

ANNEXURE A

SCOPE OF WORK SIGNATURE

The scope of work will be verified and signed off by all parties involved.

	Name & Surname	Department/Designation	Date & Signature
Scope of work Prepared by:			
Verified by:			
Supported by:			

Technical Evaluation Team

Names	Department/Designation	Date:	Signature:

Document reference

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C3.1: EMPLOYER'S WORKS INFORMATION

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PROJECT & CONTRACT TITLE

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1 Description of the works

1.1 Executive overview

- (1) Duvha Power Station is in a process of installing flow meters to comply with the Eskom standard GGD 0561 “Water Balance Accounting Framework for Coal Fired Power Stations” and the Water Accounting-Directive 32-1110 which states that the stations shall have working flow metering devices on all major streams and shall report weekly and monthly performance of water usage.
- (2) The replacement of station flow meters project was initially separated into two projects (phases 1&2). Phase 1 scope of work was partially implemented in 2017 financial year but it was not completed.
- (3) Phase 2 of the project was to install 19 additional meters that were not covered on phase 1 as required by Water Accounting and Management Framework Standard 240-105200800.

1.2 Employer’s objectives and purpose of the works

- (1) The objective of the works is to implement phase 2 scope of work.
- (2) The purpose of the works is to install flow meters in all major streams to comply with the Eskom Standard GGD 0561. (See Appendix B – a spread sheet showing all the required work to be executed by the Contractor)
- (3) Testing and verification should be done to ascertain that the flow meters meet the required operational expectation.
- (4) Required flowmeters should have design life of +-10years.

1.3 Interpretation and terminology

The following abbreviations are used in this Works Information:

Abbreviation	Meaning given to the abbreviation
ECSA	Engineering Council of South Africa
SACPCMP	South African Council for Project and Construction Management Professionals
PM	Project Manager
WTP	Water Treatment Plant
DCS	Distributed Control System
mA	Milli-ampere
cm	Centimetre
OTI	Operating Training Instructor
USS	Unit Shift Supervisor
mm	millimetre
QCP	Quality Control Procedure
PTW	Permit To Work

2 Management and start up.

2.1 Management meetings

- (1) Regular meetings of a general nature may be convened and chaired by the *Project Manager* as follows:

Title and purpose	Approximate time & interval	Location	Attendance by:
Kick off meeting , implementation strategy	One off 60 minutes (Time to be announced by Project Manager)	Project Managers office	PM, System Engineer and contractor
Risk register and compensation events	As and when required	Project Managers office	PM, System Engineer and contractor
Overall contract progress and feedback	Weekly on Monday at 08:30	Project Managers office	<i>PM. Contractors' Manager</i>
Commissioning	Once off	Project Managers office & Site	PM. Contractors' Manager & Supervisor

- (2) 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*.
- (3) Records of these meetings shall be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.
- (4) All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting.
- (5) Such minutes or register as in point (3) shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the *conditions of contract* to carry out such actions or instructions.

2.2 Documentation control

- (1) The *Contractor's* site manager must submit a daily log, which needs to be signed by the *Employer's Supervisor* / Project Manager daily

2.3 Health and safety risk management

- (1) The Contractor's personnel is to undergo Safety Induction Training at Duvha prior to commencement of this contract and all the relevant Documentation is to be approved by Safety Officials and the Project Manager before any activities can be started on site..
- (2) The Contractor complies with the requirements of the Duvha Power Station Safety, Health & Environmental Specifications SAS 0012: Duvha Power Station Contractors safety manual
- (3) The documents are completed by the Contractor's and submitted to the Employer before taking possession of the works.
- (4) These documents are valid for the duration of the works.
- (5) The Contractor and all his personnel attend a Health and Safety Induction Course prior to starting with the works.
- (6) The induction course is presented by the Safety Risk Department at Duvha Power Station.
- (7) The Contractor makes arrangements with Safety Risk Management at telephone number 013-690-0143.
- (8) The Contractor submits all the documents as indicated in the Safety, Health & Environmental Specifications relevant to the work to Safety Risk Management before the induction course.
- (9) The Contractor completes all appointments required and ensures that the appointee and appointees fully understand their responsibilities and are competent and trained to execute their duties.
- (10) The appointees/appointee ensures that all duties are carried out and records are kept by the Contractor for review/audit by the Employer or Inspector of Machinery.

- (11) Duvha Safety Risk Management has the right and authority to visit and inspect the Contractor's work place or Site establishment.
- (12) The Contractor supplies and ensures that his employees wear the necessary PPE according the risk assessments performed on the specific tasks to be carried out.
- (13) The Contractor ensures that everyone entering Duvha Power Station under his supervision are medically, physically and psychologically fit to enter Duvha Power Station.
- (14) The medical examination, at the Contractors cost, is carried out by a Registered Professional Occupational Health Practitioner and the examination shall include the following tests:
 - i. Eye Test, Blood Pressure,
 - ii. Heart Function,
 - iii. Hearing Test and
 - iv. Lung Function.
- (15) A thorough examination is done and previous physical injuries, as well as occupational diseases/complications are covered.
- (16) If at any point in time during the execution of the works, the Contractor has a radiation-related incident/exposure, the onus is on the Contractor to immediately notify the Employer, the Medical Station, the Risk Manager and the Safety Risk Management Department.
- (17) The onus thereafter is for the Contractor to immediately arrange, at his/her cost, for blood samples to be taken by a Registered Laboratory and for this sample to be sent to the Excellerator Laboratory in Cape Town for full radiation exposure tests. This test results are then to be discussed with the Duvha Occupational Health Practitioners, who will then advise the Power Station Management on the risk, if any, of the incident/exposure.
- (18) The Contractor takes full responsibility and accountability for all other people/staff/personnel/labour that he/she employs or utilises, whether in full-time/part-time/contract basis, in executing the works or other work whilst on the Employers premises.
- (19) The Contractor ensures that Safety Harnesses are used for all work carried out in elevated positions, as defined in the Occupational Health and Safety Act, No 85 of 1993 or any other Code of Practice or standard or the Construction Regulations.
- (20) All safety equipment or Machinery used complies with the SANS Codes of Quality and Practice or any Code as stipulated in the Occupational Health and Safety Act, No 85 of 1993, and any amendments thereto.
- (21) The Contractor at all times consider himself as "Employer" as defined in the Occupational Health and Safety Act, No 85 of 1993 and do not consider himself as under supervision or management of the Employer with regard to Health and Safety Requirements but only from a Commercial Contractual Condition of Contract. Under no circumstances does the Contractor consider himself a sub-ordinate or being given supervision.
- (22) The Contractor provides and maintains his own facilities as required in the Occupational Health and Safety Act, No 85 of 1993 or any other Code of Practice or standard or the Construction Regulations, if not agreed contractually or arranged by the Employer.
- (23) The Contractor has Safety Systems in place at his premises for the total contract period and these shall include the following:
- (24) Safety Management Structure and Compliance to these
- (25) Statutory Appointments
- (26) Records and documentation of all Risk and Hazard Analyses.
- (27) Planned Job Observations Records and Documents.
- (28) Employment history and records of all personnel, part-time or full-time or contract labour.
- (29) Medical History of all personnel, part-time or full-time or contract labour
- (30) Training and Competency Records with regard to Safety, Health and Environment.
- (31) Training and Competency Records with regard to the skills he uses to carry out the works or any other works in the Employers premises.
- (32) Compensation Commissioner records and proof of registration.
- (33) Records and documentation with regard to any sub-contractor or labour-only contracts he places or uses to carry out the works or any other works in Employers premises.
- (34) Personal Protective Equipment and Safety Equipment Inspection, training and competency records and documentation.
- (35) Employment contracts for all sub-contractor or labour-only contracts.
- (36) Compliance to a Safety System, such as NOSA or any other system that is similar in nature.
- (37) Records of all incidents or accidents, and vehicle accidents, incurred during execution of this works or any other works in the Employers premises.

- (38) Records of all man-hours, including sub-contractors or labour-only contracts, the Contractor spends on the Employers premises.
- (39) Written Safe Work Procedures for all hazardous tasks the Contractor executes on the Employers premises.
- (40) A Fall Protection Plan for all elevated work the Contractor does on the Employers premises.
- (41) Environmental Plan and awareness training.
- (42) Induction training records of his staff by himself/herself.
- (43) Minimum wage compliance for the different skills and to which Bargaining Council compliance is made to and proof of membership, if any.
- (44) Risk Assessment of this type of works
- (45) Proof of authorisation/accreditation from Department of Labour and or other Statutory Body for this type of works, if applicable
- (46) Emergency Evacuation and Rescue Plan for the hazardous tasks related to the works.

2.4 Environmental constraints and management

- (1) The Contractor shall comply with the environmental criteria and constraints stated in Annexure ENVP 0005: Procedure for environmental handling of waste including redundant and obsolete equipment. Additionally the Contractor shall comply to the requirement of ENVP0030: Procedure for Environmental Requirements for contractors.
- (2) The Contractor is responsible to keep the work area clean of any rubble.
- (3) All waste introduced and/or produced on the Employer's premises by the Contractor for this contract, is handled in accordance with the Duvha Waste Management Procedure (ENVP 0005).
- (4) Refuse Disposal
 - i. The Employer will provide special colour coded bins for refuse disposal.
 - ii. The Employer will empty these bins.
 - iii. The Contractor ensures that all workers under his control strictly adhere to the correct use of refuse bins:
 - a. Maroon bins: - Scrap metal only
 - b. White bins: - Lagging and general waste
 - c. Yellow bins: - Ash, dust, coal dust and sand
- (5) For the full duration of the Works, the Contractor is responsible to keep the work area clean of any rubble, and to place all refuse into the bins provided.
- (6) Removal of scrap and waste, including concrete/ash/refractory material, to a location within the Duvha Power Station security gates and/or the ash dams must be included in the Price Schedule or Bill of Quantities. This must be inclusive of labour and equipment i.e. forklifts spades, shovels, transport, etc.
- (7) The contractor should immediately report any incidents that may cause harm to the environment to the Employer.

2.5 Quality assurance requirements

- (1) All work is carried out under the supervision of an experienced supervisor.
- (2) The Contractor complies with Supplier Quality Management Specification (Document id 240-105658000/QM58). Appendix D
- (3) All quality control documentation (QCP) is submitted to the Project Manager within 7 days of Contract date.

2.6 Programming constraints

- (1) The Contractor submits a programme within 1 week of the Contract Date.
- (2) The program shall be in Microsoft Excel or Projects format (preferably 2003 version or lower)
- (3) The programme indicates
 - i. The hour duration of each activity,
 - ii. The working calendar (number of work hours per day, days per week),
 - iii. The exact quantity of people per day
 - iv. All phases and interfaces

2.7 Contractor's management, supervision and key people

- (1) The contractor shall provide a site Supervisor or Project Manager to supervise, monitor, control and coordinate all activities during the execution of the project.

The contractor submit the following qualification during tender returnable

Design

National Diploma with 5 years' experience

Safety Officer

Safety Management Diploma/Samtrac plus 2 years industrial experience

Artisan

Trade test certificate

Technicians

National Diploma in Instrumentation

2.8 Invoicing and payment

- (1) Within one week of receiving a payment certificate from the *Service Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice showing the amount due for payment equal to that stated in the *Service Manager's* payment certificate.
- (2) The *Contractor* shall address the tax invoice to CRM_FSS@eskom.co.za and include on each invoice the following information:

Name and address of the *Contractor* and the *Service Manager*;

The contract number and title;

Contractor's VAT registration number;

The *Employer's* VAT registration number 4740101508;

Description of service provided for each item invoiced based on the Price List;

Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT;

The contractor will only receive payment once the installation has been verified by a 3rd party that will be awarded by the contractor and suggested by Eskom.

2.9 Insurance provided by the *Employer*

- (1) Refer to the Contract Data Section 8 – Risks and Insurance.

2.10 Contract change management

- (1) The contractor or the Project Manager notifies each other of any event which may lead to a change in agreed terms as per NEC 3.

2.11 Provision of bonds and guarantees

- (1) The form in which a bond or guarantee required by the *conditions of contract* (if any) is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.
- (2) The *Employer* may withhold payment of amounts due to the *Contractor* until the bond or guarantee required in terms of this contract has been received and accepted by the person notified to the *Contractor* by the *Project Manager* to receive and accept such bond or guarantee. Such withholding of payment due to the *Contractor* does not affect the *Employer's* right to termination stated in this contract.

2.12 Records of Defined Cost, payments & assessments of compensation events to be kept by the *Contractor*

- (1) The *Contractor* may keep records of payment and assessments of compensation events if he deems it necessary.

2.13 Training workshops and technology transfer

(1) Maintenance:

- i. Before the Works can be handed over, the Contractor must supply training to the technicians.
- ii. The Training will be done on site. It will be dedicated to Maintenance Personnel and will be mostly practical with sufficient theory.
- ii. The Contractor should provide 3 session training on different week to accommodate all maintenance personals (10)
- iii. All the specifications of the new equipment must be clearly explained.
- iv. Upon mutual agreement that the training dealt with all the new aspects, a training register must be signed by all relevant parties.
 - a. The register must show all the names of the trainees who attended together with their signature as well as the Contractor's representative who performed the training.
 - b. The register must be submitted to the Project Manager for approval and record keeping.

2.14 PROJECT EXECUTION METHODOLOGY

2.14.1 GENERAL REQUIREMENTS

- (1) The *Contractor* is responsible for carrying out all activities and supplying everything to provide the works. Excluding terminals, PLC. The Contractor will use the existing terminals currently in use in the KP cabinets. If any additional terminals and power supplier are needed, The Contractor should provide as it stated on the Appendix A and Loss Diagrams.
- (2) This includes clarification and co-ordination with process plant engineers, other equipment manufacturers/suppliers and the *Project Manager*. The Contractor requests that a full clarification takes place directly after Contract is signed. This series of meetings must be attended by all Employer Key Personnel
- (3) All documentation submitted by the *Contractor* conforms to all the requirements of the documentation synopsis and is in an adequate state of completeness. The Contractor will provide Original Equipment Manufacture produced Catalogue manuals which are inclusive of everything needed to operate the devices
- (4) The following methodologies are followed during the execution of the *works*:
 - i. Test and identify location of the flow meters along the pipe.
 - ii. Installation of the flow meters.

2.14.2 TEST AND IDENTIFY LOCATION OF THE FLOW METER

- (1) The Contractor follows the Testing and Identifying location of the flow meter during the execution of the works.
- (2) Identify the location along the pipe for fully operation of the flow meter.
- (3) The Employer and the Contractor jointly identify the best possible location along the pipe for the best possible operation of the flow meter prior installation.

3 Engineering and the Contractor's design

3.1 GENERAL

- (1) The Contractor shall execute the work presented in Appendix A&B (Works flow meters activity Schedule)
- (2) The Contractor should verify the information in Appendix A&B if necessary.
- (3) The Contractor shall provide advice on the design or installation of the Flow Meters (FM).
- (4) Specification for Magflow display - it is required to protrude/ be visible in order to be easily read.
- (5) Design life of all the flowmeter should be +-10 years.
- (6) Contractor to submit a list of spares to cater for maintenance support of all the flowmeter supplied to Duvha P/S.
- (7) **Error! Reference source not found.** presents the FMs and the associated infrastructure.

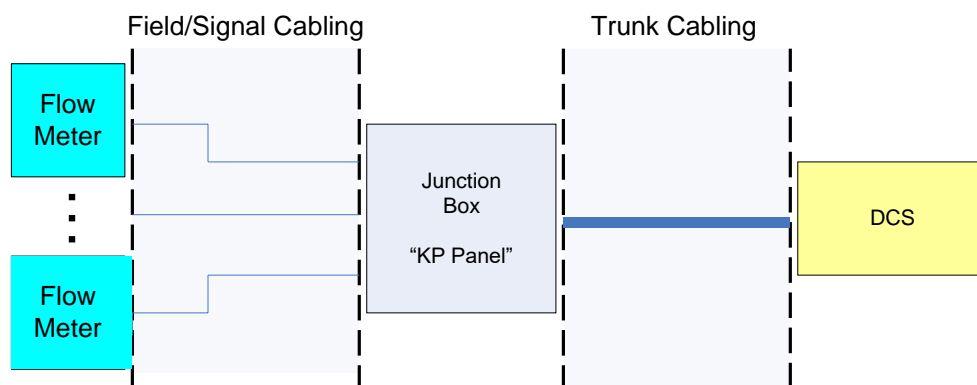


Figure 1: Flow meters and associated infrastructure

- (8) All field equipment is installed in the best practical location ensuring that it operates in an environment within the parameters stipulated by the manufacturer.
- (9) Where harsh environmental conditions are unavoidable, the field equipment shall be designed for operation in that environment.
- (10) All IP ratings are as per SANS 60529
- (11) All field equipment, excluding Junction Boxes (JBs) and their electrical connections are rated IP 67 for Mag Meters and IP 65 for Clamp on meters
- (12) Additional protection hoods and enclosures must protect those transmitters situated outdoors or in adverse environments.
- (13) All field equipment (referring to the FMs and the associated infrastructure) operates over an ambient temperature range of: -10°C to 70°C.
- (14) The equipment layout shall be such that when mechanical work is performed, no C&I equipment shall be damaged.
- (15) The field equipment provided shall be standardised to the maximum extent possible

3.2 SCOPE OF WORK

3.2.1 Phase 2 Scope of work

Phase 2 Scope of work (Appendix B) involves supply, installation and commissioning 19 flow meters. This includes interface of all flow meters to the WTP DCS system, supplying, installation of signal cable and DCS configuration to view all flow meter on the WTP HMI.

The following work is to be performed at Duvha Power station:

- Supply and install water flow meters (19 flow meters)
- Supply and install signal cable and power cable from junction boxes to the flow meter positions.
- Supply and install weather covers to protect flow meters from harsh environment (rain, wind and lightning).
- Calibration and commissioning of the flow meters.
- Testing and verification of operation of each flow meter (Test results to be supplied to Duvha)
- Flow meter operation will be approved and verified by third parties (Independent Supplier and Eskom Enterprises-Technical Support Services).
- Supply of P&ID, Electrical/C&I interface, loop drawings, maintenance and operating manuals.
- Provide training to operating, engineering and maintenance staff.

3.3 FLOW METERS

3.3.1 GENERAL

- (1) **Error! Reference source not found.** presents the components that constitute a FM.

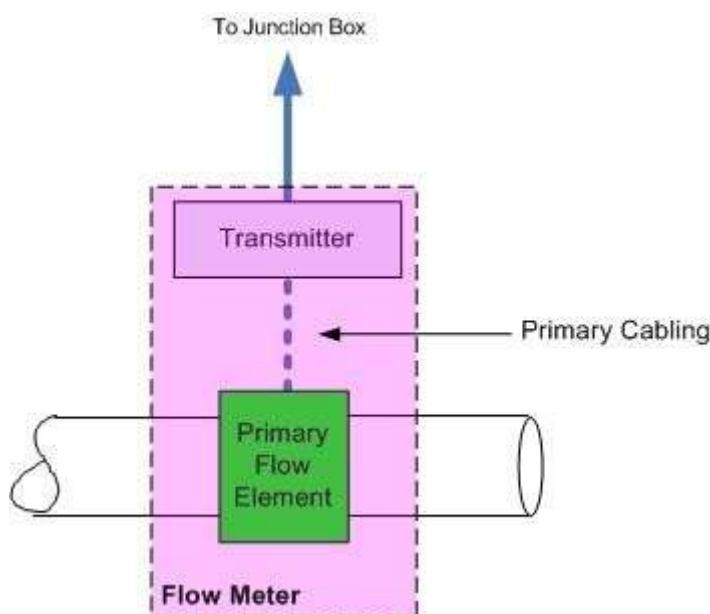


Figure 2: The components that constitute a Flow Meter

- (2) The Employer and the Contractor shall identify the location of the new FMs.
- (3) The chosen location shall ensure optimal performance of the FMs.
- (4) The installation of each FM shall allow for:
- a. Safe and easy access during maintenance and calibration
 - b. Environmental conditions
- (5) A FM and its installation position shall be labelled such that if the FM is removed the label shall still be visible on the plant.
- The labels are provided as per the labelling requirements defined in The C+I refurbishment Project section.
- (6) All supplied FMs shall have a built-in diagnostics that constantly monitor and alarm any faults on the FMs.
- (7) All FMs supplied shall be suited to fulfil the following functional requirements:
- a. Built-in local digital indication that can be programmed to indicate the range and the engineering units of the process.

- b. Indication for both instantaneous and totalised flow rates.
 - c. A high turn down ratio so that the minimum possible different types of transmitters can be used for all the applications.
 - d. A minimum accuracy span of 2.0%.
 - e. A 4-20 mA output.
 - f. A minimum drift free guarantee period of 10 years, provided the standard of maintenance is adequate and the condition of the pipes.
- (8) All installed FMs shall be wired to the appropriate JB.

3.3.2 IMPULSE PIPING

- (1) Non-destructive testing is conducted on all impulse piping welds. Xrays have not been included by the Contractor.
- (2) The results of all non-destructive testing on impulse piping welds must be accepted by the *Employer's* TUV representative
- (3) All pipe work provided is inclusive of supports, valves, fittings, condensing chambers for closed vessel level transmitters, transition pieces to primary isolating valves and drains to provide complete impulse, equalising and blow-down lines for all instruments.
- (4) The Employer will request the Contractor to provide X-Rays as and when required as per Variation Instruction

3.3.3 TRANSMITTER RACKS

- (1) The FM transmitter, where applicable, shall be mounted on suitable racks.
- (2) Racks will provide adequate covering for protection against the environment.
- (3) The *Contractor* shall use existing racks where possible and supply racks where needed.
- (4) All racks provided shall be durable, sturdy, suitable for the environment in which they are installed and easily accessible.
- (5) If angle iron is used for local indication racks, a minimum wall thickness of 3mm is required.
- (6) Where local indication cannot be mounted on a rack, the *Contractor* shall obtain clearance from the *Employer* regarding alternative installation.

3.3.4 SURFACE PREPARATION

- (1) Metal surfaces - degreasing
 - a. All harmful deposits, which are detrimental to the adhesion of the coatings to the surface, shall be removed.
 - b. According to degree and nature of contamination, degreasing is carried out using an alkaline cleaning solution, alkaline detergent or cold solvents.
 - c. Rinsing with water to remove all traces of residues follows the degreasing operation. Items are allowed to dry completely before coatings are applied.
- (2) Mechanical wire brushing or grinding
 - a. Mechanical wire brushing or grinding is only used where the condition of the substrate metal is such that efficient brushing or grinding can be achieved and where the coating system is designed for application to brushed or ground surfaces.

- b. Prior to wire brushing, all welds are free of slag, slag inclusions and pinholes. Adjacent areas are free of weld spatter, which are removed by grinding or scraping.
 - c. All oil and grease deposits are removed prior to wire brushing as detailed in above. In this regard, special attention is paid to drillings, bolt holes, etc.
 - d. Following the degreasing as described above, all surfaces of steelwork and plant under this category are scraped and wire brushed to remove all loose scale, rust and deleterious matter.
 - e. The Contractor utilise manual wire brushing only where the required standard of finish is achieved. Where necessary, mechanical brushing is used. Burnishing of the surface is not permitted.
 - f. In all cases, after wire brushing or grinding, all traces of loose material are removed from the surface by compressed air or vacuum cleaning. Cleaned surfaces are not contaminated with oil, grease, rust or other deposits before coating
- (3) Application of coatings
- a. Care is taken to ensure adequate coating of all bolt holes, edges and other areas normally prone to corrosion attack. Where appropriate, these areas are stripe coated.
 - b. Damaged paint areas are cleaned. Rust spots and any other deleterious matter are removed. Spot repairs are carried out such that the patch painting extends at least 25 mm beyond the damaged areas. Spot repairs reinstate each of the previous coats and commence directly after surface preparation.
 - c. Care is taken to ensure that all machined parts are adequately protected against contamination and corrosion during paint application, transport/shipping and pre-commissioning storage.

3.4 CABLING

3.4.1 GENERAL

- (1) Refer to **Error! Reference source not found.** and **Error! Reference source not found.**.
The scope of the primary, field/signal and trunk cabling is defined as follows:
 - a. Primary cabling refers to the cabling (or impulse piping) between the primary flow element and the flow transmitter.
 - b. Field cabling refers to all the cabling between the FMs and the JB.
 - c. Trunk cabling refers to all cabling between the junction boxes the DCS.
- (2) The scope of power supply cabling is defined as being all cabling to power field devices.
- (3) Should Spare capacity be required, the Employer will Instruct the Contractor via a Variation Instruction to proceed

3.4.2 CABLING REQUIREMENTS

- (1) The *Contractor* shall provide the design, supply, installation, termination, labelling, testing and commissioning of all cabling.
- (2) Existing cable routes, racking, trunking, conduits and cabling shall be used where possible, without compromising the integrity of the installation.

- (3) The routes for field/signal cabling, trunk cabling and power supply cabling and cabling racking is of a consistent and integrated design.
- (4) New cable routes shall be designed such that equipment can be removed for maintenance without causing damage to the cables.
- (5) Cable conduits shall be provided for all field/signal cabling, if not existing.
- (6) Durable cable numbering/labelling shall be provided for all installed cables entering JB's.
- (7) The cable numbering/labelling shall be such that cable maintenance is easily achieved.
- (8) Cable numbering per access way is restricted.
- (9) All cables, as a minimum, shall be insulated with flame-retardant, halogen-free PVC outer sheath
- (10) All field cabling shall have a minimum of 2 pairs (UVG2ACM).
- (11) Internal cores of all multi-core cables shall be colour coded.
- (12) The management, design expertise, supply and installation for all cables, cabling and routing shall be provided by the *Contractor*.
- (13) All installed cables are tested and Certificates of Compliance are issued prior to commissioning of any FM.
- (14) All cables provided are secured with suitable cable glands, straps or clamps on racks, in cubicles, switchgear rooms, control rooms, equipment rooms etc.
- (15) All cables termination in cubicles shall be such that maintenance is easily achieved.

3.5 Power Supply

- (1) The Contractor shall supply 24 VDC power supplies, where necessary in accordance with flowmeter requirements.
- (2) The 24 VDC power supply will make use of the 220 VAC power supply available at each JB.
- (3) Where required, the Contractor shall make use of the available 220 VAC supply, available at the specified JB.
- (4) The Contractor shall earth the newly installed 24 VDC power supplies and provide surge and lighting protection.
- (5) The Employer will instruct the Contractor to Provide Power Supplies via a Variation Instruction, Should Power Supply requirements during Engineering be an issue.
- (6) The Employer will request the Contractor Option to provide Surge Protectors

3.6 Earthing, Lighting and Electrical Protection

- (1) All metal instrument casing shall be earthed.

3.7 Labelling requirements

- (1) All AKZ labels shall be replaced.
- (2) New labels shall be provided for all new FM's cables and any other equipment provided as part of the *Works*. All new AKZ codes will be provided by the *Employer*.
- (3) Labels of removed equipment shall also be removed.
- (4) All labels are made from anodised aluminium and are pop riveted in place

3.8 Procedure for submission and acceptance of *Contractor's* design

- (1) The Contractor submits any drawing or documentation that will fulfil the requirements of this works.

3.9 Other requirements of the Contractor's design

Test and provide proof for working flow meters. The format of all documents pertaining to this Project will be jointly agreed upon upfront

4 Procurement

- (1) The Contractor shall comply with Basic Condition of Employment Act and Labour Relation Act for the use of labour in executing the works to give effect to the right to fair labour practices referred to in section 23(1) of the Constitution by establishing and making provision for the regulation of basic conditions of employment; and thereby to comply with the obligations of the Republic as a member state of the International Labour Organisation; and to provide for matters connected therewith.

4.1 People

4.1.1 Minimum requirements of people employed on the Site

- (1) The Contractor supplies and ensures that his employees wear the correct PPE according the risk assessments performed on the specific tasks to be carried out.
- (2) The Contractor ensures that everyone entering Duvha Power Station under his supervision is medically, physically and psychologically fit to enter Duvha Power Station.
- (3) The medical examination, at the Contractor's cost, is carried out by a Registered Professional Occupational Health Practitioner and the examination shall include the following tests:
 - i. Eye Test, Blood Pressure,
 - ii. Heart Function,
 - iii. Hearing Test and
 - iv. Lung function.

4.1.2 BBBEE and referencing scheme

- (1) The Employer formal Black Economic Empowerment (BEE) programme was first initiated in 1995 with the publication of its policy regarding procurement from Black Suppliers (ESKADAAT6). ESKADAAT6 has set the standard for BEE programmes within Eskom and across South Africa as a whole.
- (2) Eskom's policy is to maximise purchases from Black or Black Empowering Enterprises (BEE's) whether Black Woman-owned, small or Large Black or Black empowering suppliers. The purpose is to promote entrepreneurship in black communities and give black business access to the mainstream of business opportunity.
- (3) Eskom will concentrate its development efforts on black suppliers in the manufacturing, construction and mining /extraction sector of the economy and provide

4.2 Subcontracting

4.2.1 Preferred subcontractors

- (1) The Contractor shall make use of any supplier for sourcing of equipment, tools and material whatever that the contractor will use to execute works shall comply with the SABS.

4.2.2 Subcontract documentation, and assessment of subcontract tenders

- (1) The Contractor shall submit the proposed contract data for each subcontracting for acceptance to the Project Manager
- (2) The Contractor shall prepare subcontracting document as according to NEC contract.
- (3) The Contractor must inform the Employer's representative when intending to subcontract some of the works from the contract scope.
- (4) The Contractor shall not subcontract a contractor that has lower or higher level accreditation than his/her according to CIDB.

4.2.3 Limitations on subcontracting

- (1) The Contractor shall not subcontract more than 25% of the contract scope

4.2.4 Attendance on subcontractors

- (1) The Contractor shall in writing inform the Employer's representative about the subcontractor intentions for site visit.

4.3 Plant and Materials

4.3.1 Quality

Refer to Supplier Quality Management Specification (Document id 240-105658000/QM58). Appendix D

4.3.2 Plant & Materials provided "free issue" by the Employer

- (1) The Employer will provide power supply, water and land for the storage of equipment and material.
- (2) The Contractor shall supply all the necessary equipment and material required to execute the Works except where stipulated.
- (3) Should the Contractor require using any of the Employer's Equipment, including compressed air, electricity, water supply, crane age and scaffolding it must be specified in the Works Information supplied by the Contractor.
- (4) The Employer does not guarantee continuity of supply of any of these items required in point 3.

4.3.3 Contractor's procurement of Plant and Materials

- (1) The *Contractor* shall make use of SABS approved plant and material.
- (2) Test certificates shall be given to the *Project Manager* of the project.

4.3.4 Spares and consumables

- (1) The *Contractor* shall not provide any spares and consumables as they are not required for this project.
- (2) The *Contractor* must supply a recommendation for spares holding based on the project requirements and the *Employer's* goals.

4.4 Tests and inspections before delivery

- (1) The *Contractor* does not bring to the working area those plant and material which the works information states are to be tested or inspected before delivery until the supervisor has notified the contractor that they have passed the test.

4.5 Marking Plant and Materials outside the Working Areas

- (1) All plant and materials outside working areas are to be marked "for contractor" until such time that they are tested and installed at the site/plant.

4.6 Contractor's Equipment (including temporary works).

- (1) The Contractor shall supply lifting machine to hold the pipes during dismantling or assembly of pipe section and valves.

5 Construction

5.1 Temporary works, Site services & construction constraints

- (1) The pipe sections and valves are approximately $\pm 1\text{m}$ above/below ground level, provision for supporting or holding the pipe and valves to be made during dismantling/assembly.

5.1.1 Employer's Site entry and security control, permits, and Site regulations

Refer to Access Control document see Appendix C

5.1.2 Restrictions to access on Site, roads, walkways and barricades

- (1) Pedestrian crossing are made on the road they should be used when crossing the road
- (2) Inside the plant walkways are clear makes they should be used when walking inside the plant to keep safe on any object that might fall.
- (3) Barricades are provided where there are open trenches and around the sumps and manholes.
- (4) The contractor shall occupy only such ground as is necessary to carry out the works.
- (5) All fences and other structure that have been damaged or interfered with by the contractor shall be restored to be a condition at least equivalent to their original condition

5.1.3 People restrictions on Site; hours of work, conduct and records

- (1) The LAR is for the person in charge of the plant to maintain control over activities taking place on his plant that are not covered by the Plant Safety Regulation and Operating Regulations for High Voltage Systems.
- (2) Activities that are allowed to be carried out under the LAR must not require a permit and must satisfy the following criteria:
 - (3) They must not involve danger to the person carrying out the activity;
 - (4) No plant isolations must be required;
 - (5) The activity must be performed by a skilled person and there must be no risk of a production loss;
 - (6) The duration of the activity must be less than 24 hours
 - (7) The Supervisor accompanies the Contractor during the first instances of working under a LAR on a specific plant area.
- (8) It is very important that the person who plans to do an activity on a plant under the LAR informs the person in charge of the plant (ASS on the panel or PPO at WTP) of what will be done.
- (9) This means verbally telling the person in charge of the plant what will be done and not just signing the LAR book. The LAR book is also signed.
- (10) It is also important that as soon as the activity is completed the person, who was doing the activity, notify (verbally) the person in charge of the plant that conditions are back to normal and that the LAR has been signed off. Just signing the LAR book is not sufficient.
- (11) For more information please refer to Plant Safety Regulation C11.

5.1.4 Health and safety facilities on Site

Refer to Health and Safety Specification document see attached Appendix D

5.1.5 Environmental controls on site

Refer to Environmental Policy See Appendix D

5.1.6 Site services and facilities

- (1) Potable Water Supply:
 - i. Potable water is available at the existing points. There are no portable points for the work that is done outside the station therefore the Contractor to provide his/her alternative supply.
- (2) Electrical Power Supply
 - i. Power is available at the existing points.
 - ii. The Contractor provides his own portable 380V electrical distribution boards, and supply cables to and from the boards, for all his power supply requirements to execute the works.
 - iii. Contractors' Electrical Distribution Boards complies with OHSA as referred to in the Electrical Installation Regulations and the Electrical Machinery Regulations.
 - iv. Each board brought onto site has a Certificate of Compliance issued by an accredited person.
 - v. The Contractors' electrical distribution boards are installed at the works on a time negotiated with the Supervisor, prior to the possession date.

- vi. The Employer connects distribution boards to a 380V three-phase AC power supply, only after the Contractor has submitted the valid Certificate of Compliance.
- vii. All Contractors' Electrical Distribution Boards are earthed to the steel structure of the plant.
- viii. There will be no supply points for work that will be done away/outside from the station therefore a Contractor to provide alternative supply system (e.g. petrol/ diesel equipment)

5.1.7 Facilities provided by the Contractor

- (1) The contractor should provide facilities they deem necessary in executing the work. This must be discussed with the Project Manager prior to commencement of work.

5.2 Completion, testing, commissioning and correction of Defects

5.2.1 Take over procedures

- (1) During take over, the Contractor is responsible to demonstrate to the relevant parties the completed works.
- (2) If any concerns are raised during the demonstration, the onus falls on the Contractor to address and correct.
- (3) If any concern as per point (2) was part of the works, the final signoff will be postponed until such concerns have been addressed.

5.2.2 Access given by the Employer for correction of Defects

- (1) If the Contractor is required to correct any defect, a Permit To Work (PTW) will be issued.
- (2) The availability of the PTW will be dependent on the plant accessibility and constraints.

5.2.3 Performance tests after Completion

- (1) The performance of the system will be verified and tested during normal production cycles.
- (2) If any defect or deviation from the required performance is identified, will it be treated as a defect and applicable clauses will apply.
- (3) The Contractor will be responsible for first line maintenance during the defects period and such incident will be handled as system defects.
- (4) The accuracy and cleaning of the instrumentation will form part of the defects period.
- (5) Should cleaning or recalibration be required during the defects period, the Contractor will be notified of such defect.
- (6) The Minimum Documentation that the suppliers need to leave after installation are: PEM Manual, Maintenance requirements / schedules, Calibration certificates, strategic spares, long lead time item identification, etc. needs to be stipulated.
The Contractors Documentation for Flow Meters is deemed sufficient for all further activities Pertaining to the meters
- (7) A performance report must be issued after each visit as per point 4, detailing any drifting, blocking, scaling up, etc for each instrument.
- (8) The maintenance philosophy must be adjusted accordingly after each visit and performance report, as per point 5 and 6.

5.2.4 Training and technology transfer

- (1) Operating:
 - i. Before the Works can be handed over, the *Contractor* must supply training to the POs of all the shifts, OTIs and USSs. The Training will be done on site. It will be dedicated to Operating Personnel and will be mostly practical with sufficient theory.
The Contractor should provide 8 session training on different weeks to allow all 4 shift to attend.
 - ii. Any changes in the Operating Philosophy must clearly be explained, demonstrated and practised.

- iii. The revised Operating Philosophy must be at hand during and after the training.
- iv. Upon mutual agreement that the training dealt with all the new aspects, a training register must be signed by all relevant parties.
 - a. The register must show all the names of the trainees who attended together with their signature as well as the *Contractor's* representative who performed the training.
 - b. The register must be submitted to the *Project Manager* for approval and record keeping.
- (2) Maintenance:
 - i. Before the Works can be handed over, the *Contractor* must supply training to the technicians.
 - ii. The Training will be done on site. It will be dedicated to Maintenance Personnel and will be mostly practical with sufficient theory.
 - iii. The Contractor should provide 3 session training on different week to accommodate all maintenance personals (10)
 - iv. All the specifications of the new equipment must be clearly explained.
 - v. Upon mutual agreement that the training dealt with all the new aspects, a training register must be signed by all relevant parties.
 - a. The register must show all the names of the trainees who attended together with their signature as well as the *Contractor's* representative who performed the training.
 - b. The register must be submitted to the *Project Manager* for approval and record keeping.

6 General Specification

- (1) Wiring is multi-core and conforms to SABS 1411 (1996) and SABS 1574 (1992)
- (2) Use can be made from the existing cabling. Any additional cabling required is included in the prices.
- (3) The number of cables in any one conduit does not exceed the number permitted by the SABS Code of Practice 0142.
- (4) Cables only enter panels from the bottom, never from the top.
- (5) Where the wiring enters control panels, etc., the wires of each conduit / cable are neatly and carefully bunched together and secured by means of plastic cable straps.
- (6) All cables are colour coded or numbered consistently and continuously throughout the work.
- (7) Painting of conductors is not acceptable under any circumstances.
- (8) Cable spacing is maintained by cable ties accepted by the Project Manager, every 300 mm in horizontal and vertical runs of trays.
- (9) Single cables run from a tray follow the building or structure members and are supported every 300 mm. Where necessary additional steel angles or channels are installed to support the cables.
- (10) When cables are installed in positions exposed to areas with pedestrian traffic, vehicle traffic or maintenance activities, and could be subject to damage, they are provided with mechanical protection in the zone from floor or ground level to three metres above the floor.
- (11) And again removes all accumulated dirt and debris. On completion of the cable installation, the Contractor ensures that all covers are in place on the trenches and trays where applicable.
- (12) During installation of the cables, extreme care is exercised to avoid kinking or bending which may damage the cable insulation or sheath. Cables that are accidentally damaged during installation are repaired or replaced to the satisfaction of the Project Manager. In no case is a cable, on which the outer sheath has been punctured, installed.
- (13) Signal and control cables are not laid until the cables are safe from damage that may be caused by construction operations.
- (14) All conductors on vertical runs of cable tray are supported independently of the terminal connections.
- (15) Cables are installed in the trays in logical order such that they will lie flat on the tray with no crossovers.
- (16) Cables entering or leaving a tray are routed to prevent possible mechanical damage due to abrasion.
- (17) The Contractor is responsible for storage of all cables and suitably protects it from weather and damage during storage and handling.

6.1 Cable Routing

- (1) Low voltage cables (less than 50 V) in conduits are separated from circuits of higher voltages. These services are not run in the same conduit.
- (2) Signal cables parallel to any power cables are routed at least 1000 mm from such power cables in the plant and cross the power cables at right angles where necessary.

6.2 Cable Termination

- (1) Cable ends are properly crimped with pin lugs and securely connected in terminal blocks.
- (2) Solder less crimping lugs are used.
- (3) The terminals used in junction boxes are of non-brittle plastic,
- (4) Only compression glands to suit the cable and boxes are used. Termination of armoured cable in all power and control equipment is made in IP21 armoured cable glands.

6.3 Panel Wiring

- (1) Crimping connector size is determined by the wire size.
- (2) Every wire is identified by numbered at each end.
- (3) All panel wiring is neatly laid in trucking to a maximum capacity of 80% of trimming capacity.
- (4) All exposed wiring is neatly looped in accordance with accepted practice.
- (5) Terminals are of the Clip-on polyamide feed through type or equivalent approved by the Project Manager.
- (6) Each terminal has a space for numbering.
- (7) Connection is made to terminal strips on one side only, leaving the other side clear for field connections.
- (8) Not more than one wire is connected to one side of any terminal.
- (9) Wiring passing through a terminal carries a terminal number on both ends.