Eskom	Report	Technology

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1. INTRODUCTION

Camden Power Station consists of two coal stockyard reclaim conveyors namely Conveyor 18 and E1. Conveyor 18 is equipped with an automated coal sampler hammer, whereas there is no sample hammer installed on conveyor E1. Coal sampling is done manually on conveyor E1, and this does not provide a true representation of the coal which is supplied to the mill bunkers through this conveyor and non-conformance to the SANS 13909 standard. The need for and automated sample collection and storage system has been identified and will reduce the bias in the samples .A coal sample hammer is required to be installed, in order to have a true representation of coal supplied through conveyor E1.

2. SUPPORTING CLAUSES

2.1 SCOPE

The scope of this document includes installation and commissioning of a free issued an automated coal sampler hammer The drawings issued herewith are to be read in conjunction with the specification and all items mentioned, together with all ancillary equipment necessary for the correct installation, operation and full compliance of the automated sampling hammer.

2.1.1 Purpose

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

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] 383-CMDN-BDDD-D00185-9 - Tender Technical Evaluation Strategy Camden Conveyor E1 Sampling Hammer Installation & Commission

[2] 240-93576498 KKS Coding Standard

[3] 240-53114002: Engineering Change Management Procedure**.**

[4] 240-53113685: Design Review Procedure

[5] 240-53665024: Engineering Quality Manual

2.2.2 Informative

[6] 240-53665024: Engineering Quality Manual

[7] Environmental Management System Policy/Procedures

[8] SHEQ Policy/Procedure

[9] 240 - 56227516: LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and including 1000V AC and 1500V DC Standard.

[10] 240-56227442: Requirements for control and power cable for powers stations standard.

[11] 240 – 64550692: Label Specification and Plant Codification.

[12] 240 – 56356396: Earthing and lighting protection standard.

[13] 240 - 56227516: LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and including 1000V AC and 1500V DC Standard.

[14] 240-56227442: Requirements for control and power cable for powers stations standard.

[15] 240 – 64550692: Label Specification and Plant Codification.

[16] Project Plant Specific Technical Documents - Handover Works Instruction 240-124341168

[17] Project Documentation Deliverable Requirement Specification 240-65459834.

[18] Technical Documentation Classification and Designation Standard 240-54179170.

[19] Project/ Plant Specific Technical Documents and Records Management Work Instruction 240-76992014.

2.3 DEFINITIONS

2.3.1 Disclosure Classification

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

2.4 ABBREVIATIONS

Abbreviation	Meaning
CD	Compact Disc
EPL	Equipment Protection Level
HDPE	High Density Polyethylene
IEC	International Electrotechnical Commission
IP	Ingress Protection
kg	Kilogram
KKS	Kraftwerk-Kennzeichensystem
m^3	Cubic-metre
mm	Millimetre
SANS	South African National Standards
VDSS	Vendor Documents Submittal Schedule

3. SCOPE OF WORK

3.1 EMPLOYER'S DESIGN

Camden Power Station consists of two coal stockyard reclaim conveyors namely Conveyor 18 and E1. Conveyor 18 is equipped with an automated coal sampler hammer, whereas there is no sample hammer installed on conveyor E1. Coal sampling is done manually on conveyor E1, and this does not provide a true representation of the coal which is supplied to the mill bunkers through this conveyor. A coal sample hammer is required to be installed, in order to have a true representation of coal supplied through conveyor E1.Therefore the works consists of the installation of one automated sampling hammer on conveyor E1 as mentioned above.

The works is inclusive of all activities necessary for the provision of a fully functional automated sampling system that meets the Employers requirements. The *Contractor* is responsible for the, Design, supply of material, erection, installation, site testing and commissioning of all Mechanical, Civil, Electrical, Equipment and Material required for the works as defined in this Technical Specification. This includes interfacing with and utilisation of existing plant and equipment.

3.1.1 Plant Battery Limits

The battery limits are:

- Sampling hammer installation to be installed on conveyor E1 (KKS: 0 0ECA25AF100) structure after the coal conveyor E1 metal detector. The contractor is to identify the suitable location after the metal detector where the sample hammer can be installed, taking into consideration the discharge chute and sampling bin encloser.
- The electrical power supply for the Conveyor E1 sampling hammer installation is from 380V Conveyor Board 4 (04BJA) and the control Panel Should be mounted as close as possible to the sampling hammer as specified on electrical installation section.

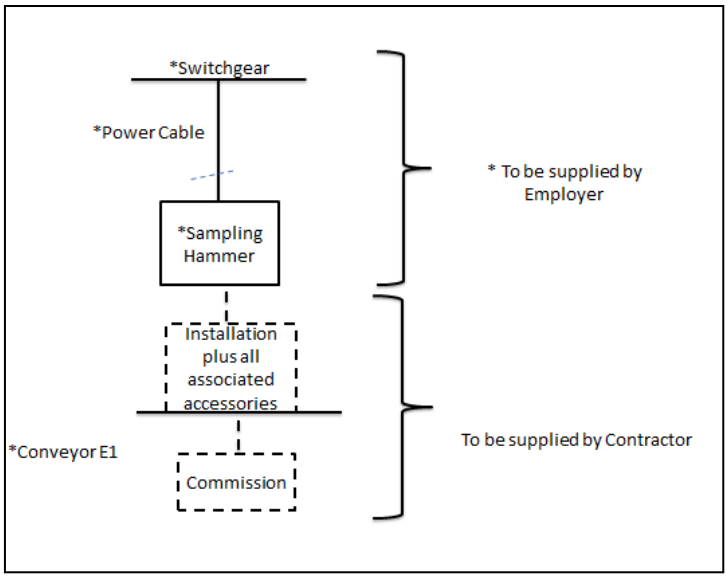


Figure 1: Limit of Service Supply

3.1.2 Free Issue Items

The following components/Items are supplied as free issue items by the employer:

- Cross belt sampler including geared servomotor, the head and machine guards/covers
- Electrical control panel (double panel)
- Idler frames and rollers
- Tracking switches including mounting brackets
- Packing plates for correct height setting of the machine

3.1.3 Mechanical Scope of Work

3.1.3.1 Process condition

The specification for conveyor E1 is as follows:

- Belt width: 900mm wide
- Belt speed: 4m/s
- Troughing angle: 40^0 (Three roll-idlers)
- Idler diameter: 127mm
- Idler face: 340mm
- Conveyor incline angle: 6^0
- Conveyor throughput: 800 tonnes per hour
- Material type/density: Coal/850 kg/m^3
- Particle size/moisture: 50mm/10% moisture.

3.1.3.2 Hammer sampler installation position:

The hammer sampler shall be installed on conveyor E1 (KKS: 0 0ECA25AF100) structure after the coal conveyor E1 metal detector. The contractor is to identify the suitable location after the metal detector where the sample hammer can be installed, taking into consideration the discharge chute and sampling bin encloser.

- The Sampler is supplied with a square to round chute which mounts directly onto the discharge chute in order to discharge into a 430mm diameter bin that has a height of 650mm and in order to collect the sample in an easy manner without causing any coal spillages.

- Conveyor E1 is located in an open to the atmosphere area, therefore in order to avoid water ingress to the collection bin the bin must be under the encloser. The contractor shall be responsible for the design, supply of material, construction of the sampling bin encloser, taking into consideration that personnel will require safe access to the sampling bin encloser.

3.1.4 Electrical Scope of Work

The electrical scope of work consist of supply & delivery material/equipment, installation, labelling and commission of the Conveyor E1 hammer cross belt sampler to be fed as per technical data provided below:

3.1.4.1 Supplied equipment's electrical data:

Equipment name: Cross belt sampler – 900HD – (150) RH
Input voltage: 400V, 3PH and 50Hz
Out voltage: 400VAC
Input current: 51.7Amps
Output current: 57.5 Amps

CONV E1 HAMMER CROSS BELT SAMPLER – MAIN ELECTRICAL POWER SUPPLY

No:	BOARDM	Description
1.	Board name:	380V Conveyor Board 4 (04BJA)
2.	Item number	14
3.	Circuit description	Conveyor E1 Coal Sampler
4.	Single line Drawing	14068-SHT2
	PANEL WIRING	
6.	KKS function code	01ECB01AF001
7.	Circuit type	FDR-CFS
8.	Circuit diagram	19.36/15034
9.	Switch type	Fuse isolator
10.	Fuse trip rating	63A
11.	KKS location code	04BJA04FA001
12.	Cable number	04BJA1044
13.	Cable type	BVX04RCV
14.	Number of conductors	4
15.	Rated area (mm2) per conductor	150mm^2
	POWER SUPPLY CABLE (Outgoing)	
16.	Power supply cable	10mm^2 (BVX04GCV)
17.	Supply cable distance	300m
18.	Voltage drop	2.99%
19.	Cable laying	Existing cable rack to be used.
20.	Earthing	Separate earth cable 6mm^2 to be installed (Green with yellow tracer).

3.1.4.2 The installation shall comply with the following Eskom standard:

- 240 - 56227516: LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltage up to and including 1000V AC and 1500V DC Standard.
- 240-56227442: Requirements for control and power cable for powers stations standard.
- 240 – 64550692: Label Specification and Plant Codification.
- 240 – 56356396: Earthing and lighting protection standard.

Hammer sampler installation:

- The hammer sampler shall be installed after the coal conveyor metal detector system from the conveyor non-drive end. This is to avoid the metallic material into the sampler.
- The execution for this scope of work shall align and correspond with the Conveyor E1 Sampling Hammer Supply and Delivery – Technical Specification report Doc No: 240-126753130.

3.1.5 Civil Requirements

The *Contractor to*:

- Conduct designs such that the coal sampler is successfully installed on conveyor E1 structure.
- Conduct structural design assessment and provide all supporting structures on which the sampling plant is constructed, including foundations (if required as per the design).
- These structures are to be integrated with the existing conveyor E1 structure in order to ensure successful installation of sampling hammer.
- Design, supply of material and modify the walkway around the discharge chute of the sample hammer, in order to ensure safe access and adequate space around the discharge chute.
- Communicate any additional requirements on the conveyor structure to the *Employer* for approval prior to commencement with the installation of sampling hammer.

3.2 CONTRACTOR'S WORKS

3.2.1 General Requirements

- The *Contractor* shall be responsible for the installation, site testing and commissioning of all Plant and Material required ensuring a fully functional sampling hammer.
- The *Contractor* shall be responsible for carrying out all activities and supplying all that is necessary to provide the *works* in accordance with the requirements of this technical specification.
- The *Contractor* supplies all equipment including cranes, scaffolding, and other earthmoving equipment for the construction of the *works.*
- The *Contractor* shall be required to perform a plant walk down and evaluates items described in the *works* for inclusion in tender submission.
- No work will be done without a QCP that is approved by the *Employer*. A QCP must be submitted to the *Employer* for all work that will be done 3 days before that part of the work is to be commenced.
- QCP's and related documentation is subject to comment and approval by the *Employer's* Quality Control personnel as well as Engineering. QCP's will make provision for signatures for interventions by at least the *Contractor's* QC representative, the *Employers* QC representative, the *Employer's* Engineering Department and the site AIA representative.
- On completion of the installation of all plant and equipment the *Contractor* is required to make appropriate arrangements and supply any instruments or apparatus etc. necessary for the testing of all plant and equipment supplied by the *Contractor*. Testing shall be in the presence of the *Employer's* representative in order to demonstrate compliance with the requirements or the specification.

3.2.2 Quality assurance requirements

The *Contractor* complies with the Eskom Quality Requirements Standards.

a) The *Contractor* and all subcontractors comply with the Employer's quality requirements including those listed in the Employers specification document, QM 58.
b) The *Contractor* uses the QMS for all phases of the Project. The Contractor provides evidence of a fully implemented QMS within its own organisation. The Employer may, at his sole discretion, carry out an audit on the Contractor or Subcontractor's QMS for acceptance.

3.2.3 The Contract Quality Plan (CQP)

The Contractor submits to the Project Manager within 30 days of Contract Date for review and acceptance prior to the commencement of work, a CQP which will detail the Contractor's organisation, quality assurance and quality control procedures within that organisation specific to this project. The CQP must be aligned to, and reference ISO 10005:2005 QMS, guidelines for quality plans and in compliance with the guideline in QM58.

The CQP will make reference to the *Contractor's* QMS documents to be used in this Contract:

a) The Contractor's QMS compliance with the requirements of ISO 9001
b) Contractor's quality manual
c) Contractor's quality procedures
d) Contractor's quality forms and work instructions
e) Contractor's quality system documents referenced in this Works Information
f) Employers Works Information, drawings, specifications, standards and codes, etc

3.2.4 Quality Control Plan or Inspection and Test Plan

As defined in the approved CQP the Contractor drafts and submits to the Supervisor for acceptance, prior to the commencement of any works, the requisite Inspection and Test Plan (ITP) or Quality Control Plan (QCP). The ITP/QCP shows each activity from the Works Information. The Supervisor inserts intervention points based on the risk profile of the equipment.

a) The interventions points include all witness, hold, verification, surveillances and review points required by the *Project Manager*. The Contractor's failure to allow the intervention points will constitute a non-conformance.
b) The intervention requirements take into consideration the criticality of the Plant and Materials.
c) Where intervention points have been bypassed without prior written waver from the Supervisor result in the repeat performance of the activity in question and a Non-conformance (NC) is issued.

3.2.5 Operational Documents

The Contractor submits as a minimum the following documents, as required by the *Project Manager* during the execution of the works:

a) Updated QCP register
b) Inspection notifications accompanied by their inspection report
c) Non-conformance and Defects registers and reports
d) Updated Site and off site inspection schedules.
e) Inspection and or FAT / SAT dates
f) f) Inspections, completed and outstanding. Inspection and test reports
g) Weekly and monthly contract quality progress report
h) Data books for the completed works, before commissioning can commence (refer to the data book specification)

3.2.6 Quality Responsibility

The Contractor responsibilities include but are not limited to the following:

a) The Contractor is accountable for the quality of the output and liable for any failures.
b) Implementation of their QMS on site
c) Administration of their QA/QC systems on site
d) Verification of approval status of Subcontractor's Quality programmes, that is, CQP's, QCPs, NC's, Defects and all their operational procedures and works instructions
e) On-and-offsite inspections
f) Weekly and monthly progress reporting on quality performance
g) The Contractor is responsible for defining the level of intervention of QA/QC or inspections in line with the Employers requirements.
h) The Contractor is responsible for defining the level of intervention of QA/QC or inspections to be imposed on his Subcontractor, suppliers and sub-suppliers and must ensure that these are in line with the Employer's requirements.

The Supervisor will be responsible for the following:

a) Reviews of the quality submissions
b) Verification of the Contractor's intervention points
c) Reviews the Contractor's ITP/QCP documents (procedures, test results)
d) Reviews the data book

3.2.7 Non-Conformances

Where Non-Conformance (NC) notifications are issued, the Contractor acknowledges receipt within the period of reply and proposes corrective and preventive actions to the Supervisor. The corrective and preventive actions will include the implementation and completion dates. Progress on all NCs notifications issued to the Contractor must be reported to the Supervisor on weekly basis.

a) The Contractor's Quality Manager keeps a register of all NC notifications issued
b) Records of NCs notifications are kept and form part of the data book records.

3.2.8 Quality Reporting

The Contractor submits a monthly quality report, on the last working day of the month. The report includes but not limited to the following:

a) A register of NCRs and defects
b) Updated QCP / ITP register
c) QA monthly report summary
d) Planned and completed local and foreign inspection dates
e) Completed and outstanding Inspections
f) Audit findings report

3.2.9 Documentation Management

All documents supplied by the Contractor shall be subject to client's approval. The Contractor is required to submit the Vendor Document Submission Schedule (VDSS) as per agreed dates to the project manager. The client will pre-allocate document numbers on the VDSS and send back to the Contractor through the delegated Eskom project manager.

3.2.9.1 Documents Submission

- All project documents must be submitted to the project manager with transmittal note according to 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 project manager with a transmittal note. In addition, the Contractor will be provided with the following standards which must be adhered to:
  - Project Plant Specific Technical Documents - Handover Works Instruction 240-124341168
  - Project Documentation Deliverable Requirement Specification 240-65459834.
  - Project/ Plant Specific Technical Documents and Records Management Work Instruction 240-76992014.
- Where applicable and contractually agreed, e-mail submissions can be used, as well as other submission methods employed in the relevant project e.g. Box; Norman Secure, etc.

3.2.10 Drawing Format and Layout

The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of engineering drawing Standard 240-86973501. Drawings issued to Eskom will be a minimum of one hardcopy and an electronic copy that is editable. All Contractors are required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in pdf format. No drawings in TIFF, AUTOCAD or any other electronic format will be accepted. Drawings issued to Eskom may not be "Right Protected" or encrypted. The Employer reserves the right to use these drawings to meet other contractual obligations. The Contractor shall include the Employer's drawing number in the drawing title block. Drawing numbers will be assigned by the Employer as drawings are developed.

The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of engineering drawing Standard 240-86973501. Drawings issued to Eskom will be a minimum of one hardcopy and an electronic copy that is editable. The contractor is required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in pdf format. No drawings in TIFF, AUTOCAD or any other electronic format will be accepted. Drawings issued to Eskom may not be "Right Protected" or encrypted. The Employer reserves the right to use these drawings to meet other contractual obligations. The Contractor shall include the Employer's drawing number in the drawing title block. Drawing numbers will be assigned by the Employer as drawings are developed.

3.2.11 Plant Coding and Labelling

3.2.11.1 Plant Coding

Coding of the design shall be based on the latest revision of 240-93576498 KKS Coding Standard and the Employer shall undertake the coding in line with its standards. The KKS coding shall be applied during the design review stage(s) and cross referenced to all arrangement drawings, schematics, instructions and manuals and where practical to spare parts list/manuals. The Contractor shall be required to include allocated coding to the electronic design drawings.

The Employers KKS Standard shall be used to allocate codes to plant or system included in the Works. Plant Coding shall be undertaken by the employer and as such the service provider shall make available the following documentation to code:

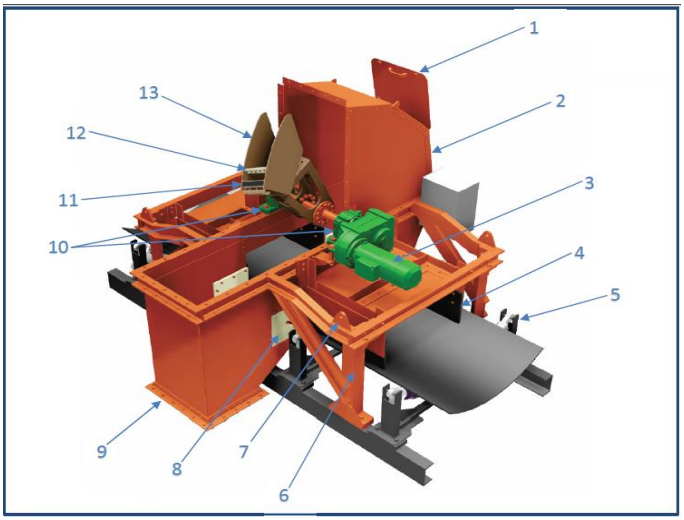
- **Mechanical**
  - Piping and Instrumentation Diagrams (P&IDs)
  - Interface list
  - Process flow diagrams (PFDs)

- **Electrical**
  - Single line diagrams
  - Electrical board general arrangements (GA)
  - Cable schedule

3.2.11.2 Plant Labelling

The Contractor shall also manufacture and install KKS labels to identified plant items as per list supplied by the Employer. Labels shall be manufactured and installed according to the Employer's KKS Plant Labelling and Equipment Descriptions Standard. The labeling standard shall be supplied as part of the enquiry documents.

3.2.12 Hammer Sample Features and General Arrangement



Item	Description
1	Inspection hatch
2	Sampling Head Guard
3	Geared Servomotor
4	Replaceable Rubber Skirts
5	Flexible Idler Frame c/w Flexible Idler
6	Support Legs
7	Main Frame Lifting Lug
8	Replaceable Poly Cover
9	Discharge Chute
10	Plummer Block Bearings
11	Back Scraper 2
12	Back Scraper 1
13	Sampling Head

Figure 2: Sampling Hammer components and general Arrangement

3.2.12.1 Cross Belt Sampler

The Cross Belt Sampler was designed to suit your specific application based on the design criteria given. The sampler mounts directly on to the conveyor stringer (or conveyor gantry) and has a locally mounted field control panel. The materials of construction are 350WA steel coated appropriately with our standard inland paint specification for mechanical equipment and an IP65 powder coated control panel.

3.2.12.2 Support Idlers

In order to support the conveyor belt and create the appropriate curvature in the area of sampling, the cross belt sampler has been supplied with 5 roll support idlers. These mount directly onto the stringers, before and after the sampling head, and possibly beneath the sampler depending on the application refer to General Arrangement Drawing for details on positioning of the idlers with respect to the sampler.

3.2.12.3 Sample Discharge

The Sampler is supplied with a square to round chute which mounts directly onto the discharge chute in order to discharge into a 430mm diameter bin that has a height of 650mm and in order to collect the sample in an easy manner without causing any coal spillages.

3.2.12.4 Sample Tracking Switches

The sampler has been designed with a double sweep/cleaning system which together with the provided idlers which shape the belt ensure that a clean cut is taken. The servo controlled asynchronous servo-motor with minimum backlash gearbox ensures absolute speed control of the sampling arm and the most correct sample as a result. The sampling arm is designed to make contact with the belt to ensure a clean cut of material is taken. Damage to the belt is mitigated by installing belt tracking limit switches to ensure the belt is tracked as well as a system that leads the sampling arm onto the belt when it first makes contact.

3.3 MECHANICAL INSTALLATION

The mechanical installation should only be conducted by qualified mechanical personnel as stipulated on technical evaluation criteria [1]. The installation of the sampler should be done in according the approved general arrangement drawing number 57-04-01-01-008. Check that the discharge chute is installed on the appropriate side of the conveyor and according to the signed general arrangement drawing.

3.3.1.1 Location of the Sampler

- It is important to note that the position of the sampler should not be less than three times the conveyor belt idler spacing (on average) from the discharge chute or any loading point onto the belt.
- This should provide enough space for the material to settle into position on the belt so as not to bias the sample. Therefore the sampler should be installed after the coal conveyor metal detector system from the conveyor tail end, this is to avoid the metallic material into the sampler.
- The *contractor* to select a suitable installation point of the coal sampler after the metal detector Note: the *contractor* must contact the client /engineer to verify the installation location.

3.4 ELECTRICAL INSTALLATION

The proposed coal sampler installation location is deemed a classified area. The equipment placement and design the area classification report deemed the area Zone 21. All electrical equipment should thus be suitable to be installed in a Zone 21 area. Electrical installation must comply with the regulations as stated in SANS 10108 as is applicable, noting that the regulations of SANS 10142-1 alone are not sufficient for compliance in the hazardous area. All electrical equipment shall be Explosion Protected according to SANS 10108 and SANS 60079-10-2.

3.4.1.1 Electrical Control Panel Installation

The location of the electrical control panel is important. The panel should be mounted close to the sampler and in a convenient position so that the operator can get access to the panel.
The panel need to be mounted close to the sampler for a few reasons:

- The operator can visually see the sampler running and take action should there be a problem
- The electrical conductors that bring feedback to the panel need to be as short as possible for the feedback system to work efficiently.

The panel should be mounted at a convenient height for the operator to be able to comfortably use the panel and should also be protected from any potential harm from moving machinery. Therefore the sampler electrical panel should be erected by means of steel frame 2-3 metres away from the actual sampler.

3.4.1.2 Electrical Interconnection of Panel and Sampler

In order to successfully connect up the control panel to the sampler the following steps should be taken:

- The Proximity Switches are terminated in the CCG box and Panel (4 Cores)
- The Motor Thermal Protection and Brake are terminated in the motor terminal box and the panel (4 Cores)
- The Belt Alignment Switches need to be terminated in the panel
- Motor Supply Cable (4 Cores) to the Panel
- Encoder (8 Cores) to the Panel
- All electrical connections to be checked

Table 1: Summary of Cables Required

Application	Description	Specification
Thermal and Brake	1,5mm^2 - 4 core Armoured Cable	BVX04CCV
Proximity Cable	1,5mm^2 - 4 core Armoured Cable	BVX04CCV
Belt Alignment	1,5mm^2 - 4 core Armoured Cable	BVX04CCV
Motor Cable	10mm^2 - 3 core plus Earth Armoured	BVX04GCV
Encoder Cable	0.5mm^2 - 1,5mm2 - 8 core + Screen	Shielded / Screened

3.5 SAMPLING HAMMER OPERATING PHILOSOPHY

The coal sampler shall be able to automatically take coal samples from the conveyor belt at preselected intervals. The sampling intervals shall range from 30 minutes to 24 hours. The sample hammer shall only operate when the conveyor belts is in service.

3.5.1 The cross belt sampler has four modes of operation:

The sampling hammer has four modes of operation as follows:

1. Remote – Signal to Sample via 24VDC pulse signal
2. Local Timing – Local operation via a local timer (set by the client)
3. Local Manual – Local push button (test mode)
4. Inspection/Maintenance – Two inspection positions and a jog mode

4. SAMPLING HAMMER COMMISSIONING

The *Contractor* commissions the *works* and ensures conformance to the *Employer's* performance requirements of the works.

The *Contractor* submits a commissioning schedule and program to the project manager for acceptance by the *Employer*. The schedule should consists of cold commissioning and hot commissioning plan. Prior to the time when commissioning is to commence, the *Employer* appoints a representative who will co-ordinate the commissioning of all Plant and Equipment forming an integral part of the system being commissioned.

The *Contractor* must take into consideration the safety of the Plant and Equipment in respect of any particular commissioning test and in the event of damage accepts responsibility for such Plant and Equipment damages. In the event of incorrect functioning, the *Contractor* determines the cause and corrects the defect.

Testing and commissioning includes as a minimum:

- The services of skilled Engineers (OEM) if required to supervise the testing and commissioning in ensuring a fully functioning of the installed sampling hammer.
- All management, supervision, labour, tools, instruments, test apparatus, calibration equipment and any other equipment and facilities as may be necessary.

Where the results of the performance tests performed don't correlate with expected results (concentration values, flow rates, etc.) and/or the control functions as per the operating philosophy do not meet the specifications guaranteed, the *Contractor*, at his/her own expense, carries out all necessary adjustments and modifications to the works required to obtain the stated tolerances.

4.1 COLD COMMISSIONING

Cold commissioning is required in order to be able to set up the sampler for first operation. It may be necessary to understand the operation of the sampler fully in order to be sure that the correct steps are taken during Cold Commissioning. Cold Commissioning involves the following Steps:

4.1.1 Setting the height of the Sampler

- In order to correctly set the height of the sampler it is necessary to slowly rotate the sampling head around to check the clearances to the belt and any other nearby components to ensure that a sample at full speed can be attempted.
- The sampling head will now be making contact with the belt, and given that the conveyor belt will still be simulated as running, it is necessary to wet the belt in the area of sampling such that the sampling head does not try to push the conveyor off of its centre position.
- The sampler is to be operated in the “INSPECTION MODE” and the “JOG” function will be used to slowly rotate the sampler around to check clearances and interference with the wetted belt.
- The sampling head is designed to make contact with the belt along the aft 90% of the side plates as well as the back plate as well as the two respective scrapers.
- Remove ONE packing plate at a time to check the amount that the sampler is pressing on the belt.
- In order to remove a packer to set the height correctly, the weight needs to be removed off of the footplates (i.e pick up the sampler), with the bolts slightly loosened, and then remove one plate per foot at a time until the height is correct.
- NB! Be sure to line up the remaining packer plates and tighten all bolts on final assembly and prior to any further cold commissioning.

4.1.2 Electrical Power-Up and Panel Commissioning

- Prior to powering up the panel, the responsible person needs to verify that the electrical connections have been correctly made and the responsible commissioning engineer should be present to oversee all cold commissioning activities.
- Check that all fuses are installed and that none of the components (relays) have shifted during transportation.
- Power up the control panel by rotating the rotary isolator handle
- On the switch panel, there should be lights on indicating that the 380VAC (GREEN) supply is healthy and that the 24VDC (BLUE) is healthy.
- If there hasn’t been any shift of the sampling head during transportation and the proximities have been connected the correct way around then the “homed” light (AMBER) should be on. The tripped light (RED) should also be on if it has not been reset.

4.1.3 High Speed Runs

- The sampler is ready to be tested at its nominal running speed.
- Ensure that there are no personnel in the vicinity and that everyone is aware that the sampler is undergoing cold commissioning.
- It is possible to continue to perform testing with the belt running signal simulated, however, when running at full speed, it is preferable to wet the belt in the area of sampling as in the previous step so as to reduce the friction on the belt and prevent the sampler from moving the belt off of its' position.
- With the selector switch in manual mode – press "Manual Cut".
- After timing out of the siren, the sampling head should perform one complete revolution and then re-home itself.
- If this is successful and the sampling head "sweeps/squeegees" the water off of the belt, then the height of the sampler is set correctly for the particular belt tension.
- The remaining modes of operation can now be tested – namely, Auto and Remote.
- Remember to cancel the belt running simulation or remove the belt running bridge that were put in place at the start of cold commissioning

4.2 HOT COMMISSIONING

Once cold commissioning is completed, the Sampler needs to be tested in a live situation. It is preferable to first test the sampler in "MANUAL MODE" on an empty running belt, prior to testing the unit on material.

- Recording of live inverter values during sampling is conducted to verify the safety margin of the sampler, and any adjustments to the settings of the sampler take place at this time.
- After the sampler has been tested on a running empty belt, it is time to load the belt and test the sampler with material on the belt.
- It is important at this point to try and monitor the cleanliness of the belt in the area of sampling to ensure that a clean sweep is being achieved.
- Note: If there are fines left on the belt, it may be necessary to lower the sampler further in order to collect these for an accurate representation of the material on the belt. This may happen due to the material on the belt, which is lowering the belt from the position teste during the cold commissioning stage.
- This belt height may vary depending on if the belt is loaded or running empty, or even at varying belt loading conditions. Thus, during hot commissioning, this should be monitored to ensure that a clean sweep is achieved.

It is also possible on a new conveyor belt installation that the belt can stretch with its initial use. Should it be required, the belt tension could be rectified such that the initial hot commissioning parameters are achieved, alternatively, should this not be possible, further adjustments to the sampler may be required.

5. AUTHORISATION

This document has been seen and accepted by:

- Jabulani Radebe – Lead Discipline Engineer – Electrical Engineering
- Eugene Venter – Chief Engineer Professional

6. REVISIONS

Date	Rev.	Compiler	Remarks
February 2021	01	Y. Mgwebi	Original document
August 2021	02	Y. Mgwebi	Scope changes on the following sections: • Hammer sampler installation point (3.1.3.2). • Civil Requirements (3.1.5)

5. DEVELOPMENT TEAM

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

- Jabulani Radebe

6. ACKNOWLEDGEMENTS

- N/A

7. APPENDIX

7.1 APPENDIX A – LIST OF DRAWINGS

- List of drawings (Attached)
  - 57-0000-02-010-1 – Cross Belt Sampler Standard Electrical Circuit Diagram
  - 57-0000-02-010-2 – Cross Belt Sampler Standard Electrical Circuit Diagram
  - 57-0401-01-008 – Approved GA Drawing
  - 57-0000-02-011 Rev 01 - Cross Belt Sampler Standard Electrical Circuit Diagram
  - 0.36/13924 Rev 07 – Coal Handling Plant P&ID Diagram