet 600 x 800 Inclu. 4 fans & 10 way power	4
1	Pigtail 1m LC	809
1	9U Cabinet IP rated	27
1	Midcouplers	811
1	Splice protectors	800
1	Empty plastic splice shelf SC sim/LC Dup Black	77
1	Splice Cassettes	86
1	LC (9/125) duplex patchcord 3m	211
1	43U Slack Rack	6
1	Connector 5mm - 5mm (re-usable)	181
1	End Cap 5mm	402
1	End Port Gland	137
1	Emtell TCD	3
1	Flush Mount Keystones 25x50mm with Collar	178
1	Sprague (20mm)	68
1	Empty plastic splice shelf SC sim/LC Dup Black: fibre installation of sound system	12

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1	JBL PD764 Precision Directivity Speaker - EP Sirens	12
1	JBL PD764 Precision Directivity Speaker - EP Sirens	6
1	IP65 Enclosure, Bracket and Fastening Equipment for EP Sirens	4
1	PA Speakers (per unit)	4
1	Cabling for horn and ceiling speakers	2 000
1	CTS-1200 Crown Amplifier	5
1	CTS-2000 Crown Amplifier	6
1	Ateis IDA 8C Voice Evacuation DSP Master Control Processor with 5 in and 4 out 100 volt switching. EN60849 approved	7
1	Ateis PSS G2E Touch Screen control & microphone console	4
1	24 VOLT REGULATED DC POWER SUPPLY 1 AMP	17
1	Ateis Net L3 2 CH Fibre Optic input/output Card	4
1	25U Equipment Rack x600mm Deep	4
1	Complete Rack Wiring, Prep & Testing	4
1	4X4 internal box, with 50x50 cut out cover plate flush mounted	89
1	Threaded rods M10 and nuts and anchor bolts	21
1	6mm Insulated earth cable	30
1	100mm Wire Mesh Medium Duty	189
1	300mm Wire Mesh Medium Duty	132
1	2x1.5 PH30 SWA CABLE	920
1	1 Meter UTP Patch Lead	210
1	3 Meter UTP Fly Lead	400
1	Molex CAT6 Cable	6 226
1	Power Cable 4x4 LHC SWA Cable	180
1	Power Cable 3x6 LHC Cable	750
1	1U Blank Plate - beige	184
1	1U Blank Plate - black	22
1	Cage nuts	1 235
1	LC duplex patchcord 2m	21
1	LC-SM Patch Cord 1m	10
1	PVC Fibre Tube Gland M32	1
1	PVC Fibre Tube Gland M40	4
1	PVC Fibre Tube Gland M63	3
1	Keystone Collar (50x50)	265
1	Molex blanks (25x50)	484
1	6mm THREADED ROD	690
1	10mm THREADED ROD	21
1	6mm BOLTS	284
1	8mm BOLTS	940

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1	10mm BOLTS	424
1	12mm BOLTS	202
1	6mm FLY BOLTS	126
1	10mm CHEESE HEAD BOLTS	95
1	6mm GUTTER BOLT & NUTS	524
1	6mm NUTS	705
1	8mm NUTS	77
1	10mm NUTS	53
1	12mm NUTS	12
1	6mm WING NUTS	136
1	6mm FLAT WASHERS SMALL	613
1	8mm FLAT WASHERS SMALL	334
1	10mm FLAT WASHERS SMALL	677
1	12mm FLAT WASHERS SMALL	219
1	6mm FLAT WASHERS MEDIUM	78
1	8mm FLAT WASHERS MEDIUM	25
1	6mm FLAT WASHERS LARGE	434
1	8mm FLAT WASHERS LARGE	110
1	6mm SPRING WASHERS	769
1	8mm SPRING WASHERS	421
1	10mm SPRING WASHERS	692
1	12mm SPRING WASHERS	65
1	6mm DRY WALL ANCHORS	144
1	8mm KNOCK IN ANCHORS	50
1	6mm FISHER PLUGS (55mm)	26
1	6mm FISHER PLUGS (60mm)	424
1	6mm FISHER PLUGS (70mm)	97
1	8mm FISHER PLUGS (80mm)	627
1	8mm RAW BOLTS	167
1	CABLE TIES (T50R)	3400
1	MS1 Grey- body	3
1	MS2 Beige - body	3
1	MS2 Grey - body	9
1	MS1 (50x50) cover - white	8
1	'MS1 (50x50) cover - beige	10
1	MS1 (50x50) cover - light grey	12
1	'MS1 (50x50) cover - grey	11
1	'MS1 (50x50) cover plate mounting	42
1	CTS-600 Crown Amplifier	2
1	JUNCTION BOXES (T160)	11
1	PORCELAIN CONNECTORS	51
1	Ateis IDA 8 hand held Microphones	2
1	Ateis DPA 4X 250 Amplifier	8

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1	4x4 INTERNAL BOXES - Without Cover Plates	12
1	20mm STRAGHT COUPLINGS	786
1	20mm 90 DEGREE SOLID BENDS	111
1	20mm HOSPITAL SADDLES	728
1	20mm MALE ADAPTER	302
1	20mm MALE ADAPTER LOCK NUTS	219
1	20mm FEMALE COUPLINGS	384
1	20mm Q-CLAMP	545
1	20mm BOX COUPLING 3 WAY	810
1	20mm BOX COUPLING 2 WAY	332
1	20mm BOX COUPLING 1 WAY	132
1	20mm PVC END CAP (Bush)	163
1	20mm SPRAGUE ADAPTOR	35
1	25mm BOSAL PIPE	164
1	25mm MALE ADAPTER	89
1	25mm FEMALE COUPLINGS	47
1	25mm 90 DEGREE SOLID BENDS	20
1	25mm Q-CLAMP	7
1	25mm BOX COUPLING 3 WAY	2
1	25mm BOX COUPLING 2 WAY	25
1	25mm BOX COUPLING 1 WAY	8
1	COVER PLATES (Box Lid Galv)	1814
1	25mm SPRAGUE ADAPTOR	5
1	P1000 Without cover	88
1	P1000 Cover	81
1	P1000 90 Degree Angle fitting (P1325)	180
1	P1000 90 Degree Angle fitting (OL1026)	26
1	P1000 Flat fitting (P1036)	5
1	P1000 Flat fitting (P1031)	4
1	P1000 Flat fitting (P1065)	13
1	P1000 Flat fitting (P1067)(Flat plate arm)	1
1	P1000 Flat fitting (P1064)	31
1	P1000 Flat fitting (P1028)	1
1	Beam clamp M10 (OL1272)	286
1	Beam clamp M10 Bolts	311
1	P1001 Without cover	2
1	P 2000 Without cover	185
1	6mm Spring Nuts	436
1	8mm Spring Nuts	804
1	10mm Spring Nuts	404
1	12mm Spring Nuts	168
1	P 8000 Only	240
1	P8000 Cover	594

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1	P8000 Splices	62
1	P8000 90 Degree Corners	47
1	P8000 Hanger bracket	291
1	150mm Wire Mesh Medium Duty	132
1	Cable hold down bracket (P1450)	8
1	Wire mesh rack joiner clamp	164
1	Galvanized Bolt M10	40
1	M10 Washer	40
1	M10 Nut	40
1	Galvanized Bolt M12	50
1	M12 Washer	50
1	M12 Nut	50
1	Galvanized Bolt M14	49
1	M14 Washer	49
1	M14 Nut	49
1	150 mm Cantilever Bracket, including accessories	48
1	7-Way tube Rodent Resident	15 896
1	12-Way tube Rodent Resident	9 000
1	CCG No 1 shroud	1
1	CCG SWA Gland No 0 (without shroud)	8
1	CCG SWA Gland No 2 (without shroud)	7
1	2.5mm Earth Terminal	80
1	4mm Terminal	76
1	DIN Rail	2
1	POK Box with back plate Size 10	6
1	POK Box without Back Plate Size 51	7
1	0.6mm <sup>2</sup> x 10 Pair SWA Telecommunications Cable	842
1	20mm Armed Glands ( stainless steel) with locknut and rubber shroud, (CCG no1 Gland)	50
1	DIN 35 Yellow Slotted Steel Rail 2M	1
1	End Stop	63
1	Cable ties (T120R)	11
1	25mm Galvanized hospital saddles	295
1	25mm Galvanized couplings	155
1	25mm End caps	55
1	6 x 55 knock-in anchors	217
1	2.5mm Terminal	203

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**Installed Inter-Building PH30 Cabling:**

<b>Building Island</b>	<b>Interconnected Building</b>	<b>Type</b>	<b>Channel</b>	<b>Distance</b>
Station Services Building	Auxiliary Substation A	PH30	Channel A	490
Station Services Building	Auxiliary Substation A	PH30	Channel B	490
Station Services Building	Auxiliary Substation B	PH30	Channel A	564
Station Services Building	Auxiliary Substation B	PH30	Channel B	564
Station Services Building	Auxiliary bay Finishing Unit 1, 16m	PH30	Channel A	445
Station Services Building	Auxiliary bay Finishing Unit 1, 16m	PH30	Channel B	445
Station Services Building	Auxiliary bay Finishing Unit 1, 9m	PH30	Channel A	432
Station Services Building	Auxiliary bay Finishing Unit 1, 9m	PH30	Channel B	432
Station Services Building	FGD Substation unit 1.	PH30	Channel A	760
Station Services Building	FGD Substation unit 1.	PH30	Channel B	760
Station Services Building	Compressor Building, Unit 1-3	PH30	Channel A	624
Station Services Building	Compressor Building, Unit 1-3	PH30	Channel B/Strobe	624
Station Services Building	Fabric Filter Substation Unit 1	PH30	Channel A	650
Station Services Building	Fabric Filter Substation Unit 1	PH30	Channel B/Strobe	650
Station Services Building	ACC substation Unit 1	PH30	Channel A	711
Station Services Building	ACC substation Unit 1	PH30	Channel B	711
Station Services Building	CPP Unit 1	PH30	Channel A	738
Station Services Building	CPP Unit 1	PH30	Channel B	738
Station Services Building	Boiler unit 1	PH30	Channel A	445
Station Services Building	Boiler unit 1	PH30	Channel B/Strobe	445
Station Services Building	Turbine unit 1	PH30	Channel A	445
Station Services Building	Turbine unit 1	PH30	Channel B/Strobe	445
North Coal Yard Substation	Coal stockyard office	PH30	Channel A	465
North Coal Yard Substation	Coal stockyard office	PH30	Channel B	465

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Water treatment Electrical building	Hydrogren Substation	PH30	Channel A	415
Water treatment Electrical building	Hydrogren Substation	PH30	Channel A	415

### Installed Quantities:

Building Description	SIRENS	SPEAKERS	STROBES	DPA250	IDA8 C	IDA8 S
Hydrogen Plant Substation	12					
Auxiliary Bay Finishing, Unit 1 (16m)	2	64				
Auxiliary Bay Finishing, Unit 1 (9m)	30	12				
Air Cooled Condenser Substation, Unit 1	24					
Water Treatment Substation		20		2	1	
Auxiliary Substation A	30					
Station Services Building	58	46		6	1	2
Ash Dump Substation	22			1	1	
Auxiliary Substation B		30				
Limestone Handling Substation	18			1	1	
North Coal Yard Substation	20			2	1	
Condensate Polisher Plant Unit 1	34	34				
South Coal Yard Substation	20			1	1	
Substation South	12	8		1		
FGD Substation, Unit 1	20	6				
Fabric Filter Substation, Unit 1	10					
Compressor Building Unit 1-3	20					
Coal Stock Yard Offices		14				
Access Control Building	8	39		1	1	
Boiler Building U1	32		20			
Turbine Hall U1	20		20			

### 17.10 ELECTRICAL LOAD LIST

Area	Equipment	Standby Load (W) @ 230VAC	Full Load (W) @230VAC
<b>Water Treatment Plant</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44

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		<b>180</b>	<b>2430</b>
	AMPS ON 230VAC	0,782608696	10,56521739
<b>Access Control</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>180</b>	<b>2430</b>
	AMPS ON 230VAC	0,782608696	10,56521739
<b>Station Services Building</b>	ATES IDA 8C	48	48
	Ateis IDA 8 SAB	48	48
	Ateis IDA 8 SAB	48	48
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>452</b>	<b>7202</b>
	AMPS ON 230VAC	1,965217391	31,31304348
<b>Substation South</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>136</b>	<b>1261</b>
	AMPS ON 230VAC	0,591304348	5,482608696
<b>Admin Building</b>	ATES IDA 8C	48	48
	Ateis IDA 8 SAB	48	48
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>272</b>	<b>3647</b>
	AMPS ON 230VAC	1,182608696	15,85652174
<b>North Coal Yard</b>	ATES IDA 8C	48	48

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	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>180</b>	<b>2430</b>
	AMPS ON 230VAC	0,782608696	10,56521739
<b>South Coal Yard</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>136</b>	<b>1261</b>
	AMPS ON 230VAC	0,591304348	5,482608696
<b>Ash Dump Substation</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>136</b>	<b>1261</b>
	AMPS ON 230VAC	0,591304348	5,482608696
<b>Limestone hadeling Substation</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>136</b>	<b>1261</b>
	AMPS ON 230VAC	0,591304348	5,482608696
<b>Aux Bay Unit 4 CABINET 1</b>	ATES IDA 8C	48	48
	Ateis IDA 8 SAB	48	48
	Ateis IDA 8 SAB	48	48
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
<b>Aux Bay Unit 4 CABINET 2</b>	ATES IDA 8C	48	48
	Ateis IDA 8 SAB	48	48
	Ateis IDA 8 SAB	48	48
	ATEIS DPA FOUR 250	44	1169

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	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
<b>Cabinet 1 &amp; 2</b>		<b>904</b>	<b>14404</b>
	AMPS ON 230VAC	3,930434783	62,62608696
<b>EPPA Siren Pole No. 1 to Pole No. 4</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	ATEIS DPA FOUR 250	44	1169
	Airconditioner		
	Cabinet Fans	44	44
		<b>1487,930435</b>	<b>25171,62609</b>
	AMPS ON 230VAC	6,46926276	109,4418526
<b>Ash Dump Workshop</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>136</b>	<b>1261</b>
	AMPS ON 230VAC	0,591304348	5,482608696
<b>Limestone Control Building</b>	ATES IDA 8C	48	48
	ATEIS DPA FOUR 250	44	1169
	Cabinet Fans	44	44
		<b>136</b>	<b>1261</b>
	AMPS ON 230VAC	0,591304348	5,482608696

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