

	SCOPE OF WORK	ENGINEERING
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1. Introduction

This project is for the replacement of the obsolete Sootblower Control System on unit 5; from the Modicon 884 PLC to the advanced Quantum PLC, with the same configurations that were implemented on Units 1 and 3. The retrofitting of these changes shall also be implemented on Units 2, 4 and 6. The replacement includes the refurbishment of the Mimic Panel which is the Operator's interface with the field (plant) and installation of the new SCADA HMI.

2. Supporting Clauses

2.1 Scope

This document outlines the deliverables that shall be supplied by the *Contractor* replacing the Sootblower Control System on the Kendal Unit 5.

2.1.1 Purpose

The purpose of this document is to provide the scope of work of the *Contractor* replacing the Sootblower Control System on Unit 5 at *Kendal Power Station*.

The objective of the *works* is:

- To replace the current obsolete Modicon 884 PLC and associated PLC hardware with an advanced modern PLC system.
- Installation of new Sootblowing SCADA HMI that will communicate with the newly installed PLC and with the necessary interfaces to the PI data historian.
- To be able to use data from the PI data historian to enable full automatic soot blow scheduling and automatic execution.
- To replace the current mimic panels with HMI PC screen displays.
- To install new pressure transmitters on both common ranges (air heater and lance / wall blowers), which will be supplied by the Employer. All other hardwiring (cabling), fittings, brackets and pipe work is supplied by the *Contractor*. The *Contractor* determines and installs the conversion and configurations in order to accommodate the change-over valve selections and the high and low system pressures alarms. The wiring and cabling numbering shall correspond with the drawings.

The replacement of the mentioned systems promotes the following:

- User friendliness for both operating and maintenance
- Flexibility in operation
- Improved maintainability
- Improved reliability
- Improved availability
- Reduction in maintenance cost
- Easy configuration of new control philosophies

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- Easy system administration and configuration management
- Improved incident analysis
- Improved plant monitoring and real time information
- Process information archiving

2.1.2 Applicability

This document shall apply to the Kendal Power Station.

2.1.3 Effective date

This document shall be effective from the date of authorization.

2.2 Normative/Informative References

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

2.2.1 Normative

- [1] ISO 9001 Quality Management Systems
- [2] C.GKE0373 Sootblower Control System Replacement Project 2
- [3] 32-727 Safety, Health, Environment and Quality Policy
- [4] 240-43327398 Engineering Policy

2.2.2 Informative

- [1] 240-53114026 Project Engineering Change Management Procedure
- [2] 240-52843929 Engineering Design Process Reference Guideline
- [3] 240-48197042 Procedure for the Management of Technology Obsolescence

2.3 Definitions

2.3.1 Controlled disclosure

Controlled disclosure of information to external parties; either enforced by law or discretionary.

2.3.2 The Works

The works are all activities necessary to install and commission the Sootblower Control System on Unit 5.

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2.3.3 Plant

The plant is any hardware or software, whether fixed or mobile, that is being amended with the works happening in the project.

2.3.4 Employer

The *Employer* is a representative of Eskom Kendal Power Station who enters into a contract with the suitable Contractor of the project

2.3.5 Contractor

The *Contractor* is a company awarded to design, supply, deliver to Site, Install and Commission all the works of the Sootblower Control System on Unit 5.

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2.4 Abbreviations

Abbreviation	Meaning given to the abbreviation
C&I	Control and Instrumentation
CAD	Computer Aided Design
CM	Corrective maintenance
DCS	Distributed Control System
DCR	Design Change Request
FAT	Factory Acceptance Testing
FSSS	Furnace Safeguide and Supervisory System
GGG	Group Generation Standard
HMI	Human Machine Interface
KKS	Kraftwerk Kennzeichen Systeme
LOSS	Limits Of Supply and Services
LCD	Liquid Crystal Display
MTTR	Mean Time To Repair
NEC	New Engineering Contract
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
P&ID	Process and Instrument Diagram
PPE	Personal Protective Equipment
PI	Process Information
PLC	Programmable Logic Control
PM	Preventative maintenance
QA	Quality Assurance
QC	Quality Control
SABS	South African Bureau of Standard
SANAS	South African National Accreditation System
SAT	Site Acceptance Test
SCADA	Supervisory Control And Data Acquisition
SIT	Site Integration Test
SOE	Sequence Of Events

2.5 Roles and Responsibilities

Project Engineer: The project engineer is responsible for ensuring that all the technical objectives of the project are addressed with the execution of the project.

Project manager: The project manager is responsible for ensuring that the contract to be entered into with a suitable Contractor is managed appropriately and executed within the schedule and costs.

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2.6 Process for Monitoring

This document shall be submitted to Kendal Projects Department to be used in the NEC document to acquire a contract for this project.

2.7 Related/Supporting Documents

Not Applicable

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3. Description of the works

The *Contractor* performs the *works* on Unit 5 at Kendal Power Station, with the same configurations that were implemented on Units 1 and 3. The retrofitting of these changes shall also be implemented on Units 2, 4 and 6.

3.1 The works are:

- The decommissioning of the existing Sootblower PLC and mimic panels on Unit 5.
- The removal of the existing Sootblower PLC and MIMIC panels from the Unit 5 and replacing with new system to produce as a minimum the exact functionality as per the old systems.
- The removal of the pressure switches on the plant and replacing with Pressure transmitters (supplied by the Employer).
- The use of the currently installed PLC user logic and the Operating philosophy.
- The Engineering, configuration and interfacing of the signals to PI_ (OSI Soft Historian) as specified in the Appendix A (LOSS diagram).
- The *Contractor* de-commissions all the Sootblower data currently configured on the existing CITECT system on Unit 5.
- The design, procurement, supply, transportation and delivery to Site, the offloading and storage on Site, installation, commissioning and testing of a new Sootblower PLC and SCADA / HMI system on Unit 5.
- The PLC needs to be able to get data from the PI Historian for full automatic soot blowing scheduling.
- The supply of the new Citect SCADA software licence to cater for 5000 tags.
- The supply and installation of all power cables (24VDC and 220VAC) required for the *works*. The *Contractor* terminates both ends of the cable and provides and, if applicable, installs fuses, fuse holders and/or MCBs at the *Employer's* power source.
- The supply and installation of all cabling (UVG), junction boxes and any other Plant and Material required for routing the analogue ammeter signals from the Mimic panel to the PLC in the unit equipment room. The *Contractor* displays all the analogue ammeter signals on the HMI. The signals must be linear and reflect the real value on the plant.
- The connection of the PLC and HMI to the nearest access point on the current Hirschmann network. All communication between the PLC, HMI and PI server shall be routed via the Hirschmann network.
- The rehabilitation of the panel after removal of the old mimic panel.
- The labelling of the new equipment and cables must be done. (KKS numbering).
- The making good of all affected areas.
- The training of the engineering, maintenance and operating personnel on the installed Sootblower Control System which includes the SCADA (HMI), PLC and Network equipment.
- The provision of one PG unit, with the Unity software licence and functions, to be used for Maintenance purposes.

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The Schneider Quantum PLC hardware to be installed and their quantities are:

Module type	Quantities
140 CPS 114 20 Summable 120/230 11A Power Supply	4
140 CPU 65150 Processor.	1
140 NOE 77 101 Ethernet Card.	1
140 CRP 93 200 Remote I/O Head.	1
140 ATI 0300 Thermocouple Card.	2
140 ACI 0400 Analogue Current Input Card.	3
140 DDI 353 00 Digital Input Card.	10
140 DDO 353 00 Digital Output Card	9
140 CRA 93 200 Remote I/O Drop.	3
10 Slot racks. - 4X Mounting Brackets.	4

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3.2 The scope of the works includes:

- The *Contractor* removes the old Sootblower System and installs and commissions the new Sootblower System without disrupting the Unit sootblowing sequence.
- All services, equipment and resources to fulfil the requirements of the Works Information to provide a fully functional system;
- Phased execution of the *works* which includes the complete investigation; system engineering and design; production engineering; construction and erection; commissioning and operational testing.
- The Employer shall provide the all existing control and operating philosophies to be implemented on Unit 5.
- The *Contractor* validates, optimises and then implements such control and operating philosophies into the new Sootblower Control System.
- All the changes to hardware, software and documentation that are to be implemented on the units 5 must be retrofitted back onto units 1, 2, 3, 4 & 6.
- The Computer's Operating System of Windows 7 must be 32 bits for all units.
- The re-drawn 160 P&ID drawings to be supplied for Unit 5.
- The quality control and assurance during all phases of the *works*;
- The removal, transport and offloading to the *Employer's* on Site stores and inventorying of all decommissioned components (The *Employer* has the privilege to identify the scrapped components);
- Regular on-site Progress, Risk and any other ad-hoc meetings with the *Employer's* team to fulfil the *works*.
- The following Additional functions on the system that were implemented on Units 1 and 3 are to be included on Unit 5:
 - ✓ To separate charging-up of the system on Air heaters and Lance blowers on the local and manual modes.
 - ✓ Have specific alarming: - low pressure status alarm must indicate the individual Lance or Wall blower that has the problem.
 - ✓ An additional pressure transmitter on the Common header (valve HCB12) indicating a system low pressure alarm.
 - ✓ SCADA failure: hardwire reset button to cancel the alarm, emergency shutdown (PLC shutdown.)
 - ✓ Wall blowers: when any group of blowers are in-service and a fault occurs on any blower the other blowers in-service must continue with their sequence/cycle until they have retracted completely. The program stops and prevents sootblowing until the faulty blower has been rectified.
 - ✓ An isolated blower alarm status to be added when in automatic mode the PLC checks for the Motor Current (MAC) and Limit Switch (LS) the conditions are:
 - ✓ no MAC & no L = Isolated.
 - ✓ MAC & no L = sticky limit.
 - ✓ SOE: summary of the critical alarms. (Check the colour coding).

The *Contractor* provides all services, equipment and resources to fulfil the requirements of the scope of work to provide a fully functional system.

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The *Contractor* ensures that the *works*, upon completion, are fit for the intended purpose as described in this scope of work.

All interaction required from the *Contractor* with the *Project Manager*, Supervisor and any other of the *Employer* staff members during any of the project phases is done on Site unless otherwise agreed between the *Contractor* and the *Project Manager*.

The *works* are designed for environmental conditions prevailing at the Site. The *Contractor* familiarises himself with the environmental conditions prevailing at the Site and provides for these in his design and consequent installation of the new Sootblower Control System.

3.3 Training Requirements

- a) The objective of training is to provide the Kendal Power Station personnel with the necessary skills and knowledge to achieve all plant performance targets with respect to safety, reliability, availability and economic plant operation.
- b) The *Employer* provides for all costs pertaining to salaries, travelling and subsistence as a consequence of *Employer* personnel that are required to travel to receive such training. All other training costs are borne by the *Contractor*.
- c) The *works* further requires that:
 - i. Training provided by the *Contractor* is directly applicable to Kendal Power Station's new Sootblower System hardware and software components.
 - ii. All the training material and manuals, provided by the *Contractor*, including third party documentation are in the *language of this contract*.
 - iii. The *Contractor* submits a training programme for acceptance by the *Project Manager* prior to commissioning of the unit.
 - iv. Training on all the components of the new Sootblower System for the *Employer's* maintenance and engineering staff are official and accredited.
 - v. On Completion of the training programmes the *Employer's* personnel are tested, evaluated and declared competent by the *Contractor*.
 - vi. Training for the *Employer's* Operating, Maintenance (C&I and Electrical) and Engineering personnel takes place at Kendal Power Station.

Training Documentation

The *Contractor* provides all course material including manuals. All course material is in English and includes all third party documentation. A copy of the training documentation is supplied to each trainee with an additional 3 hard copies and 2 software copies submitted to the *Project Manager* for the *Employer's* library and training department.

The supply of drafts, pre-print proofs and printed copies of training documentation is planned by the *Contractor* in such a way that the required training is complete before commissioning of the unit commences. Training manuals are continuously updated by the *Contractor* up to the date of issue of the Defects Certificate for the whole of the *works*.

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3.4 SHEQ Requirements

The requirements included in the OHS Act 85 of 1993 and Eskom SHEQ Policy shall be adhered to ensure the safety of Employees.

Plant Safety Regulations

- a) NO work is carried out, by the *Contractor*, without a "Permit to Work "
- b) The *Contractor* appoints at least two Responsible Persons and adequate Authorised Supervisors (under the ESKOM Plant Safety Regulations (GGR0992)) to Provide the Works.
- c) This requirement for the *Contractor's* Responsible Persons and Authorised Supervisors remains until the *completion date* for the whole of the *works*.
- d) The *Contractor's* Responsible Person satisfies himself that all sources of possible danger are isolated. Details of the Permit to Work system are available in the Plant Safety Regulations for Kendal Power Station.
- e) Plant with a prohibitive sign attached is not operated. Any *Contractor's* employee or subcontractor found tampering with such plant is permanently removed from Site, on instruction from the *Project Manager*.

The *Contractor* appoints a person who liaises with the *Employer's* Safety Officer responsible for the premises relevant to this contract. The person so appointed supplies the *Employer's* Safety Officer, on request:

- i. with copies of minutes of all Health And Safety Committee meetings, whenever he is required to do so;
- ii. with copies of all appointments in respect of employees employed on this contract, in terms of the OHSA Act and Regulations and promptly advises the *Employer's* Safety Officer of any changes thereto.

The *Employer* is, at any stage of the duration of this Contract, entitled to:

- i. do safety audits at the *Contractor's* premises, its work-places and on its employees;
- ii. refuse any employee, subcontractor or agent of the *Contractor* access to its premises if such person has been found to commit any unlawful act or any unsafe working practice or is found to be not authorised or qualified in terms of the Act;
- iii. issue the *Contractor* with a work-stop order or a non-compliance order should the *Employer* become aware of any unsafe working procedure or conditions or any non-compliance with the Act, Regulations and Procedures referred to in the above, by the *Contractor* or any of its employees, subcontractors or agents.

No extension of time is granted as a result of any action taken by the *Employer* in terms of the above and the *Contractor* has no claim against the *Employer* as a result thereof.

- a) The following health and safety requirements are complied with:

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- i. The *Contractor's* provides proof of registration with the Compensation Commissioner and payment at the Contract Date.
- ii. The *Contractor* demonstrates that all of the *Contractor's* employees are aware of and understand the risks and hazards associated with the type of work or activity carried out.

The *Contractor* is responsible to inspect and maintain such equipment as required in terms of the OHS Act and local procedures.

The *Contractor* takes cognisance of, and complies with the environmental constraints and management stated in the Kendal Power Station Specific Constraints.

3.5 Engineering Change Management requirements

The Eskom Project Lifecycle Model stages shall apply to comply with the engineering change management process.

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From the *starting date* until Completion of the whole of the *works* the *Project Manager* convenes and chairs progress meetings on a monthly basis or at such frequency as is deemed appropriate and mutually agreed with the *Contractor*.

The *Project Manager* and the *Contractor* schedules meetings to discuss and resolve any technical or commercial matters on an as required basis.

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the *works*. Records of these meetings are submitted to the *Project Manager* by the person convening the meeting within five (5) days of the meeting.

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register is not used for the purpose of confirming actions or instructions under the contract as these are done separately by the person identified in the *conditions of contract* to carry out such actions or instructions.

3.5.1 Project Execution Methodology

The Contractor undertakes all phases of engineering and design from the investigating phase, system engineering & design through technical clarification, design freeze, procurement and production engineering to installation, commissioning and testing and addresses the following throughout the execution of the different project phases:

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- a) The translation and incorporation of all mechanical, electrical, C&I, P&ID and third party documentation onto the Contractor's documentation to ensure an integrated documentation system.
- b) The design, engineering, commissioning and testing of all interfaces are performed by the Contractor.
- c) The Contractor's design and engineering takes into account the performance requirements as specified in the scope. In particular an integrated and working new Sootblower System on Unit 5 is provided which meets safety, reliability, availability, operability and maintainability criteria, performs switching control, protection functions, supervisory control functions and information sharing functions as specified in the Scope.
- d) The Contractor provides the various documents during the various phases as shown in the Accepted Programme. Part of the Completion criteria of each phase is when the relevant documents for the next phase are accepted by the Project Manager.

3.5.2 Investigation, System engineering and design phase

- a) The Contractor's personnel are authorised for the LAR process at Kendal Power Station during the investigation phase. The Contractor takes cognisance of and complies with the stipulations of Kendal Power Station Specific Constraints, in this regard.
- b) The Contractor appoints at least two Responsible Persons as per the ESKOM Pant Safety Regulations and sufficient Authorised Supervisors for the works.
- c) The detailed design is done to ensure that all systems and sub-systems form an integrated and consistent whole, including verification of all interfaces, and the ability of these interfaces to create seamless connections to all systems.
- d) All functional and performance requirements are translated, by the Contractor, into a detail design which the Contractor presents to the Project Manager for acceptance, before proceeding with the Production engineering phase. Overall concepts are checked for validity and refined by the Contractor.
- e) On Completion of the Investigation and design stage, the Contractor presents one set of the complete Unit 5 Sootblower system design and the detail switching control, operating, alarming and information sharing philosophies to the Project Manager for acceptance at least 5 working days prior to the start of the Technical Clarification stage. This is performed during formal clarification meetings arranged by the Contractor as shown in the Accepted Programme.
- f) Assistance for this review and acceptance process is provided by the Employer to the Project Manager and the Contractor ensures that these Employer activities are planned and are shown in the Accepted Programme to ensure availability of Employer personnel for such reviews and acceptances.
- g) The Investigation, System engineering and design phase documentation is in a logical format, complete and prepared in conformity with the agreed documentation synopsis and supporting master document register.

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3.5.3 Investigation and design stage

- a) The Contractor together with the Project Manager clarifies all project management issues.
- b) The Contractor validates any documentation provided by the Employer for accuracy against the existing installation to enable the detailed engineering and design by the Contractor for the new Sootblower System.
- c) The Contractor designs, supplies and installs cable rack, trays and conduit needed to accommodate the cables to fulfil the works. The Contractor may use of the Employer's existing cable trays, racks and routes after formal acceptance from the Project Manager.
- d) The Contractor's lead engineer compiles the commissioning procedures, to ensure that the commissioning is done with no harm to people, no plant damage and no plant production loss.
- e) The Contractor identifies and gathers any information and data required for the design. Where the information required is not available the Contractor collects or alternatively, generates the information.
- f) There is no involvement of an intermediate engineering function and the Contractor works directly with the Employer's personnel for all technical matters.
- g) The documentation synopsis and drawing register is submitted to the Project Manager and his acceptance is obtained as a prerequisite to Completion of the Investigation and Design stage.
- h) During the design, all functional and performance requirements are translated into specific hardware and software designs.

3.5.4 Technical clarification stage

- a) The Project Manager is presented with the information, as indicated in the Document Synopsis (Appendix B), for Employer review, acceptance and finalisation at the start of this project phase.
- b) During this stage the Contractor clarifies all technical issues and redlines all the documents for this phase indicated in the document synopsis with the Employer's personnel to enable the Contractor to proceed to the design freeze stage.

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3.5.5 Design Freeze stage

To achieve design freeze:

- a) The Contractor updates all documentation redlined during the Technical Clarification stage and submits to the Project Manager within 5 working days of Completion of the technical clarification phase and it is shown in the Accepted Programme:
- b) The Contractor obtains the Project Manager's acceptance of the system engineering and design phase documentation as a prerequisite to Completion of the design freeze stage and prior to the commencement of work on the next project phase.
- c) The detailed Accepted Programme down to the fourth level for the Production Engineering Phase with the emphasis on planning for two week windows.
- d) The Accepted Project programme down to the second level for the Construction and Erection Phase and Commissioning Phase.
- e) The Contractor submits the format, content and layout of all documents supplied as part of the works, to the Project Manager for his acceptance as a prerequisite to Completion of the Design Freeze stage.
- f) Inspection checklists and activity certification documents relating to format and content are presented to the Project Manager for acceptance as a prerequisite to Completion of the Design Freeze stage.
- g) All drawings, manuals and schematics are uniquely identified and cross referenced with all related documents.

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3.5.6 Production engineering and FAT phase

- a) During this phase the Contractor completes all production engineering (engineering activities that translate the requirements finalised during technical clarification and design freeze into a fully operational system).
- b) The Contractor in conjunction with the operating and engineering personnel develops all new displays for the SCADA / HMI that will be used to perform the required sootblowing functionality. The graphical displays include as a minimum all the necessary status indications for the valve statuses, blower statuses, motor current indications etc. The Project Manager accepts all displays.
- c) The Contractor in conjunction with the operating and engineering personnel identifies and integrates all the trending requirements related to the sootblowing system into the standard trending functionality provided for in the SCADA / HMI. The Project Manager accepts all trends.
- d) The Contractor in conjunction with the operating and engineering personnel identifies and integrates all the report requirements related to the sootblowing system into the standard report functionality provided for in the SCADA / HMI. The Project Manager accepts all reports.
- e) The Contractor in conjunction with the operating and engineering personnel defines all the Sootblowing operating data, alarms, event related signals and measurements to be displayed on the SCADA / HMI. The Contractor defines alarms and their priority as per new SCADA / HMI standard classification.
- f) The following documentation is presented to the Project Manager at least five (5) working days prior to factory acceptance testing and it is shown in the Accepted Programme:
- g) All documentation required for FAT as per the Appendix B - Document Synopsis
- h) All documentation required for Installation and Commissioning as per the Appendix B - Document Synopsis
- i) Prior to transport of the new Sootblower system to Site the Contractor performs a Factory Acceptance Testing (FAT) on the complete system at the Contractor's premises in South Africa. With this test the Contractor demonstrates that the new Sootblower system meets all the requirements of the works Information. The tests are witnessed by the Supervisor, the Employer (e.g. the Employer's personnel) and Others (e.g. a third party inspectorate).
- j) The Contractor corrects all Defects notified during the FAT to achieve completion of FAT.
- k) The complete Sootblower system is available and fully operational before the FAT commences.
- l) As a pre requisite to the Completion of the Production Engineering Phase, the Contractor submits for the Project Manager's acceptance:
- m) The final revision of Installation procedure, SIT procedure, Commissioning procedure, SAT procedure and Operational test procedure, including methodologies for all the aforementioned procedures.
- n) The aforementioned procedures as a minimum includes the following:
- o) A detailed description of the test objectives, test conditions and the acceptance criteria for verifying the design intent.
- p) The initial state of the plant and interfacing systems.
- q) Special precautions to be adhered to in order to prevent damage to existing equipments, interfacing systems and equipment, and any personnel safety hazards prevalent during testing.

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- r) A full description of the test equipment to be used.
- s) A test schedule should be included.
- t) All pre and post installation qualification tests for individual components.
- u) The detailed acceptance test procedures cover all the activities and related documentation of the site acceptance test stage. Refer to Document Synopsis and supporting Master Document Register and supporting Master Document Register.
- v) The detailed Accepted Programme down to the fourth level for the Construction and Erection Phase and Commissioning Phase with the emphasis on planning for two week windows.
- w) The Accepted Project programme down to the second level for the Operational Testing Phase.

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4. Acceptance

This document has been seen and accepted by:

Name	Designation
Mbali Molefe	C&I Engineering Manager
Malibongwe Mabizela	Engineering Manager (Acting)
Khaya Baraza	Project Leader

5. Revisions

Date	Rev.	Compiler	Remarks
November 2019	00	M. Matlaila	Initial draft of the document for project scope.
December 2020	1	M. Matlaila	

6. Development Team

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

- Moipone Matlaila

7. Acknowledgements

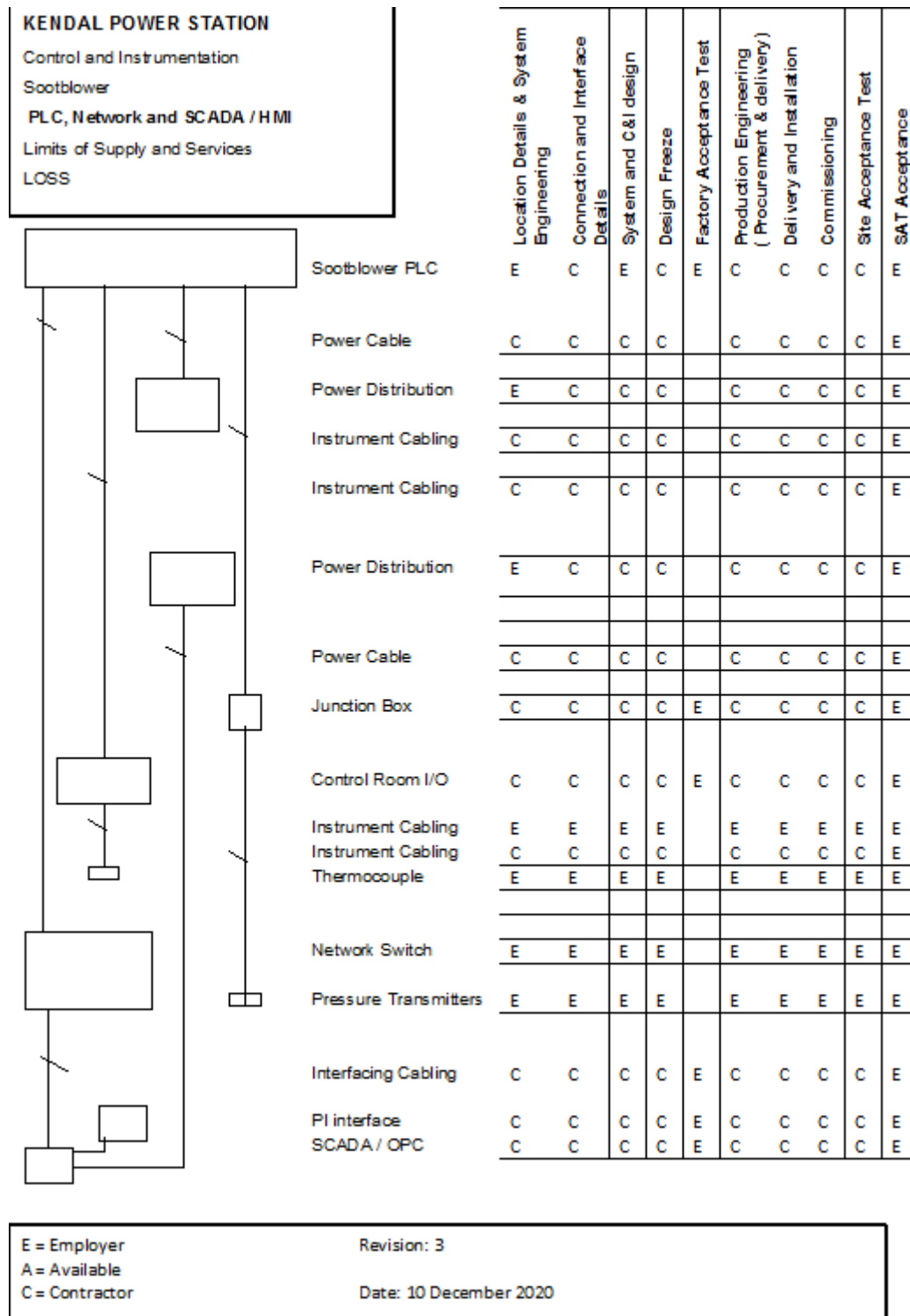
None

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Appendix A - Sootblower PLC LOSS Diagram



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Appendix B– Document Synopsis

	Documentation required for:		
	Clarification and Design Freeze	Install and commissioning	As-Built
Sootblower project document list			
Document management procedures	X		
Quality assurance documents		X	X
Installation, test, commissioning and optimization procedures	X	X	X
Functional Diagrams		X	X
System functional and performance specifications.	X	X	X
Wiring diagrams, Network and Power Distribution Layout drawings.		X	X
PLC wiring connections		X	X
Hardware configuration settings and control system parameter lists		X	X
Documentation that indicates all Kendal Power Station specific settings of all components of the Sootblower PLC and SCADA / HMI system.		X	X
The Functional Design Specification (FDS), which includes the final performance, functionality, equipment specifications and control philosophies of the new Sootblower System as compiled during the technical clarification phase.	X	X	X
Power supplies specifications, allocation and distribution, lockable isolation facilities (220VAC and 24VDC) and earthing.	X	X	X
Documented proposals for new cable rack/conduit routing and application for acceptance to reuse existing cable racking.	X	X	X
Alarm/event handling.	X	X	X
Interfacing and communication specifications.	X	X	X
All hardware and software interfaces.	X	X	X
Calculations (SCADA / HMI, PLCs and PG Units)	X	X	X
HMI screen layouts	X	X	X
Installation, test, commissioning and optimisation procedures.		X	X
Installation, test, commissioning and optimisation results.		X	X
Full set of all relevant drawings on the SCADA / HMI and PLC for P&ID, signal flow, terminal marshalling, electrical drawings, functional drawings, as built configuration and settings at all the levels of the process control and monitoring system, databases, equipment lists and associated listings also supplied.		X	X
FAT documentation.		X	X
SAT and operational test procedures and methodologies. This covers both the requirements of the process function and performance parameters to be met as well as for the new Sootblower System functionality and performance.		X	X
Process flow Diagrams		X	X
P&ID's with Eskom KKS numbering as per Eskom numbering.		X	X
SABS approved Instrument loop drawings		X	X
Network diagrams		X	X
Commissioning procedure		X	X
Hardware breakdown structure	X	X	X
Logic diagrams		X	X
Software media and licences with a complete list of all software revisions used on the works			X
All other documents according to the Contractor's expertise			X

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