

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.



NEC3 Engineering & Construction Contract

**Between ESKOM HOLDINGS SOC Ltd
(Reg No. 2002/015527/30)**

and

**for Phase 2: Supply, deliver, installation, commissioning and
verifying of station Flow Meter as per the scope of work
and (Appendix B) for Duvha Power Station.**

Contents:

**No of
pages**

Part C1 Agreements & Contract Data

[•]

Part C2 Pricing Data

[•]

Part C3 Scope of Work

[•]

Part C4 Site Information

[•]

CONTRACT No.

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Part C1: Agreements & Contract Data

Contents:	No of pages
C1.1 Form of Offer and Acceptance	[3]
C1.2a Contract Data provided by the <i>Employer</i>	[•]
C1.2b Contract Data provided by the <i>Contractor</i>	[•]
C1.3 Proforma Guarantees	[•]

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

C1.1 Form of Offer & Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

The tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance the tenderer offers to perform all of the obligations and liabilities of the *Contractor* under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the *conditions of contract* identified in the Contract Data.

Options A	The offered total of the Prices exclusive of VAT is	
	Value Added Tax @ 15% is	
	The offered total of the amount due inclusive of VAT is ¹	
	(in words) [●]	

This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, whereupon the tenderer becomes the party named as the *Contractor* in the *conditions of contract* identified in the Contract Data.

Signature(s)

Name(s)

Capacity

For the tenderer:

Name & signature of witness

Date

Tenderer's CIDB registration number (if applicable)

¹ This total is required by the *Employer* for budgeting purposes only. Actual amounts due will be assessed in terms of the *conditions of contract*.

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Acceptance

By signing this part of this Form of Offer and Acceptance, the Employer identified below accepts the tenderer's Offer. In consideration thereof, the Employer shall pay the Contractor the amount due in accordance with the *conditions of contract* identified in the Contract Data. Acceptance of the tenderer's Offer shall form an agreement between the Employer and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part C1	Agreements and Contract Data, (which includes this Form of Offer and Acceptance)
Part C2	Pricing Data
Part C3	Scope of Work: Works Information
Part C4	Site Information

and drawings and documents (or parts thereof), which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The tenderer shall within two weeks of receiving a completed copy of this agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the *conditions of contract* identified in the Contract Data at, or just after, the date this agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy signed between them of this document, including the Schedule of Deviations (if any).

Unless the tenderer (now *Contractor*) within five working days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the Parties.

Signature(s)

Name(s)

Capacity

**for the
Employer**

(Insert name and address of
organisation)

Name &
Signature of
witness

Date

Note: If a tenderer wishes to submit alternative tenders, use another copy of this Form of Offer and

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Acceptance.

Schedule of Deviations to be completed by the *Employer* prior to contract award
Part one - Data provided by the *Employer*

[Instructions to the contract compiler: (delete these two notes in the final draft of a contract)]

1. Please read the relevant clauses in the conditions of contract before you enter data. The number of the clause which requires the data is shown in the left hand column for each statement however other clauses may also use the same data.
1. Some ECC3 options are always selected by Eskom Holdings SOC Ltd. The remaining ECC3 options are identified by shading in the left hand column. In the event that the option is not required select and delete the whole row. Where the following symbol is used "[•]" - data is required to be inserted relevant to the specific option selected.]

Completion of the data in full, according to the Options chosen, is essential to create a complete contract.

	Statement	Data
1	General	
	dispute resolution Option and secondary Options	A: Priced contract with activity schedule W1: Dispute resolution procedure X1: Price adjustment for inflation X2: Changes in the Law X5: Sectional Completion X7: Delay damages X16: Retention X17: Low Performance damages will be charged on instruments that are not operational after verification X18: Limitation of liability Z: Additional conditions of contract
	of the NEC3 Engineering and Construction Contract, April 2013 (ECC3)	
10.1	The <i>Employer</i> is (Name):	Eskom Holdings SOC Ltd (reg no: 2002/015527/30), a state owned company incorporated in terms of the company laws of

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

	Address	the Republic of South Africa Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg
10.1	The <i>Project Manager</i> is: (Name)	Precious Mkize
	Address	Duvha Power Station
	Tel	013 690 0127
	Fax	086 537 4438
	e-mail	Mkizepr@eskom .co.za
10.1	The <i>Supervisor</i> is: (Name)	TBA
	Address	Duvha Power Station
	Tel No.	
	Fax No.	
	e-mail	
11.2(13)	The <i>works</i> are	Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.
11.2(14)	The following matters will be included in the Risk Register	<ol style="list-style-type: none"> 1. Permit Requirements and access to the plant 2. Delay completion date 3. Program and recovery plan not submitted to Eskom 4. Contractor CSD Compliance 5. Slipping and falling 6. Dust (inhalation, skin and eye irritation) 7. Scorching sun(skin irritation) 8. Fracture 9. Electric shock
11.2(15)	The <i>boundaries of the site</i> are	Duvha Power Station – Site allocation for this project
11.2(16)	The Site Information is in	Part 4: Site Information
11.2(19)	The Works Information is in	Part 3: Scope of Work and all documents and drawings to which it makes reference.
12.2	The <i>law of the contract</i> is the law of	the Republic of South Africa
13.1	The <i>language of this contract</i> is	English

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

13.3 The *period for reply* is

Three (3) working days

The *Contractor's* main responsibilities

Data required by this section of the core clauses is provided by the *Contractor* in part 2 and terms in *Italics* used in this section are identified elsewhere in this Contract Data.

Time

11.2(3)	The <i>completion date</i> for the whole of the <i>works</i> is	2024-01-31 (Subject to change due to PTW and other Water plant constraints) to be changes	
11.2(9)	The <i>key dates</i> and the <i>conditions</i> to be met are:	<i>Condition to be met</i>	<i>key date</i>
		1 Submission and approval of a program	1 Week after contract awarded
		2 Kick off meeting	2 Weeks after contract awarded
		3 Site establishment	2 Weeks after contract awarded
		4 Execution as per the scope	As per the signed program
		5 Commissioning	As per the signed program
		6 De-establishment and hand over	As per the signed program
30.1	The <i>access dates</i> are:	Part of the Site	Date
		1 Duvha Power station	After contract award
		2 On site	After all employees have attended Induction

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

31.1	The <i>Contractor</i> is to submit a first programme for acceptance within	1 weeks of the Contract Date.
31.2	The <i>starting date</i> is	2022-08-01 or as soon as possible
32.2	The <i>Contractor</i> submits revised programmes at intervals no longer than	3 weeks.
35.1	The <i>Employer</i> is not willing to take over the <i>works</i> before the Completion Date.	

Testing and Defects

42.2	The <i>defects date</i> is	52 weeks after Completion of the whole of the works.
43.2	The <i>defect correction period</i> is	2 weeks except in those circumstances where correction in such period is not practical, in which case the defect shall be corrected by the contractor within such time as mutually agreed by both parties.

Payment

50.1	The <i>assessment interval</i> is	on the 25th of each successive month.
51.1	The <i>currency of this contract</i> is the	South African Rand.
51.2	The period within which payments are made is	4 weeks.
51.4	The <i>interest rate</i> is	<p>(i) zero percent the publicly quoted prime rate of interest (calculated on a 365 day year) charged from time to time by the Standard Bank of South Africa Limited (as certified, in the event of any dispute, by any manager of such bank, whose appointment it shall not be necessary to prove) for amounts due in Rands and</p> <p>(ii) the LIBOR rate applicable at the time for amounts due in other currencies. LIBOR is the 6 month London Interbank Offered Rate quoted under the caption "Money Rates" in The Wall Street Journal for the applicable currency or if no rate is quoted for the currency in question then the rate for United States Dollars, and if no such rate appears in The Wall Street Journal then the rate as quoted by the Reuters Monitor Money Rates Service (or such service as may replace the Reuters Monitor Money Rates Service) on the due date for the payment in question, adjusted <i>mutatis mutandis</i> every 6 months</p>

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

thereafter and as certified, in the event of any dispute, by any manager employed in the foreign exchange department of The Standard Bank of South Africa Limited, whose appointment it shall not be necessary to prove.

Compensation events

60.1(13)	<p>The place where weather is to be recorded is:</p> <p>The <i>weather measurements</i> to be recorded for each calendar month are,</p> <p>The <i>weather measurements</i> are supplied by</p> <p>The <i>weather data</i> are the records of past <i>weather measurements</i> for each calendar month which were recorded at:</p> <p>and which are available from:</p>	<p>Duvha Power Station</p> <p>the cumulative rainfall (mm)</p> <p>the number of days with rainfall more than 10 mm</p> <p>the number of days with minimum air temperature less than 5 degrees Celsius</p> <p>the number of days with maximum air temperature more than 35 degrees Celsius</p> <p>the number of days with snow lying at 09:00 hours South African Time</p> <p>and these measurements:</p> <p>The Contractor</p> <p>Witbank area</p> <p>the South African Weather Bureau and included in Annexure A to this Contract Data provided by the <i>Employer</i></p>
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Title

There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.

Risks and insurance

80.1	These are additional <i>Employer's</i> risks	<ol style="list-style-type: none"> 1. Availability of an AP/RP safety risk 2. Warranty 3. Access to plant 4. Permit to work availability
84.1	The <i>Employer</i> provides these insurances from the Insurance Table	as stated for "Format A" / "Format B" / "Format Dx" {choose the applicable format then delete the others and delete this note}

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

		<p>available on http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies_From_1_April_2014_To_31_March_2015.aspx (See Annexure B for basic guidance) (Format "A" is included in the contract)</p>
84.2	The insurance against loss of or damage to the <i>works</i> , Plant and Materials is to include cover for Plant and Materials provided by the <i>Employer</i> for an amount of	R100 000.00
84.2	The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the <i>works</i> , Plant, Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the <i>Contractor</i>) caused by activity in connection with this contract for any one event is	Whatever the <i>Contractor</i> deems necessary in addition to that provided by the <i>Employer</i>.
84.2	The minimum limit of indemnity for insurance in respect of death of or bodily injury to employees of the <i>Contractor</i> arising out of and in the course of their employment in connection with this contract for any one event is	As prescribed by the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 and the <i>Contractor's</i> common law liability for people falling outside the scope of the Act with a limit of Indemnity of not less than R500 000 (Five hundred thousand Rands).
Termination		There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.
Data for main Option clause		
A	Priced contract with activity schedule	There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.
Data for Option W1		
W1.1	The <i>Adjudicator</i> is	the person selected from the ICE-SA Division (or its successor body) of the South African Institution of Civil Engineering Panel of Adjudicators by the Party intending to refer a dispute to him. (see www.ice-sa.org.za). If the Parties do not agree on an Adjudicator the Adjudicator will be appointed by the Arbitration Foundation of Southern Africa (AFSA).

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Address [•]

Tel No. [•]

Fax No. [•]

e-mail [•]

W1.2(3)	The <i>Adjudicator nominating body</i> is:	the Chairman of ICE-SA a joint Division of the South African Institution of Civil Engineering and the London Institution of Civil Engineers. (See www.ice-sa.org.za) or its successor body.
W1.4(2)	The <i>tribunal</i> is:	Arbitration.
W1.4(5)	The <i>arbitration procedure</i> is	the latest edition of Rules for the Conduct of Arbitrations published by The Association of Arbitrators (Southern Africa) or its successor body.
	The place where arbitration is to be held is	[•] South Africa
	The person or organisation who will choose an arbitrator	
	<ul style="list-style-type: none"> if the Parties cannot agree a choice or if the arbitration procedure does not state who selects an arbitrator, is 	the Chairman for the time being or his nominee of the Association of Arbitrators (Southern Africa) or its successor body.

Data for secondary Option clauses

X1	Price adjustment for inflation			
X1.1(a)	The <i>base date</i> for indices is		[•]	
X1.1(c)	The proportions used to calculate the Price Adjustment Factor are:	proportion	linked to index for	Index prepared by
		0. [•]	[•]	[•]
		0. [•]	[•]	[•]
		0. [•]	[•]	[•]
		0. [•]	[•]	[•]
		[10%]	non-adjustable	
	Total	100%		
X2	Changes in the law		There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.	

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

X5	Sectional Completion	As per approved task order	
		Section (task order)	Description
		1.	Site establishment
		2.	Safety (Medicals and Safety PPE)
		3.	Supply and deliver material.
		4.	Mechanical work
		5.	Installation of meters Electrical work
		6.	verification
		7.	Testing
		8.	Commissioning
		9.	Site de-establishment
X7	Delay Damages for completion of the whole of the works are	0.10% of the total contract value per week limited to 5% contract value, based on the submitted program – key milestone dates.	
X17	Low performance damages	R2 500.00 per flow meter	
X16	Retention	Not used with option F	
X16.1	The <i>retention free amount</i> is	0%	
	The <i>retention percentage</i> is	10% of the contract value.	
X18	Limitation of liability		
X18.1	The <i>Contractor's</i> liability to the <i>Employer</i> for indirect or consequential loss is limited to:	R0.0 (zero Rand) The contractor shall not be liable to the Employer for the loss of use of any Works, loss of production, loss of profit of any Contract and for the damage caused by the interruption of operations, unavailability of the works, loss of data (including the retrieval of data), loss of interest, liability for financing expenses and, or for any indirect or consequential loss or damage which may be suffered by the Employer.	
X18.2	For any one event, the <i>Contractor's</i> liability to the <i>Employer</i> for loss of or damage to the <i>Employer's</i> property is limited to:	the amount of the deductibles relevant to the event described in the insurance policy format selected in the data for clause 84.1 above, which policy is available on http://www.eskom.co.za/Tenders/InsurancePoliciesProcedures/Pages/EIMS_Policies_From_1_April_2014_To_31_March_2015.aspx	

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

X18.3	The <i>Contractor's</i> liability for Defects due to his design which are not listed on the Defects Certificate is limited to	The greater of the total of the Prices at the Contract Date and the amounts excluded and unrecoverable from the <i>Employer's</i> assets policy for correcting the Defect (other than the resulting physical damage which is not excluded) plus R15M first amount payable in terms of the <i>Employer's</i> assets policy.
X18.4	The <i>Contractor's</i> total liability to the <i>Employer</i> for all matters arising under or in connection with this contract, other than excluded matters, is limited to:	<p>The total of the Prices other than for the additional excluded matters.</p> <p>The <i>Contractor's</i> total liability for the additional excluded matters is not limited.</p> <p>The additional excluded matters are amounts for which the <i>Contractor</i> is liable under this contract for</p> <ul style="list-style-type: none"> • Defects due to his design which arise before the Defects Certificate is issued, • Defects due to manufacture and fabrication outside the Site, • loss of or damage to property (other than the <i>works</i>, Plant and Materials), • death of or injury to a person and • Infringement of an intellectual property right.
X18.5	The <i>end of liability date</i> is	<p>(i) [●] years after the <i>defects date</i> for latent Defects and</p> <p>(ii) the date on which the liability in question prescribes in accordance with the Prescription Act No. 68 of 1969 (as amended or in terms of any replacement legislation) for any other matter.</p> <p>A latent Defect is a Defect which would not have been discovered on reasonable inspection by the <i>Employer</i> or the <i>Supervisor</i> before the <i>defects date</i>, without requiring any inspection not ordinarily carried out by the <i>Employer</i> or the <i>Supervisor</i> during that period.</p> <p>If the <i>Employer</i> or the <i>Supervisor</i> do undertake any inspection over and above the reasonable inspection, this does not place a greater responsibility on the <i>Employer</i> or the <i>Supervisor</i> to have discovered the Defect.</p>

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Z	The <i>Additional conditions of contract</i> are	Z1 to Z12 always apply.
Z1	Cession delegation and assignment	
Z1.1	The <i>Contractor</i> does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the <i>Employer</i> .	
Z1.2	Notwithstanding the above, the <i>Employer</i> may on written notice to the <i>Contractor</i> cede and delegate its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the Electricity Supply Industry.	
Z2	Joint ventures	
Z2.1	If the <i>Contractor</i> constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations then these persons or organisations are deemed to be jointly and severally liable to the <i>Employer</i> for the performance of this contract.	
Z2.2	Unless already notified to the <i>Employer</i> , the persons or organisations notify the <i>Project Manager</i> within two weeks of the Contract Date of the key person who has the authority to bind the <i>Contractor</i> on their behalf.	
Z2.3	The <i>Contractor</i> does not alter the composition of the joint venture, consortium or other unincorporated grouping of two or more persons without the consent of the <i>Employer</i> having been given to the <i>Contractor</i> in writing.	
Z3	Change of Broad Based Black Economic Empowerment (B-BBEE) status	
Z3.1	Where a change in the <i>Contractor's</i> legal status, ownership or any other change to his business composition or business dealings results in a change to the <i>Contractor's</i> B-BBEE status, the <i>Contractor</i> notifies the <i>Employer</i> within seven days of the change.	
Z3.2	The <i>Contractor</i> is required to submit an updated verification certificate and necessary supporting documentation confirming the change in his B-BBEE status to the <i>Project Manager</i> within thirty days of the notification or as otherwise instructed by the <i>Project Manager</i> .	
Z3.3	Where, as a result, the <i>Contractor's</i> B-BBEE status has decreased since the Contract Date the <i>Employer</i> may either re-negotiate this contract or alternatively, terminate the <i>Contractor's</i> obligation to Provide the Works.	
Z3.4	Failure by the <i>Contractor</i> to notify the <i>Employer</i> of a change in its B-BBEE status may constitute a reason for termination. If the <i>Employer</i> terminates in terms of this clause, the procedures on termination are P1, P2 and P3 as stated in clause 92, and the amount due is A1 and A3 as stated in clause 93.	
Z4	Confidentiality	
Z4.1	The <i>Contractor</i> does not disclose or make any information arising from or in connection with this contract available to Others. This undertaking does not, however, apply to	

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

information which at the time of disclosure or thereafter, without default on the part of the *Contractor*, enters the public domain or to information which was already in the possession of the *Contractor* at the time of disclosure (evidenced by written records in existence at that time). Should the *Contractor* disclose information to Others in terms of clause 25.1, the *Contractor* ensures that the provisions of this clause are complied with by the recipient.

- Z4.2 If the *Contractor* is uncertain about whether any such information is confidential, it is to be regarded as such until notified otherwise by the *Project Manager*.
- Z4.3 In the event that the *Contractor* is, at any time, required by law to disclose any such information which is required to be kept confidential, the *Contractor*, to the extent permitted by law prior to disclosure, notifies the *Employer* so that an appropriate protection order and/or any other action can be taken if possible, prior to any disclosure. In the event that such protective order is not, or cannot, be obtained, then the *Contractor* may disclose that portion of the information which it is required to be disclosed by law and uses reasonable efforts to obtain assurances that confidential treatment will be afforded to the information so disclosed.
- Z4.4 The taking of images (whether photographs, video footage or otherwise) of the *works* or any portion thereof, in the course of Providing the Works and after Completion, requires the prior written consent of the *Project Manager*. All rights in and to all such images vests exclusively in the *Employer*.
- Z4.5 The *Contractor* ensures that all his subcontractors abide by the undertakings in this clause.

Z5 Waiver and estoppel: Add to core clause 12.3:

- Z5.1 Any extension, concession, waiver or relaxation of any action stated in this contract by the Parties, the *Project Manager*, the *Supervisor*, or the *Adjudicator* does not constitute a waiver of rights, and does not give rise to an estoppel unless the Parties agree otherwise and confirm such agreement in writing.

Z6 Health, safety and the environment: Add to core clause 27.4

- Z6.1 The *Contractor* undertakes to take all reasonable precautions to maintain the health and safety of persons in and about the execution of the *works*. Without limitation the *Contractor*:
- accepts that the *Employer* may appoint him as the "Principal Contractor" (as defined and provided for under the Construction Regulations 2014 (promulgated under the Occupational Health & Safety Act 85 of 1993) ("the Construction Regulations") for the Site;
 - warrants that the total of the Prices as at the Contract Date includes a sufficient amount for proper compliance with the Construction Regulations, all applicable health & safety laws and regulations and the health and safety rules, guidelines and procedures provided for in this contract and generally for the proper maintenance of health & safety in and about the execution of *works*; and
 - undertakes, in and about the execution of the *works*, to comply with the Construction Regulations and with all applicable health & safety laws and regulations and rules, guidelines and procedures otherwise provided for under this contract and ensures that his Subcontractors, employees and others under the *Contractor's* direction and control, likewise observe and comply with the foregoing.

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Z6.2 The *Contractor*, in and about the execution of the *works*, complies with all applicable environmental laws and regulations and rules, guidelines and procedures otherwise provided for under this contract and ensures that his Subcontractors, employees and others under the *Contractor's* direction and control, likewise observe and comply with the foregoing.

Z7 Provision of a Tax Invoice and interest. Add to core clause 51

Z7.1 Within one week of receiving a payment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice in accordance with the *Employer's* procedures stated in the Works Information, showing the amount due for payment equal to that stated in the payment certificate.

Z7.2 If the *Contractor* does not provide a tax invoice in the form and by the time required by this contract, the time by when the *Employer* is to make a payment is extended by a period equal in time to the delayed submission of the correct tax invoice. Interest due by the *Employer* in terms of core clause 51.2 is then calculated from the delayed date by when payment is to be made.

Z7.3 The *Contractor* (if registered in South Africa in terms of the companies Act) is required to comply with the requirements of the Value Added Tax Act, no 89 of 1991 (as amended) and to include the *Employer's* VAT number 4740101508 on each invoice he submits for payment.

Z8 Notifying compensation events

Z8.1 Delete from the last sentence in core clause 61.3, "unless the *Project Manager* should have notified the event to the *Contractor* but did not".

Z9 Employer's limitation of liability

Z9.1 The *Employer's* liability to the *Contractor* for the *Contractor's* indirect or consequential loss is limited to R0.00 (zero Rand)

Z9.2 The *Contractor's* entitlement under the indemnity in 83.1 is provided for in 60.1(14) and the *Employer's* liability under the indemnity is limited.

Z10 Termination: Add to core clause 91.1, at the second main bullet point, fourth sub-bullet point, after the words "against it":

Z10.1 or had a business rescue order granted against it.

Z11 Addition to secondary Option X7 Delay damages (if applicable in this contract)

Z11.1 If the amount due for the *Contractor's* payment of delay damages reaches the limits stated in this Contract Data for Option X7 or Options X5 and X7 used together, the *Employer* may terminate the *Contractor's* obligation to Provide the Works using the same procedures and payment on termination as those applied for reasons R1 to R15 or R18 stated in the Termination Table.

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Z12 Ethics

For the purposes of this Z-clause, the following definitions apply:

Affected Party	means, as the context requires, any party, irrespective of whether it is the <i>Contractor</i> or a third party, such party's employees, agents, or Subcontractors or Subcontractor's employees, or any one or more of all of these parties' relatives or friends,
Coercive Action	means to harm or threaten to harm, directly or indirectly, an Affected Party or the property of an Affected Party, or to otherwise influence or attempt to influence an Affected Party to act unlawfully or illegally,
Collusive Action	means where two or more parties co-operate to achieve an unlawful or illegal purpose, including to influence an Affected Party to act unlawfully or illegally,
Committing Party	means, as the context requires, the <i>Contractor</i> , or any member thereof in the case of a joint venture, or its employees, agents, or Subcontractors or the Subcontractor's employees,
Corrupt Action	means the offering, giving, taking, or soliciting, directly or indirectly, of a good or service to unlawfully or illegally influence the actions of an Affected Party,
Fraudulent Action	means any unlawfully or illegally intentional act or omission that misleads, or attempts to mislead, an Affected Party, in order to obtain a financial or other benefit or to avoid an obligation or incurring an obligation,
Obstructive Action	means a Committing Party unlawfully or illegally destroying, falsifying, altering or concealing information or making false statements to materially impede an investigation into allegations of Prohibited Action and
Prohibited Action	means any one or more of a Coercive Action, Collusive Action Corrupt Action, Fraudulent Action or Obstructive Action.

Z 12.1 A Committing Party may not take any Prohibited Action during the course of the procurement of this contract or in execution thereof.

Z 12.2 The *Employer* may terminate the *Contractor's* obligation to Provide the Works if a Committing Party has taken such Prohibited Action and the *Contractor* did not take timely and appropriate action to prevent or remedy the situation, without limiting any other rights or remedies the *Employer* has. It is not required that the Committing Party had to have been found guilty, in court or in any other similar process, of such Prohibited Action before the *Employer* can terminate the *Contractor's* obligation to Provide the Works for this reason.

Z 12.3 If the *Employer* terminates the *Contractor's* obligation to Provide the Works for this reason, the procedures and amounts due on termination are respectively P1, P2 and P3, and A1 and A3.

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Z 12.4 A Committing Party co-operates fully with any investigation pursuant to alleged Prohibited Action. Where the *Employer* does not have a contractual bond with the Committing Party, the *Contractor* ensures that the Committing Party co-operates fully with an investigation.

Z 12.5 Eskom will assist with 2 RPs and the Supplier to ensure to have own RP within three months authorised at Duvha Power Station.

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Annexure A: One-in-ten-year-return *weather data* obtained from SA Weather Bureau for [weather station]

If any one of these *weather measurements* recorded within a calendar month, before the Completion Date for the whole of the *works* and at the place stated in this Contract Data is shown to be more adverse than the amount stated below then the *Contractor* may notify a compensation event.

	<i>Weather measurement</i>			
Month	Average Rainfall (mm)	Average Number of days with rainfall	Absolute High [Low] temperature (C)	Average midday High [Low] temperature (C)
January	138	11	34 [5]	25 [13]
February	89	7	34 [8]	25 [13]
March	75	7	33 [5]	24 [12]
April	52	5	29 [1]	23 [10]
May	9	2	26 [-6]	20 [6]
June	23	2	24 [-3]	18 [4]
July	6	1	25 [-5]	18 [3]
August	11	2	28 [-6]	21 [5]
September	25	3	31 [-2]	24 [8]
October	96	8	33 [0]	25 [10]
November	120	10	33 [-2]	25 [11]
December	159	10	31 [0]	25 [13]

Only the difference between the more adverse recorded weather and the equivalent measurement given above is taken into account in assessing a compensation event.

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Annexure B: Insurance provided by the Employer

These notes are provided as guidance to tendering contractors and the Contractor about the insurance provided by the Employer. The Contractor must obtain its own advice. Details of the insurance itself are available from the internet web link given below.

1. For the purpose of works contracts, insurance provided by Eskom (the *Employer*) has been arranged on the basis of “project” or “contract” value, where the value is the total of the Prices at Completion of the whole of the works including VAT.

A “project” is a collection of contracts or work packages to be undertaken as part of a single identified capital expansion or refurbishment of a particular asset or facility.

A “contract” is a single contract not linked to or being part of a “project”.

2. For ECC3 there are three main “formats” of cover and deductible structure; Format A, Format B and Format Dx.

Format A is for a project or contract value less than or equal to R350M (three hundred and fifty million Rand) inclusive of VAT.

Format B is for a project or contract value greater than R350M. (Three hundred and fifty million Rand) inclusive of VAT.

In the case of contracts / packages within a project:

- For a contract / package of R50M which is part of a R400M project, Format B will apply
- For a contract / package of R250M which is part of a R6 billion project, Format B will apply;
- For a contract / package of R120M which is part of a R350M project Format A will apply;

For a contract which is not part of a project the same limits apply:

- For a contract of R50M, Format A will apply
- For a contract of R355M, Format B will apply.

Format Dx applies only to Distribution Division projects and contracts. If a Distribution Division project or contract exceeds the Format A limit, the Eskom Insurance Management Services [EIMS] need to be contacted for advice on how to formulate the insurance cover. Cover and deductibles for Distribution Division are per the relevant policy available on the internet web link given below.

Format A generally applies to Transmission Division projects and contracts. If a Transmission Division project or contract exceeds the Format A limit, the Eskom Insurance Management Services [EIMS] need to be contacted for advice on how to formulate the insurance cover.

3. Tendering contractors should note that cover provided by the *Employer* is only per the policies available on the internet web link listed below and may not be the cover required by the tendering contractor or as intended by each of the listed insurances in the left hand column of the Insurance Table in clause 84.2. In terms of clause 84.1 “the *Contractor* provides the insurances stated in the Insurance Table except any insurance which the *Employer* is to

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

provide". Hence the *Contractor* provides insurance which the *Employer* does not provide and in cases where the *Employer* does provide insurance the *Contractor* insures for the difference between what the Insurance Table requires and what the *Employer* provides.

4. When the Marine Insurance is required the *Contractor* needs to obtain a copy of the latest edition of Eskom's Marine Policies Procedures found at internet website given below.
5. Further information and full details of all Eskom provided policies and procedures may be obtained from:

http://www.eskom.co.za/live/content.php?Item_ID=9248

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

Annexure C: The *Employer's* Panel of Adjudicators

The following persons listed in alphabetical order of their surname have indicated their willingness to be included in the Eskom Panel of Adjudicators. Their CV's may be obtained by using the contact details provided.

Name	Location	Contact details (phone & e mail)
Nigel ANDREWS	Gauteng	+27 11 836-6760 nigela@quoin.net
Andrew BAIRD	Gauteng	+27 11 803 3008 andrewbaird@ecsconsult.co.za
Christopher BINNINGTON	Gauteng	+27 11 888-6141 cdb@bca.co.za
Peter HIGGINS	UK	+44 1293 873 868 peterhiggins@pdconsult.co.uk
Bruce LEECH	Gauteng	+27 11 290 4000 leech@counsel.co.za
Nigel NILEN	Gauteng	+27 11 465 3601; nilences@global.co.za
Peter THURLOW	Gauteng	+27 11 787 6226 info@thurlowassoc.com

Information about the Panel and appointment of the selected *Adjudicator* is available from Eskom Supply Chain Operations management, by contacting Leighton Itholeng (Tel.: +27 (0)11 800 4031) (Fax :+27 (0)86 668 0419) E-mail: Leighton.Itholeng@eskom.co.za

Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.

PART 2: PRICING DATA
ECC3 Option A

Document reference	Title	No of pages
C2.1	Pricing assumptions: Option A	
C2.2	The <i>activity schedule</i>	

C2.1 Pricing assumptions: Option A

How work is priced and assessed for payment

Clause 11 in NEC3 Engineering and Construction Contract, (ECC3) Option A states:

**Identified and
defined terms** 11
11.2

(20) The Activity Schedule is the *activity schedule* unless later changed in accordance with this contract.

(27) The Price for Work Done to Date is the total of the Prices for

- each group of completed activities and
- each completed activity which is not in a group.

A completed activity is one which is without Defects which would either delay or be covered by immediately following work.

(30) The Prices are the lump sum prices for each of the activities on the Activity Schedule unless later changed in accordance with this contract.

This confirms that Option A is a lump sum form of contract where the work is broken down into activities, each of which is priced by the tendering contractor as a lump sum. Only completed activities are assessed for payment at each assessment date; no part payment is made if the activity is not completed by the assessment date.

Function of the Activity Schedule

Clause 54.1 in Option A states: "Information in the Activity Schedule is not Works Information or Site Information". This confirms that specifications and descriptions of the work or any constraints on how it is to be done are not included in the Activity Schedule but in the Works Information. This is further confirmed by Clause 20.1 which states, "The *Contractor* Provides the Works in accordance with the Works Information". Hence the *Contractor* does **not** Provide the Works in accordance with the Activity Schedule. The Activity Schedule is only a pricing document.

Link to the programme

Clause 31.4 states that "The *Contractor* provides information which shows how each activity on the Activity Schedule relates to the operations on each programme which he submits for acceptance". Ideally the tendering contractor will develop a high level programme first then resource each activity and thus arrive at the lump sum price for that activity both of which can be entered into the *activity schedule*.

Preparing the *activity schedule*

Generally it is the tendering contractor who prepares the *activity schedule* by breaking down the work described within the Works Information into suitable activities which can be well defined, shown on a programme and priced as a lump sum.

The *Employer*, in his Instructions to Tenderers or in a Tender Schedule, may have listed some items that he requires the *Contractor* to include in his *activity schedule* and be priced accordingly.

It is assumed that in preparing his *activity schedule* the *Contractor*:

- Has taken account of the guidance given in the ECC3 Guidance Notes pages 19 and 20;
- Understands the function of the Activity Schedule and how work is priced and paid for;
- Is aware of the need to link the Activity Schedule to activities shown on his programme;
- Has listed and priced activities in the *activity schedule* which are inclusive of everything necessary and incidental to Providing the Works in accordance with the Works Information, as it was at the time of tender, as well as correct any Defects not caused by an *Employer's* risk;
- Has priced work he decides not to show as a separate activity within the Prices of other listed activities in order to fulfil the obligation to complete the *works* for the tendered total of the Prices.
- Understands there is no adjustment to the lump sum Activity Schedule price if the amount, or quantity, of work within that activity later turns out to be different to that which the *Contractor* estimated at time of tender. The only basis for a change to the Prices is as a result of a compensation event.

An activity schedule could have the following format:

Item No.	Activity description	QTY	PRICE
10	Site Establishment	Sum	
20	Safety (Attached Safety Cost Breakdown)	Sum	
30	Site De-Establishment	Sum	
40	Preliminary and General (Attached Cost Breakdown)	Sum	
50	Supply, Install, Verify and commission Flowmeters As Per Attached Appendix B Flowmeter List		
50.1	Unit 1 secondary CW Overflow (In)	1	
50.2	Unit 2 secondary CW Overflow (In)	1	
50.3	Unit 3 secondary CW Overflow (In)	1	
50.4	Unit 4 secondary CW Overflow (In)	1	
50.5	Unit 5 secondary CW Overflow (In)	1	
50.6	Unit 6 secondary CW Overflow (In)	1	
50.7	Ash Dan Distribution Box Discharge 1	1	
50.8	Ash Dan Distribution Box Discharge 2	1	
50.9	Ash Dan Distribution Box Discharge 3	1	
50.10	Ash Dan Distribution Box Discharge 4	1	
50.11	Ash Dan Distribution Box Discharge 5	1	
50.12	Ash Dan Distribution Box Discharge 6	1	
50.13	Ash Dan Distribution Box Discharge 7	1	
50.14	Effluent to High Level Dam	1	
50.15	CW Pipeline to supply water trucks (at South Plant)	1	
50.16	Sewerage Plant Outlet (Effluent)	1	
50.17	Mine water recovery pipeline (at the Ash Dam Distribution Box Discharge)	1	
50.18	Final sludge line (at South WTP)	1	
51	Responsible Person (RP)		
52	TOTAL PRICE FOR INSTALLATION EXCLUDING VAT		

Name& Surname

Signature

Date

Document reference	Phase 2: Supply, deliver, installation, commissioning and verifying of station Flow Meter as per the scope of work and (Appendix B) for Duvha Power Station.	No of pages
	This cover page	1
C3.1	<i>Employer's Works Information</i>	
C3.2	<i>Contractor's Works Information</i>	
	Total number of pages	

C3.1: EMPLOYER'S WORKS INFORMATION

Contents

Part 3: Scope of Work **Error! Bookmark not defined.**

C3.1: Employer's works Information	5
1 Description of the works	7
1.1 Executive overview	7
1.2 Employer's objectives and purpose of the works	7
1.3 Interpretation and terminology	7
2 Management and start up.	8
2.1 Management meetings	8
2.2 Documentation control	8
2.3 Health and safety risk management	8
2.4 Environmental constraints and management	10
2.5 Quality assurance requirements	11
2.6 Programming constraints	11
2.7 Contractor's management, supervision and key people	11
2.8 Invoicing and payment	11
2.9 Insurance provided by the Employer	12
2.10 Contract change management	12
2.11 Provision of bonds and guarantees	12
2.12 Records of Defined Cost, payments & assessments of compensation events to be kept by the Contractor	12
2.13 Training workshops and technology transfer	12
2.14 PROJECT EXECUTION METHODOLOGY	13
2.14.1 GENERAL REQUIREMENTS	13
2.14.2 TEST AND IDENTIFY LOCATION OF THE FLOW METER	13
3 Engineering and the Contractor's design	13
3.1 GENERAL	13
3.2 SCOPE OF WORK	14
3.2.1 Phase 2 Scope of work	14
3.3 FLOW METERS	15
3.3.1 GENERAL	15
3.3.2 IMPULSE PIPING	16
(1) Non-destructive testing is conducted on all impulse piping welds. Xrays have not been included by the Contractor.	16
3.3.3 TRANSMITTER RACKS	16
3.3.4 SURFACE PREPARATION	16
3.4 CABLING	17
3.4.1 GENERAL	17
3.4.2 CABLING REQUIREMENTS	18
3.5 Power Supply	18
3.6 Earthing, Lighting and Electrical Protection	19
3.7 Labelling requirements	19
3.8 Procedure for submission and acceptance of Contractor's design	19
3.9 Other requirements of the Contractor's design	19
4 Procurement	19
4.1 People	19
4.1.1 Minimum requirements of people employed on the Site	19
4.1.2 BBBEE and referencing scheme	20
4.2 Subcontracting	20
4.2.1 Preferred subcontractors	20
4.2.2 Subcontract documentation, and assessment of subcontract tenders	20

4.2.3	Limitations on subcontracting	20
4.2.4	Attendance on subcontractors	20
4.3	Plant and Materials.....	20
4.3.1	Quality	20
4.3.2	Plant & Materials provided “free issue” by the <i>Employer</i>	20
4.3.3	<i>Contractor’s</i> procurement of Plant and Materials	21
4.3.4	Spares and consumables	21
4.4	Tests and inspections before delivery.....	21
4.5	Marking Plant and Materials outside the Working Areas.....	21
4.6	<i>Contractor’s</i> Equipment (including temporary works).....	21
5	Construction	21
5.1	Temporary works, Site services & construction constraints	21
5.1.1	<i>Employer’s</i> Site entry and security control, permits, and Site regulations	21
5.1.2	Restrictions to access on Site, roads, walkways and barricades	21
5.1.3	People restrictions on Site; hours of work, conduct and records	22
5.1.4	Health and safety facilities on Site	22
5.1.5	Environmental controls on site	22
5.1.6	Site services and facilities	22
5.1.7	Facilities provided by the <i>Contractor</i>	23
5.2	Completion, testing, commissioning and correction of Defects	23
5.2.1	Take over procedures	23
5.2.2	Access given by the <i>Employer</i> for correction of Defects	23
5.2.3	Performance tests after Completion	23
5.2.4	Training and technology transfer	23
6	General Specification	24
6.1	Cable Routing	25
6.2	Cable Termination	25
6.3	Panel Wiring.....	25

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) 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 the 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:

- Before the Works can be handed over, the Contractor must supply training to the technicians.
- The Training will be done on site. It will be dedicated to Maintenance Personnel and will be mostly practical with sufficient theory.
- The Contractor should provide 3 session training on different week to accommodate all maintenance personals (10)
- All the specifications of the new equipment must be clearly explained.
- Upon mutual agreement that the training dealt with all the new aspects, a training register must be signed by all relevant parties.
 - 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.
 - 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.

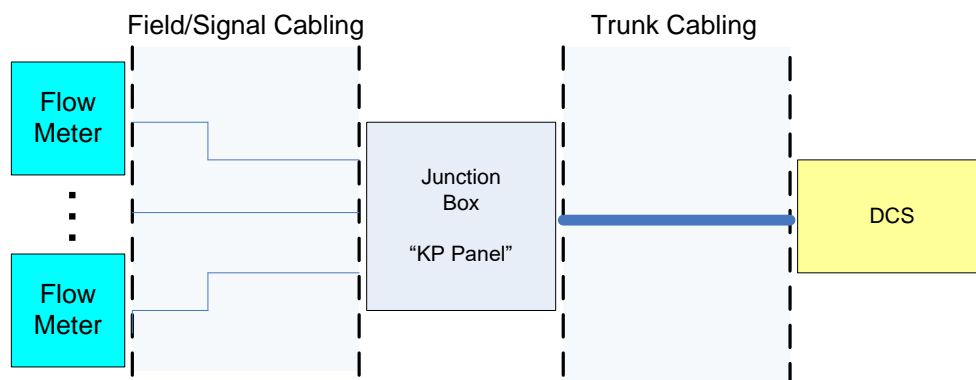


Figure 1: Flow meters and associated infrastructure

- (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.

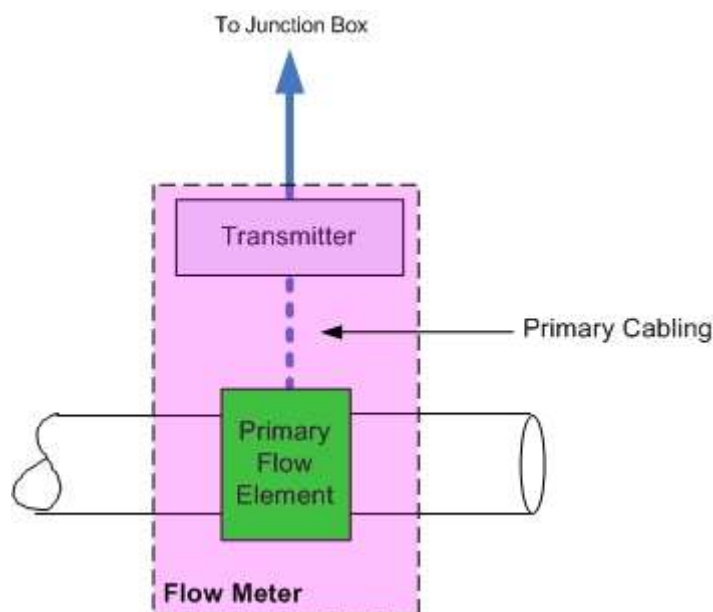


Figure 2: The components that constitute a Flow Meter

- (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 JBs.
- (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 lightning 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 FMs 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 *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.

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 of 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/assembling.

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.