



NEC3 Engineering & Construction Contract

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

and **[Insert at award stage]**
(Reg No. _____)

for Site Installation works at Vanderkloof Power Station including supply, delivery, transporting, off-loading, decommission, removal, floor preparation, installation, wiring, testing, and commissioning of Components and structure related to the Control and Instrumentation Upgrade project, Excitation System Replacement project , LV Switchgear Refurbishment project, Protection, Metering and Synchronising Scheme Replacement projects.

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CONTRACT No. [Insert at award stage]

Part C1: Agreements & Contract Data

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[to be inserted from Returnable Documents at award stage]	

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:

Site Installation works at Vanderkloof Power Station including supply, delivery, transporting, off-loading, decommission, removal, floor preparation, installation, wiring, testing, and commissioning of Components and structure related to the Control and Instrumentation Upgrade project, Excitation System Replacement project, LV Switchgear Refurbishment project, Protection, Metering and Synchronising Scheme Replacement projects.

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	R
	Sub total	R
	Value Added Tax @ 15% is	R
	The offered total of the amount due inclusive of VAT is ¹	R
	(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:**

(Insert name and address of organisation)

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*.

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 Acceptance.

Schedule of Deviations to be completed by the *Employer* prior to contract award

Note:

1. This part of the Offer & Acceptance would not be required if the contract has been developed by negotiation between the Parties and is not the result of a process of competitive tendering.
2. The extent of deviations from the tender documents issued by the Employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender.
3. A tenderer's covering letter must not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid be the subject of agreement reached during the process of Offer and Acceptance, the outcome of such agreement shall be recorded here and the final draft of the contract documents shall be revised to incorporate the effect of it.

No.	Subject	Details
1	[•]	[•]
2	[•]	[•]
3	[•]	[•]
4	[•]	[•]
5	[•]	[•]
6	[•]	[•]
7	[•]	[•]

By the duly authorised representatives signing this Schedule of Deviations below, the Employer and the tenderer agree to and accept this Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules, as well as any confirmation, clarification or changes to the terms of the Offer agreed by the tenderer and the Employer during this process of Offer and Acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Form shall have any meaning or effect in the contract between the parties arising from this Agreement.

	For the Tenderer:	For the Employer
Signature	_____	_____
Name	_____	_____
Capacity	_____	_____
On behalf of	(Insert name and address of organisation)	(Insert name and address of organisation)
Name & signature of witness	_____	_____
Date	_____	_____

C1.2 ECC3 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data
1	General	
	The <i>conditions of contract</i> are the core clauses and the clauses for main Option	
		A: Priced contract with activity schedule
	dispute resolution Option	W1: Dispute resolution procedure
	and secondary Options	
		X1: Price adjustment for inflation X2: Changes in the law X4: Parent company guarantee X5: Sectional Completion X7: Delay damages X16: Retention X17: Low Performance Damages Low Performance Damages Low Performance Damages will be applied for performance management and Bi-annual meetings will be held to ensure Performance Management for the duration of the contract. Under the service information details will be captured such as monthly meetings to be held 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 the Republic of South Africa
	Address	Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg
10.1	The <i>Project Manager</i> is: (Name)	Lubabalo Caba
	Address	1 Maxwell Drive, Sandton, Johannesburg
	Tel	+27 11 800 4174
	Fax	+27 86 664 9145
	E-mail	Cabal@eskom.co.za

10.1	The <i>Supervisor</i> is: (Name)	Marlon Williams	
	Address	Eskom Generation Peaking, 15 Pasita Street, Rosenpark, Durbanville, 7550	
	Tel No.	TBC	
	E-mail	WilliamC@eskom.co.za	
11.2(13)	The <i>works</i> are	Site Installation works at Vanderkloof Power Station including supply, delivery, transporting, off-loading, decommission, removal, floor preparation, installation, wiring, testing, and commissioning of Components and structure related to the Control and Instrumentation Upgrade project, Excitation System Replacement project, LV Switchgear Refurbishment project, Protection, Metering and Synchronising Scheme Replacement projects.	
11.2(14)	The following matters will be included in the Risk Register	All early warning matters notified by the <i>Project Manager</i> or the <i>Contractor</i>	
11.2(15)	The <i>boundaries of the site</i> are	Vanderkloof Power Station	
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	
13.3	The <i>period for reply</i> is	Two (2) working days pre installation and twenty-four (24) hours during installation	
2	The Contractor's main responsibilities	Data required by this section of the core clauses is provided by the <i>Contractor</i> in Part 2 and terms in italics used in this section are identified elsewhere in this Contract Data.	
3	Time The <i>starting date, access dates, sectional completion dates, key dates</i> and completion date are not fixed and firm and may change as per the Latest Agreed Schedule.		
11.2(3)	The <i>completion date</i> for the whole of the works is	25 February 2027	
11.2(9)	The <i>key dates</i> and the <i>conditions</i> to be met are:	Condition to be met	key date
		1 First Unit Installation	24 February 2026
		2 Commission First Unit	29 May 2026

		3	Second Unit Installation	26 October 2026
		4	Commission Second Unit	29 January 2027
30.1	The <i>access dates</i> are:	Part of the Site		Date
		1	First Unit	24 February 2026
		2	Second Unit	26 October 2026
31.1	The <i>Contractor</i> is to submit a first programme for acceptance within	Two (2) weeks of the Contract Date.		
31.2	The <i>starting date</i> is	To be advised		
32.2	The <i>Contractor</i> submits revised programmes at intervals no longer than	One (1) week		
4	Testing and Defects			
42.2	The <i>defects date</i> is	Fifty-two (52) weeks after Completion of the whole of the <i>works</i> .		
43.2	The <i>defect correction period</i> is	Two (2) weeks		
5	Payment			
50.1	The <i>assessment interval</i> is	On the 25 th day 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	Four (4) weeks from receipt of original invoice with supporting documentation.		
51.4	The <i>interest rate</i> is	(i) 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		
6	Compensation events	Applicable as per section 6 of the NEC3 ECC (April 2013)		
60.1(13)	The place where weather is to be recorded is:	the South African Weather Bureau, at or near Vanderkloof Power Station		
	The <i>weather measurements</i> are supplied by	the <i>Contractor</i> to obtain the one in ten year return weather data from South African Weather Bureau		
7	Title	Applicable as per section 7 of the ECC NEC3 (April 2013)		
8	Risks and insurance			
80.1	These are additional <i>Employer's</i> risks	None		

84.1	The Employer provides these insurances from the Insurance Table	As stated in the Employer`s Construction All Risk Insurance Policy (Format A), available on request from Eskom Group Insurance.
84.1	The Employer provides these additional insurances	As stated in the Employer`s Asset All Risk Insurance Policy available on request from Eskom Group Insurance.
84.2	The insurance against loss of or damage to the works, Plant and Materials is to include cover for Plant and Materials provided by the Employer for an amount of	Whatever the Contractor deems necessary in addition to the deductibles payable in terms of the Construction All Risk Insurance Policy.
84.2	The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the works, Plant, Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the Contractor) caused by activity in connection with this contract for any one event is	whatever the Contractor deems necessary in addition to that provided by the Employer.
84.2	The minimum limit of indemnity for insurance in respect of death of or bodily injury to employees of the Contractor 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 Contractor`s 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 Rand).
9	Termination	Applicable as per section 9 of the ECC NEC 3 (April 2013)
10	Data for main Option clause	
A	Priced contract with activity schedule	Refer to Part 2: Pricing Data of this Contract
11	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).
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	Johannesburg, South Africa

	The person or organisation who will choose an arbitrator - 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.		
12	Data for secondary Option clauses			
X1	Price adjustment for inflation			
X1.1(a)	The <i>base date</i> for indices is	the month before the month in which the enquiry closed		
X1.1(c)	The proportions used to calculate the Price Adjustment Factor are:	proportion	linked to index for	Index prepared by
		%	Labour	C3a SEIFSA
		%	Material	SEIFSA - Local
		15%	Non-adjustable	
	Total	100%		
	Foreign Portion			
X1.1(c)	The proportions used to calculate the Price Adjustment Factor are:	proportion	linked to index for	Index prepared by
		%	Labour	National Statistics – Country specific general labour index
		%	Material	National Statistics – Country specific general labour index
		15%	Non-adjustable	
	Total	100%		
X2	Changes in the law	Applicable as per secondary option clause X2		
X5	Sectional Completion			
X5.1	The <i>completion date</i> for each <i>section</i> of the <i>works</i> is:	Section	Description	Completion date
		1	First Unit Commissioning	29 May 2026
		2	Second Unit Commissioning	29 January 2027
X5 & X7	Sectional Completion and delay damages used together			

X7.1 X5.1	Delay damages for late Completion of the <i>sections</i> of the <i>works</i> are:	<i>section</i>	Description	Amount per day
		1	First Unit Installation and Commissioning	10% of the activity value
		2	Second Unit Installation and Commissioning	10% of the activity value
	Remainder of the <i>works</i>			
	The total delay damages payable by the <i>Contractor</i> does not exceed:	10% of the Contract Value		
X16	Retention			
	The <i>retention free amount</i> is	R0.00.		
	The <i>retention percentage</i> is	10% of the Prices, 5% will be released at Completion of the whole of the <i>works</i> and the remaining 5% will be released after the Defects Certificate has been issued.		
X17	Low performance damages			
X17.1	The Amount for low performance damages are:	Amount	Performance Level	
	The total low performance damages payable by the Contractor will not exceed 10% of the Total of the Prices.	R100 000.00 per day	Failure to comply with the Works information	
		R1000 000.00 per occurrence	Loss of operability of the components supplied by the Contractor	
X18	Limitation of liability			
X18.1	The Contractor's liability to the Employer for indirect or consequential loss is limited to:	R0.0 (zero Rand)		
X18.2	For any one event, the Contractor's liability to the Employer for loss of or damage to the Employer's 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 request from Eskom Group Insurance.		
X18.3	The Contractor's liability for Defects due to his design which are not listed on the Defects Certificate is limited to	The greater of <ul style="list-style-type: none">the total of the Prices at the Contract Date andthe amounts excluded and unrecoverable from the Employer's assets policy for correcting the Defect (other than the resulting physical damage which is not excluded) plus the applicable deductible as at contract date.		
X18.4	The Contractor's total liability to the Employer for all matters arising under or in connection with this contract, other than excluded matters, is limited to:	the total of the Prices other than for the additional excluded matters. The Contractor's total liability for the additional excluded matters is not limited.		

		<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) 1 (one) year 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>
Z	The <i>Additional conditions of contract</i> are	Z1 to Z17 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 information which at the time of disclosure or thereafter, without default on the part of the <i>Contractor</i> , enters the public domain or to information which was already in the possession of the <i>Contractor</i> at the time of disclosure (evidenced by written records in existence at that time). Should the <i>Contractor</i> disclose information to Others in terms of clause 25.1, the <i>Contractor</i> ensures that the provisions of this clause are complied with by the recipient.
Z4.2	If the <i>Contractor</i> is uncertain about whether any such information is confidential, it is to be regarded as such until notified otherwise by the <i>Project Manager</i> .
Z4.3	In the event that the <i>Contractor</i> is, at any time, required by law to disclose any such information which is required to be kept confidential, the <i>Contractor</i> , to the extent permitted by law prior to disclosure, notifies the <i>Employer</i> 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 <i>Contractor</i> 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 <i>works</i> or any portion thereof, in the course of Providing the Works and after Completion, requires the prior written consent of the <i>Project Manager</i> . All rights in and to all such images vests exclusively in the <i>Employer</i> .
Z4.5	The <i>Contractor</i> 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 <i>Project Manager</i> , the <i>Supervisor</i> , or the <i>Adjudicator</i> 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	<p>The <i>Contractor</i> undertakes to take all reasonable precautions to maintain the health and safety of persons in and about the execution of the <i>works</i>. Without limitation the <i>Contractor</i>:</p> <ul style="list-style-type: none"> • accepts that the <i>Employer</i> 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 <i>works</i>; and • undertakes, in and about the execution of the <i>works</i>, 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 <i>Contractor’s</i> direction and control, likewise observe and comply with the foregoing.
Z6.2	The <i>Contractor</i> , in and about the execution of the <i>works</i> , 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 <i>Contractor’s</i> 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 <i>Project Manager</i> in terms of core clause 51.1, the <i>Contractor</i> provides the <i>Employer</i> with a tax invoice in accordance with the <i>Employer’s</i> procedures stated in the Works Information, showing the amount due for payment equal to that stated in the payment certificate.
Z7.2	If the <i>Contractor</i> does not provide a tax invoice in the form and by the time required by this contract, the time by when the <i>Employer</i> 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 <i>Employer</i> in terms of core clause 51.2 is then calculated from the delayed date by when payment is to be made.
Z7.3	The <i>Contractor</i> (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 <i>Employer’s</i> 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 <i>Project Manager</i> should have notified the event to the <i>Contractor</i> but did not”.
Z9	<i>Employer’s</i> limitation of liability
Z9.1	The <i>Employer’s</i> liability to the <i>Contractor</i> for the <i>Contractor’s</i> indirect or consequential loss is limited to R0.00 (zero Rand)
Z9.2	The <i>Contractor’s</i> entitlement under the indemnity in 83.1 is provided for in 60.1(14) and the <i>Employer’s</i> 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 <i>Contractor's</i> payment of delay damages reaches the limits stated in this Contract Data for Option X7 or Options X5 and X7 used together, the <i>Employer</i> may terminate the <i>Contractor's</i> 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.

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 Subcontractor 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.
Z12.1	A Committing Party may not take any Prohibited Action during the course of the procurement of this contract or in execution thereof.
Z12.2	The <i>Employer</i> may terminate the <i>Contractor's</i> obligation to Provide the Services if a Committing Party has taken such Prohibited Action and the <i>Contractor</i> did not take timely and appropriate action to prevent or remedy the situation, without limiting any other rights or remedies the <i>Employer</i> 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 <i>Employer</i> can terminate the <i>Contractor's</i> obligation to Provide the Services for this reason.
Z12.3	If the <i>Employer</i> terminates the <i>Contractor's</i> obligation to Provide the Services for this reason, the amounts due on termination are those intended in core clauses 92.1 and 92.2.

Z12.4	A Committing Party co-operates fully with any investigation pursuant to alleged Prohibited Action. Where the <i>Employer</i> does not have a contractual bond with the Committing Party, the <i>Contractor</i> ensures that the Committing Party co-operates fully with an investigation.
Z13	Insurance
Z 13.1	Replace core clause 84 with the following:

Insurance cover	84		
	84.1	When requested by a Party, the other Party provides certificates from his insurer or broker stating that the insurances required by this contract are in force.	
	84.2	The <i>Contractor</i> provides the insurances stated in the Insurance Table A.	
	84.3	The insurances provide cover for events which are at the <i>Contractor's</i> risk from the <i>starting date</i> until the earlier of Completion and the date of the termination certificate.	
		INSURANCE TABLE A	
		Insurance against	Minimum amount of cover or minimum limit of indemnity
		Loss of or damage to the <i>works</i> , Plant and Materials	The replacement cost where not covered by the <i>Employer's</i> insurance The <i>Employer's</i> policy deductible, as Contract Date, where covered by the <i>Employer's</i> insurance
		Loss of or damage to Equipment	The replacement cost
		Liability for loss of or damage to property (except the <i>works</i> , Plant and 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	<u>Loss of or damage to property</u> <u><i>Employer's property</i></u> The replacement cost where not covered by the <i>Employer's</i> insurance The <i>Employer's</i> policy deductible, as Contract Date, where covered by the <i>Employer's</i> insurance <u><i>Other property</i></u> The replacement cost <u>Bodily injury to or death of a person</u> The amount required by applicable law
		Liability for 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	The amount required by the applicable law

Z 13.2		Replace core clause 87 with the following: The <i>Employer</i> provides the insurances stated in the Insurance Table B.																						
		INSURANCE TABLE B																						
		<table><tr><th>Insurance against or name of policy</th><th>Minimum amount of cover or minimum of indemnity</th></tr><tr><td>Assets All Risk</td><td>Per the insurance policy document</td></tr><tr><td>Contract Works insurance</td><td>Per the insurance policy document</td></tr><tr><td>Environmental Liability</td><td>Per the insurance policy document</td></tr><tr><td>General and Public Liability</td><td>Per the insurance policy document</td></tr><tr><td>Transportation (Marine)</td><td>Per the insurance policy document</td></tr><tr><td>Motor Fleet and Mobile Plant</td><td>Per the insurance policy document</td></tr><tr><td>Terrorism</td><td>Per the insurance policy document</td></tr><tr><td>Cyber Liability</td><td>Per the insurance policy document</td></tr><tr><td>Nuclear Material Damage and Business Interruption</td><td>Per the insurance policy document</td></tr><tr><td>Nuclear Material Damage Terrorism</td><td>Per the insurance policy document</td></tr></table>	Insurance against or name of policy	Minimum amount of cover or minimum of indemnity	Assets All Risk	Per the insurance policy document	Contract Works insurance	Per the insurance policy document	Environmental Liability	Per the insurance policy document	General and Public Liability	Per the insurance policy document	Transportation (Marine)	Per the insurance policy document	Motor Fleet and Mobile Plant	Per the insurance policy document	Terrorism	Per the insurance policy document	Cyber Liability	Per the insurance policy document	Nuclear Material Damage and Business Interruption	Per the insurance policy document	Nuclear Material Damage Terrorism	Per the insurance policy document
		Insurance against or name of policy	Minimum amount of cover or minimum of indemnity																					
		Assets All Risk	Per the insurance policy document																					
		Contract Works insurance	Per the insurance policy document																					
		Environmental Liability	Per the insurance policy document																					
		General and Public Liability	Per the insurance policy document																					
		Transportation (Marine)	Per the insurance policy document																					
		Motor Fleet and Mobile Plant	Per the insurance policy document																					
		Terrorism	Per the insurance policy document																					
		Cyber Liability	Per the insurance policy document																					
		Nuclear Material Damage and Business Interruption	Per the insurance policy document																					
Nuclear Material Damage Terrorism	Per the insurance policy document																							

Z14	Nuclear Liability
Z14.1	The <i>Employer</i> is the operator of the Koeberg Nuclear Power Station (KNPS), a nuclear installation, as designated by the National Nuclear Regulator of the Republic of South Africa, and is the holder of a nuclear licence in respect of the KNPS.
Z14.2	The <i>Employer</i> is solely responsible for and indemnifies the <i>Contractor</i> or any other person against any and all liabilities which the <i>Contractor</i> or any person may incur arising out of or resulting from nuclear damage, as defined in Act 47 of 1999, save to the extent that any liabilities are incurred due to the unlawful intent of the <i>Contractor</i> or any other person or the presence of the <i>Contractor</i> or that person or any property of the <i>Contractor</i> or such person at or in the KNPS or on the KNPS site, without the permission of the <i>Employer</i> or of a person acting on behalf of the <i>Employer</i> .
Z14.3	Subject to clause Z14.4 below, the <i>Employer</i> waives all rights of recourse, arising from the aforesaid, save to the extent that any claims arise or liability is incurred due or attributable to the unlawful intent of the <i>Contractor</i> or any other person, or the presence of the <i>Contractor</i> or that person or any property of the <i>Contractor</i> or such person at or in the KNPS or on the KNPS site, without the permission of the <i>Employer</i> or of a person acting on behalf of the <i>Employer</i> .
Z14.4	The <i>Employer</i> does not waive its rights provided for in section 30 (7) of Act 47 of 1999, or any replacement section dealing with the same subject matter.
Z14.5	The protection afforded by the provisions hereof shall be in effect until the KNPS is decommissioned.
Z15	Asbestos

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

AAIA	means approved asbestos inspection authority.
ACM	means asbestos containing materials.
AL	means action level, i.e. a level of 50% of the OEL, i.e. 0.1 regulated asbestos fibres per ml of air measured over a 4 hour period. The value at which proactive actions is required in order to control asbestos exposure to prevent exceeding the OEL.
Ambient Air	means breathable air in area of work with specific reference to breathing zone, which is defined to be a virtual area within a radius of approximately 30cm from the nose inlet.
Compliance Monitoring	means compliance sampling used to assess whether or not the personal exposure of workers to regulated asbestos fibres is in compliance with the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.
OEL	means occupational exposure limit.
Parallel Measurements	means measurements performed in parallel, yet separately, to existing measurements to verify validity of results.
Safe Levels	means airborne asbestos exposure levels conforming to the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.
Standard	means the <i>Employer's</i> Asbestos Standard 32-303: Requirements for Safe Processing, Handling, Storing, Disposal and Phase-out of Asbestos and Asbestos Containing Material, Equipment and Articles.
SANAS	means the South African National Accreditation System.
TWA	means the average exposure, within a given workplace, to airborne asbestos fibres, normalised to the baseline of a 4 hour continuous period, also applicable to short term exposures, i.e. 10-minute TWA.

Z15.1	The <i>Employer</i> ensures that the Ambient Air in the area where the <i>Contractor</i> will Provide the Services conforms to the acceptable prescribed South African standard for asbestos, as per the regulations published in GNR 155 of 10 February 2002, under the Occupational Health and Safety Act, 1993 (Act 85 of 1993) ("Asbestos Regulations"). The OEL for asbestos is 0.2 regulated asbestos fibres per millilitre of air as a 4-hour TWA, averaged over any continuous period of four hours, and the short term exposure limit of 0.6 regulated asbestos fibres per millilitre of air as a 10-minute TWA, averaged over any 10 minutes, measured in accordance with HSG248 and monitored according to HSG173 and OESSM.
Z15.2	Upon written request by the <i>Contractor</i> , the <i>Employer</i> certifies that these conditions prevail. All measurements and reporting are effected by an independent, competent, and certified occupational hygiene inspection body, i.e. a SANAS accredited and Department of Employment and Labour approved AAIA. The <i>Contractor</i> may perform Parallel Measurements and related control measures at the <i>Contractor's</i> expense. For the purposes of compliance the results generated from Parallel Measurements are evaluated only against South African statutory limits as detailed in clause Z15.1. Control measures conform to the requirements stipulated in the AAIA-approved asbestos work plan.

Z15.3	The <i>Employer</i> manages asbestos and ACM according to the Standard.
Z15.4	In the event that any asbestos is identified while Providing the Services, a risk assessment is conducted and if so required, with reference to possible exposure to an airborne concentration of above the AL for asbestos, immediate control measures are implemented and relevant air monitoring conducted in order to declare the area safe.
Z15.5	The <i>Contractor's</i> personnel are entitled to stop working and leave the contaminated area forthwith until such time that the area of concern is declared safe by either Compliance Monitoring or an AAIA approved control measure intervention, for example, per the emergency asbestos work plan, if applicable.
Z15.6	The <i>Contractor</i> continues to Provide the Services, without additional control measures presented, on presentation of Safe Levels. The contractually agreed dates to Provide the Services, including the Completion Date, are adjusted accordingly. The contractually agreed dates are extended by the notification periods required by regulations 3 and 21 of the Asbestos Regulations, 2001.
Z15.7	Any removal and disposal of asbestos, asbestos containing materials and waste, is done by a registered asbestos contractor, instructed by the <i>Employer</i> at the <i>Employer's</i> expense, and conducted in line with South African legislation.

Z16	Intellectual Property
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Z16.1	Intellectual Property" means (a) patents, trade marks, service marks, rights in designs, trade names, trade secrets, know how, copyrights and topography rights, in each case whether registered or not; (b) applications for registration of any of them; (c) rights under licences and consents in relation to any of them; (d) all forms of protection of a similar nature or having equivalent or similar effect to any of them which may subsist anywhere in the world.
Z16.2	"Background Intellectual Property" means any and all Intellectual Property rights that are not Foreground Intellectual Property, and are owned or controlled by the relevant party or licensed to the relevant party prior to or outside of the works but required for the purposes of the works.
Z16.3	"Foreground Intellectual Property" means all Intellectual Property rights and other matter capable of being the subject of intellectual property rights that is conceived, first reduced to practice or writing or developed in whole or in substantial part in the course of the execution of the works and rights which are developed substantially as a result of the works. Any works that will be developed, changed, modified and/or improved specifically for the Purposes will be Foreground Intellectual Property. Any data or any other information relating to <i>Employer's</i> proprietary information generated from the use of the <i>Contractor's</i> Background Intellectual Property.
Z16.4	The <i>Contractor</i> retains ownership of all Background Intellectual Property rights made by or on behalf of the <i>Contractor</i> as part of the works in information or material it uses in carrying out the works.
Z16.5	All Foreground Intellectual Property rights, contained in any developed materials which are created by the <i>Contractor</i> or on behalf of the <i>Contractor</i> , for the purposes of and in support of the execution of the works vests with the <i>Employer</i> . Any data or any other information relating to <i>Employer's</i> proprietary information generated from the use of the <i>Contractor's</i> Background Intellectual Property, the copyright therein shall be owned by the <i>Employer</i> .
Z16.6	The <i>Contractor</i> acknowledges that all rights, title, and interest in and to the Foreground Intellectual Property that may result or originate from or be developed in execution of the works vests in the

	<i>Employer</i> and that the <i>Contractor</i> has no claim of any nature in and to the Foreground Intellectual Property.
Z16.7	The <i>Contractor</i> ensures that a copyright notice is incorporated or embossed or labelled on the Foreground Intellectual Property, where the <i>Employer</i> is reflected as the owner of the Foreground Intellectual Property.
Z16.8	The <i>Contractor</i> is obliged to provide Foreground Intellectual Property manufacturing documents, designs, processes and/or specifications to the <i>Employer</i> .
Z16.9	The <i>Contractor</i> procures that each Sub-Contractor executes all and any works, and takes all and any other actions as may be required, in order to give effect to this Agreement.
Z16.10	The <i>Employer</i> retains all Background Intellectual Property rights in all documents made by or on behalf of the <i>Employer</i> including all documents and requirements provided prior to or during the execution of the works. The <i>Contractor</i> does not, without the written consent, of the <i>Employer</i> , copy, use or issue to a third party any of the <i>Employer's</i> Background Intellectual Property documents and requirements except for the purposes of executing the works.
Z16.11	Either party procures that any third party executes confidentiality undertakings not to disclose to any other third parties, any of the <i>Employer's</i> documents and requirements at all, in respect of the <i>Employer</i> , or the Background Intellectual Property other than for the Purposes, in respect of the <i>Contractor</i> .

Z17

Third Party Claims

Z17.1	In the event of any claims being made or actions brought against the <i>Employer</i> , on the ground that the <i>Contractor</i> infringed any patent, trade mark or copyright, the <i>Contractor</i> is notified thereof and at its own expense, conducts all negotiations in consultation with the <i>Employer</i> for the settlement of the claim and litigation that may arise from such alleged infringement, provided that the <i>Employer</i> will not bear any financial burden or losses
Z17.2	Save where the <i>Contractor</i> fails to take over the conduct of the negotiation or litigation within a reasonable time of the notification of the alleged infringement, the <i>Employer</i> does not make any admission which might be prejudicial to the <i>Contractor's</i> position. The <i>Employer</i> , at the request and the cost of the <i>Contractor</i> affords it all reasonable technical assistance that the <i>Employer</i> is able to provide for the purpose of contesting any such claim or action.
Z17.3	Should it be held in any such action that any such protected rights have been infringed, as definitely stated by a judgment of the court before which the action is brought, the <i>Contractor</i> , at its own expense and in consultation with the <i>Employer</i> , either: <ul style="list-style-type: none"> a. procures for <i>Employer</i> the right to continue to use the affected item or design, or b. replaces the said affected item or design with a non-infringing item, or c. provides a design of equivalent quality or modify such affected item or design so as to make it non-infringing without affecting the quality.
Z17.4	Notwithstanding anything contained in this contract, the foregoing sets forth the entire responsibility of the <i>Contractor</i> with respect to claims relating to infringement.
Z17.5	Where it is alleged that the <i>Employer</i> has committed an infringement as intended vis-à-vis the <i>Contractor</i> as set out in the third party intellectual property infringement clause, the <i>Employer</i> has the same rights and obligations as the <i>Contractor</i> , mutatis mutandis, as regards such alleged infringement.

Z17.6 The *Contractor* herewith indemnifies the *Employer* and undertakes to keep the *Employer* indemnified against all claims of whatsoever nature, real or imagined, which may be made against the *Employer* arising from the infringement of any third party intellectual property rights.

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.

Month	Weather measurement				
	Cumulative rainfall (mm)	Number of days with rain more than 10mm	Number of days with min air temp < 0 deg.C	Number of days with snow lying at 08:00 CAT	[Other measurements if applicable]
January	[•]	[•]	[•]	[•]	
February	[•]	[•]	[•]	[•]	
March	[•]	[•]	[•]	[•]	
April	[•]	[•]	[•]	[•]	
May	[•]	[•]	[•]	[•]	
June	[•]	[•]	[•]	[•]	
July	[•]	[•]	[•]	[•]	
August	[•]	[•]	[•]	[•]	
September	[•]	[•]	[•]	[•]	
October	[•]	[•]	[•]	[•]	
November	[•]	[•]	[•]	[•]	
December	[•]	[•]	[•]	[•]	

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

C1.2 Contract Data

Part two - Data provided by the *Contractor*

Notes to a tendering contractor:

1. Please read both the NEC3 Engineering and Construction Contract (April 2013) and the relevant parts of its Guidance Notes (ECC3-GN)² in order to understand the implications of this Data which the tenderer is required to complete. An example of the completed Data is provided on pages 156 to 158 of the ECC3 (April 2013) Guidance Notes.
2. 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
3. Where a form field like this [] appears, data is required to be inserted relevant to the option selected. Click on the form field **once** and type in the data. Otherwise complete by hand and in ink.

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

Clause	Statement	Data
10.1	The <i>Contractor</i> is (Name):	
	Address	
	Tel No.	
	Fax No.	
11.2(8)	The <i>direct fee percentage</i> is	%
	The <i>subcontracted fee percentage</i> is	%
11.2(18)	The <i>working areas</i> are the Site and	
24.1	The <i>Contractor's</i> key persons are:	
	1 Name:	
	Job:	
	Responsibilities:	
	Qualifications:	
	Experience:	
	2 Name:	
	Job	
	Responsibilities:	
	Qualifications:	
	Experience:	
		CV's (and further key persons data including CVs) are appended to Tender Schedule entitled .

² Available from Engineering Contract Strategies Tel 011 803 3008, Fax 011 803 3009 or see www.ecs.co.za

11.2(3)	The <i>completion date</i> for the whole of the <i>works</i> is	
11.2(14)	The following matters will be included in the Risk Register	
11.2(19)	The Works Information for the <i>Contractor's</i> design is in:	
31.1	The programme identified in the Contract Data is	
A	Priced contract with activity schedule	
11.2(20)	The <i>activity schedule</i> is in	
11.2(30)	The tendered total of the Prices is	<p>(in figures)</p> <p>(in words), excluding VAT</p>
	Data for Schedules of Cost Components	<p><i>Note "SCC" means Schedule of Cost Components starting on page 60, and "SSCC" means Shorter Schedule of Cost Components starting on page 63 of ECC3 (April 2013).</i></p>

C1.3 Forms of Securities

Pro formas for Bonds & Guarantees

For use with the NEC3 Engineering & Construction Contract

The *conditions of contract* stated in the Contract Data Part 1 include the following Secondary Options:

Option X4: Parent company guarantee

Each of these secondary Options requires a bond or guarantee “in the form set out in the Works Information”. Pro forma documents for these bonds and guarantees are provided here for convenience but are to be treated as part of the Works Information.

Option X16: Retention (not used with Option F)

The *Contractor* may provide a Retention Money Guarantee in the form stated here. When the *Employer* receives and accepts a Retention Money Guarantee exactly in the form stated he will instruct the *Project Manager* not to assess any amount be retained in terms of secondary Option X16.

The *Contractor* shall guarantee his ASGI-SA Obligations by providing the *Employer* with an ASGI-SA Guarantee in the form provided here.

The organisation providing the bond / guarantee does so by copying the pro forma document onto his letterhead without any change to the text or format and completing the required details. The completed document is then given to the *Employer* within the time stated in the contract.

Pro forma Parent Company Guarantee (for use with Option X4)

(to be reproduced exactly as shown below on the letterhead of the Contractor's Parent Company)

Eskom Holdings SOC Ltd
Megawatt Park
Maxwell Drive
Sandton
Johannesburg

Date:

Dear Sirs,

Parent Company Guarantee for Contract No

With reference to the above numbered contract made or to be made between

Eskom Holdings SOC Ltd

(the *Employer*) and

{Insert registered name and address of the Contractor}

(the *Contractor*), for

{Insert details of the works from the Contract Data}

(the *works*).

I/We the undersigned

on behalf of the *Contractor's*
parent company

of physical address

and duly authorised thereto do hereby unconditionally guarantee to the *Employer* that the *Contractor* shall Provide the Works in accordance with the above numbered Contract.

1. If for any reason the *Contractor* fails to Provide the Works, we hereby agree to cause to Provide the Works at no additional cost to the *Employer*.
2. If we fail to comply with the terms of this Deed of Guarantee, the *Employer* may itself procure such performance (whether or not the Agreement be formally determined). The *Employer* is to notify us and we shall indemnify the *Employer* for any additional cost or expense it incurs.
3. Our liability shall be as primary obligor and not merely as surety and shall not be impaired or discharged by reason of any arrangement or change in relationship made between the *Contractor* and the *Employer* and/or between us and *Contractor*; nor any alteration in the obligations undertaken by the *Contractor* or in the terms of the Agreement; nor any indulgence, failure, delay by you as to any matter; nor any dissolution or liquidation or such other analogous event of the *Contractor*.
4. The *Employer* shall not be obliged before taking steps to enforce the terms of this Deed of Guarantee to obtain judgement against the *Contractor* in any court or other tribunal, to make or file any claim in liquidation (or analogous proceedings) or to seek any remedy or proceed first against the *Contractor*.
5. This Deed of Guarantee shall be governed by and construed in accordance with the laws of the Republic of South Africa and we hereby submit to the non-exclusive jurisdiction of the High Court of South Africa.

Signed at _____ on this _____ day of _____ 200_

Signature(s)

Name(s) (printed)

Position in parent company

Signature of Witness(s)

Name(s) (printed)

Pro forma Retention Money Guarantee (may be used when Option X16 applies)

(to be reproduced exactly as shown below on the letterhead of the Bank providing the Guarantee)

Eskom Holdings SOC Limited
Megawatt Park
Maxwell Drive
Sandton
Johannesburg

Date:

Dear Sirs

Reference No. [●] [Drafting Note: Bank reference number to be inserted]

Retention Money Guarantee: [Drafting Note: Name of Contractor to be inserted]

Project [] : Contract Reference: [Drafting Note: Contractor contract reference number to be inserted]

1. In this Guarantee the following words and expressions shall have the following meanings:-
 - 1.1 "Bank" - means [●], [●] Branch, (Registration No. [●]); [Drafting Note: Name of Bank to be inserted]
 - 1.2 "Bank's Address" - means [●]; [Drafting Note: Bank's physical address to be inserted]
 - 1.3 "Contract" – means the written agreement relating to the Project, entered into between Eskom and the Contractor, on or about the [●] day of [●] 200[●] (Contract Reference No. as amended, varied, restated, novated or substituted from time to time; [Drafting Note: Signature Date and Contract reference number to be inserted])
 - 1.4 "Contractor" – means [●] a company registered in accordance with the laws of [●] under Registration Number [●]. [Drafting Note: Name and details of Contractor to be inserted]
 - 1.5 "Eskom" - means Eskom Holdings SOC Limited, a company registered in accordance with the laws of the Republic of South Africa under Registration Number 2002/015527/30
 - 1.6 "Expiry Date" - means the date on which the Defects Certificate is issued in terms of the Contract.
 - 1.7 "Guaranteed Sum" - means the sum of R [●] ([●] Rand); [Drafting Note: Insert amount of Retention Money Guarantee.].
 - 1.8 "Project" - means the.....
2. At the instance of the Contractor, we the undersigned _____ and _____, in our respective capacities as _____ and _____ of the Bank, and duly authorized thereto, confirm that we hold the Guaranteed Sum at the disposal of Eskom, as security for the proper performance by the Contractor of all of its obligations in terms of and arising from the Contract and hereby undertake to pay to Eskom, on written demand from Eskom received prior to the Expiry Date, any sum or sums not exceeding in total the Guaranteed Sum.
3. A demand for payment under this guarantee shall be made in writing at the Bank's address and shall:
 - 3.1 be signed on behalf of Eskom by a director of Eskom or his authorised delegate.
 - 3.2 state the amount claimed ("the Demand Amount");
 - 3.3 state that the Contractor has failed to carry out his obligation(s) to rectify certain defect(s) for which he is responsible under the Contract (and the nature of such defect(s)) alternatively that the Demand Amount is payable to Eskom in the circumstances contemplated in the Contract.

4. Notwithstanding the reference herein to the Contract the liability of the Bank in terms hereof is as principal and not as surety and the Bank's obligation/s to make payment:
- 4.1 is and shall be absolute provided demand is made in terms of this bond in all circumstances; and
- 4.2 is not, and shall not be construed to be, accessory or collateral on any basis whatsoever.
5. The Bank's obligations in terms of this Guarantee:
- 5.1 shall be restricted to the payment of money only and shall be limited to the maximum of the Guaranteed Sum; and
- 5.2 shall not be discharged and compliance with any demand for payment received by the Bank in terms hereof shall not be delayed by the fact that a dispute may exist between Eskom and the Contractor.
6. Eskom shall be entitled to arrange its affairs with the Contractor in any manner which it sees fit, without advising us and without affecting our liability under this Guarantee. This includes, without limitation, any extensions, indulgences, release or compromise granted to the Contractor or any variation under or to the Contract.
7. Should Eskom cede its rights against the Contractor to a third party where such cession is permitted under the Contract, then Eskom shall be entitled to cede to such third party the rights of Eskom under this Guarantee on written notification to the Bank of such cession.
8. This Guarantee:
- 8.1 shall expire on the Expiry Date until which time it is irrevocable;
- 8.2 is, save as provided for in 7 above, personal to Eskom and is neither negotiable nor transferable;
- 8.3 shall be returned to the Bank upon the earlier of payment of the full Guaranteed Sum or expiry hereof;
- 8.4 shall be regarded as a liquid document for the purpose of obtaining a court order; and
- 8.5 shall be governed by and construed in accordance with the law of the Republic of South Africa and shall be subject to the jurisdiction of the Courts of the Republic of South Africa.
- 8.6 Any claim which arises or demand for payment received after expiry date will be invalid and unenforceable.
9. The Bank chooses domicilium citandi et executandi for all purposes in connection with this Guarantee at the Bank's Address.

Signed at _____

Date _____ Bank's seal or stamp

For and behalf of the Bank

Bank Signatory: _____

Bank Signatory: _____

Witness: _____

Witness: _____

amp

PART 2: PRICING DATA
ECC3 Option A

Document reference	Title	No of pages
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C2.1 Pricing assumptions: Option A

1. 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 <i>activity schedule</i> 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.

2. 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.

3. 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*.

4. 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.

C2.2 the *activity schedule*

Use this page as a cover page to the *Contractor's activity schedule*.

An activity schedule could have the following format:

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL	PART NUMBER	SUPPLIER / MANUFACTURE	REF: DRAWINGS/ SCHEDULE	LABOUR RATE	UNIT PRICE	SUB-TOTAL
	<u>PRELIMINARIES</u>									
1.1	<u>General Notes</u>									
	<u>Abbreviations</u>									
	BX - Box									
	D - Depth									
	GI - Galvanised Iron									
	H - Height									
	incl - including									
	m - meter									
	mm - millimeter									
	No - numbers									
	OD - Outside Diameter									
	SS - Stainless Steel									
	Unit * - Unit 1 or Unit 2									
	W - Width									
	<u>DECOMMISSIONING WORKS</u>									
2.1	<u>Control Panels</u>									
	a) The scope of contract covers the dismantle and removals of components and control cubicles of the following panels dimension:									
	1800(H) x 2700(W) x 900(D) mm	1	item				Section 3.2.5			R -
	1800(H) x 2400(W) x 600(D) mm	1	item				Section 3.2.5			R -
	1395(H) x 900(W) x 550(D) mm	3	item				Section 3.2.5			R -
	1800(H) x 600(W) x 600(D) mm	1	item				Section 3.2.5			R -
										R -

2.2	Control Console									
	a) The scope of contract covers the cutting and removals of components for the control console:									
	Unit * Control Console	1	item				Section 3.2.5			R -
	Station Control Console	0	item				Section 3.2.5			R -
										R -
2.3	Cables									
	a) The scope of contract covers the removals of the following type of cables from panel to panel or instrument to panel:									
	BVS4BCV	3000	m				Section 3.2.5			R -
	BVS12BCV	2500	m				Section 3.2.5			R -
	BVS20BCV	2000	m				Section 3.2.5			R -
	BVX2DCV	200	m				Section 3.2.5			R -
	BVX7DCV	100	m				Section 3.2.5			R -
	BVX12DCV	200	m				Section 3.2.5			R -
	BVX2ECV	1500	m				Section 3.2.5			R -
	BVX3ECV	150	m				Section 3.2.5			R -
	BVX4ECV	50	m				Section 3.2.5			R -
	BVX2HCV	500	m				Section 3.2.5			R -
	BVX4HCV	100	m				Section 3.2.5			R -
	TVH10BV	1000	m				Section 3.2.5			R -
										R -
2.4	Instrumentation									
	a) The scope of contract covers the dismantle and removals of instruments, tubing and junction boxes of different sizes:									
	Pressure transmitter	15	item				Section 3.2.5			R -
	Pressure switch	15	item				Section 3.2.5			R -
	Level instrument	17	item				Section 3.2.5			R -
	Flowmeter	10	item				Section 3.2.5			R -
	Temperature switch	6	item				Section 3.2.5			R -
	Junction Boxes	5	item				Section 3.2.5			R -
	Copper pipe tubing	2500	m				Section 3.2.5			R -

										R -
TOTAL OF BILL NO. 01 (DECOMMISSIONING WORKS)										R -
	<u>CABLE INSTALLATION WORKS</u>									
3.1	<u>Racking</u>									
	a) The scope of work covers the supply and installation of cable trays within different area of the power station as per works information: incl. all standard bends and fixing accessories.									
	Welded (HDG) galvanised Wire mesh trays 50X50mm comes with joiner sets	2000	m				Section 3.2.6, Appendix D figure 5			R -
	Welded (HDG) galvanised Wire mesh trays 114X50mm comes with joiner sets	2000	m				Section 3.2.6, Appendix D figure 5			R -
	Medium duty (HDG) galvanised perforated tray (MCT75) 114x38x1.6mm	1000	m				Section 3.2.6, Appendix D figure 5			R -
	Medium duty (HDG) galvanised perforated tray (MCT300) 305x76x1.6mm	1000	m				Section 3.2.6, Appendix D figure 5			R -
	Heavy duty (HDG) galvanised perforated tray (MCT75) 76x38x1.6mm	500	m				Section 3.2.6, Appendix D figure 5			R -
	Heavy duty (HDG) galvanised perforated tray (MCT450) 457x76x1.6mm	1000	m				Section 3.2.6, Appendix D figure 5			R -
										R -
	b) The scope of work covers the supply and installation of cable bosal conduit within different area of the power station as per works information: incl. all standard bends and fixing accessories.									
	Bosal Conduit - 20mm	200	m				Section 3.2.7			R -
	Raised Hospital Saddles – 20mm	500	item				Section 3.2.7			R -
										R -
3.2	<u>Cabling</u>									
	a) The scope of work covers the supply and installation of power cables within different area of the power station as per works information: incl. laying, glanding, labelling, testing and wiring									
	BVV2DCM	2000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	BVV3ECM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	BVV4DCM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	BVX4DCM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	BVV4ECM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	BVX4ECM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -

										R -
	b) The scope of work covers the supply and installation of control cables within different area of the power station as per works information: incl. laying, glanding, labelling, testing and wiring.									
	UVG2ACM	5000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVG2BCM	1000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVG2CCM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVG4ACM	1000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVG4BCM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVG8ACM	2000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVG12ACM	2000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVG20ACM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVH2BCM	500	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVK1BCM	2000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	UVM12BCM	1000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
										R -
	c) The scope of work covers the supply and installation of network cables within different area of the power station as per works information: incl. laying, glanding, labelling, testing and splicing:									
	Heavy Duty Duct Multi-Mode F/O 8core	2000	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	RG58 co-axial cable, outdoor GPS antenna cable	200	m				Section 3.2.4, 3.2.7 and 3.2.8			R -
	Ruggedised MM F/O 25m Patch lead (2 core, ST-LC)	10	item				Section 3.2.4, 3.2.7 and 3.2.8			R -
	Ruggedised MM F/O 25m Patch lead (2 core, ST-ST)	6	item				Section 3.2.4, 3.2.7 and 3.2.8			R -
										R -
3.4	<u>Earthing</u>									
	c) The scope of work covers the supply and installation of earthing within different area of the power station as per works information:									
	Twisted bare copper earthing wire 16 mm sq.	4000	m				Section 3.2.17			R -
	Copper bar 25x2.5mm	100	m				Section 3.2.17			R -
TOTAL OF BILL NO. 02 (CABLING WORKS)										R -

	<u>CONTROL CUBICLES INSTALLATION WORKS</u>									
4.1	<u>Control Panels</u>									
	a) The scope of work covers the plinth preparation for the installation of the control panels:									
	1800(H) x 2700(W) x 900(D) mm	1	item				Section 3.2.9			R -
	1800(H) x 600(W) x 600(D) mm	1	item				Section 3.2.9			R -
	b) The scope of work covers the installation of the pre-assembled control panels:									
	2000(H) X 1600(W) X 800(D) mm	1	item				Section 3.2.10			R -
	1800(H) X 800(W) X 600(D) mm	3	item				Section 3.2.10			R -
	2000(H) X 800(W) X 800(D) mm	4	item				Section 3.2.10			R -
										R -
	c) The scope of work covers the terminal wiring of incoming cable for the following control panels as per Works Information: incl. earthing of spare cores.									
	Unit * Main Unit Controller Local	300	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
	Unit * Main Unit Controller Remote IO Generator	300	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
	Unit * Main Unit Controller Remote IO Turbine	350	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
	Unit * Main Unit Controller Remote IO Common	200	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
	Unit * Digital Governor	100	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
	Unit * Temperature and Speed Monitoring	300	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
	National Control Centre interface	50	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
	Station Controller	0	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
	Station Remote IO	0	item				Section 3.2.13 and 3.2.14;Appendix E figure 6, 7, 8 and 9			R -
										R -
4.2	<u>Control Console</u>									
	a) The scope of work covers the installation of the pre-assembled control console plates:									
	700(H) X 915(W) mm Top section of the unit control console	1	item				Section 3.2.12			R -
	1061(H) X 915(W) mm Middle section of the unit control console	1	item				Section 3.2.12			R -
	602(H) X 915(W) mm Bottom section of the unit control console	1	item				Section 3.2.12			R -
	700(H) X 1950(W) mm Top section of the station control console	0	item				Section 3.2.12			R -

	1061(H) X 1950(W) mm Middle section of the station control console	0	item				Section 3.2.12			R -
	602(H) X 1950(W) mm Bottom section of the station control console	0	item				Section 3.2.12			R -
										R -
	b) The scope of work covers the terminal wiring of incoming cable for the control console: incl. earthing of spare cores.									
	Unit * Control Console	150	item				Section 3.2.13 and 3.2.14; Appendix E figure 6, 7, 8 and 9			R -
	Station Control Console	0	item				Section 3.2.13 and 3.2.14; Appendix E figure 6, 7, 8 and 9			R -
										R -
4.2	<u>Junction Boxes</u>									
	a) The scope of work covers the supply and installation of junction boxes: incl. wall preparation .									
	1000(H) x 800(W) x 250(D) mm, backplates with 250 terminal	1	item				Section 3.2.9 and 3.2.11			R -
	600(H) x 600(W) x 250(D) mm, backplates with 100 terminal	1	item				Section 3.2.9 and 3.2.11			R -
										R -
	b) The scope of work covers the wiring of junction boxes: incl. earthing of spare cores.									
	Unit * Gen Terminal Junction Box 1000(H) x 800(W) x 250(D) mm	250	item				Section 3.2.13 and 3.2.14; Appendix E figure 6, 7, 8 and 9			R -
	Unit * Turbine Pit Junction Box 600(H) x 600(W) x 250(D) mm	100	item				Section 3.2.13 and 3.2.14; Appendix E figure 6, 7, 8 and 9			R -
										R -
4.3	<u>Networks Communication Cabinets</u>									
	a) The scope of work covers the supply and installation of network cabinets as per works information:									
	Cabinet for FO patch panels, 8U wall mounted, 19" network cabinet	6	item				Section 3.2.15			R -
										R -
TOTAL OF BILL NO. 03 (CONTROL CUBICLES INSTALLATION WORKS)										R -

	<u>INSTRUMENTATION WORKS</u>									
5.1	<u>Pressure Instruments</u>									
	a) The scope of work covers the supply and installation of pressure instruments: incl. process installation and wiring .									
	Pressure transmitter EJX530A-EBS8N-019EF	10	item			Yokogawa	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Pressure transmitter EJX530A-ECS8N-019EF	10	item			Yokogawa	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Pressure transmitter EJX530A-EDS8N-019EF	5	item			Yokogawa	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Differential Pressure transmitter EJX110A-EHS4G-919EB	10	item			Yokogawa	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Bourdon Tube Pressure Gauge	22	item			Wika	Section 3.2.16			R -
										R -
	b) The scope of work covers the supply and installation of pressure accessories:									
	2 Way Valve-Manifold	25	item			SUSTECH Precision	Section 3.2.16			R -
	3 Way Valve-Manifold	6	item			SUSTECH Precision	Section 3.2.16			R -
	Stainless Steel Instrumentation Quick Connect Body, SS-QC4-B-4PM, 316 Stainless Steel	25	item				Section 3.2.16			R -
	Stainless Steel braided flexible tube with quick connectors - SS-810-1-8	10	item				Section 3.2.16			R -
										R -
	c) The scope of work covers the manufacture and installation mechanical brackets:									
	Installation mechanical bracket for single pressure transmitter	12	item				Appendix F figure 10 and 12			R -
	Installation mechanical bracket for redundant pressure transmitter	16	item				Appendix F figure 13 and 15			R -
										R -
	d) The scope of work covers the supply of software for pressure instrument:									
	Field Mate Versatile Device Management Software	1	item			Yokogawa				R -
	USB FieldMate Modem (BRAIN and HART protocols)	2	item			Yokogawa				R -
5.2	<u>Level Instruments</u>									
	a) The scope of work covers the supply and installation of level instruments: incl. process installation, welding and wiring .									
	Reed Level Transmitter MPJ5-M280	8	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16; Appendix F figure 18			R -
	Reed Level Transmitter MPJ5-M505	8	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16; Appendix F figure 16 and 17			R -
	Reed Level Transmitter MPJ5-M350	4	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16; Appendix F figure 16 and 17			R -

	Reed Sensor for Bypass Level Indicators MPJ5-M1500	8	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16; Appendix F figure 16 and 17			R -
										R -
	b) The scope of work covers the supply and installation of level instruments accessories:									
	BMD-SA Magnetic Display for Bypass Level Indicator	4	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	BGU Magnetic Switch for Bypass Level Indicator	6	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Flange for BMD-SA Magnetic Display for Bypass Level Indicator	8	item			Wika	Section 3.2.16			R -
										R -
5.3	<u>Flow Instruments</u>									
	a) The scope of work covers the supply and installation of flow instruments: incl. cutting, welding and wiring .									
	DWM2000 Electromagnetic Flow Meter	16	item			Krohne	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Beta Meter Electromagnetic Flow Meter - 200B3DASSR2MXI	2	iten			SAFMAG				R -
	Flow switch - Flowphant T_DTT31-A1B111AEX1AB, with connection plug 51006327	4	item			Endress and Hauser	Section 3.2.16			R -
										R -
	b) The scope of work covers the supply and installation of flow instruments accessories:									
	Spool pieces	16	item			Krohne	Section 3.2.16			R -
										R -
5.4	<u>Position and Detector Instruments</u>									
	a) The scope of work covers the supply and installation of limit switches: incl. wiring .									
	Limit switches	40	item				Section 3.2.16			R -
										R -
	b) The scope of work covers the supply and installation of detector instruments: incl. incl. cutting drilling, welding and wiring..									
	Point level detector 11375Z	6	item			Endress & Hauser	Section 3.2.13, 3.2.14 and 3.2.16			R -
	FTW325 Transmitter	6	item			Endress & Hauser	Section 3.2.13, 3.2.14 and 3.2.16			R -
										R -
5.5.	<u>Temperature Instruments</u>									
	a) The scope of work covers the supply and installation of temperature instruments: incl. drilling and wiring .									
	Temperature probes TR10-H (Pt100, 600mm probe length for Turbine Bearing systems)	4	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -

	Temperature probes TR10-H (Pt100, 675mm probe length with 150mm flexible rod for Thrust Guide Bearing systems)	8	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Temperature probes (Pt100, 100mm probe length with embedded steel braided cable)	10	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Temperature probes (Pt100, 130mm probe length with embedded steel braided cable)	4	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Temperature probes (Pt100, 240mm probe length with embedded steel braided cable)	4	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Pt100 RTD with Terminal Head (50mm probe length)	100	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Pt100 RTD with Terminal Head (100mm probe length)	20	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Pt100 RTD with Terminal Head (200mm probe length)	4	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
										R -
	b) The scope of work covers the supply and installation of temperature instruments accessories: incl. drilling and wiring .									
	Temperature probes (Pt100 white ceramic terminal block)	200	item			Wika	Section 3.2.13, 3.2.14 and 3.2.16			R -
	Stub weld (Thermowell)	20	item			Wika	Section 3.2.16			R -
										R -
TOTAL OF BILL NO. 04 (INSTRUMENTATION WORKS)										R -
	<u>INSTRUMENTS ACCESSORIES</u>									
6.1	<u>Instrument Piping</u>									
	a) The scope of work covers the supply and installation of instruments tubing:									
	Seamless Instrumentation Grade 316 Austenitic stainless-steel tubing 12 mm OD x 2.0 mm wall thickness, in length of 6 meters	200	m	SS			Section 3.2.16			R -
	1/2" Flexible hose pipe (Parker 301SN-6) - Nitrile (NBR) Inner Tube, Two High-Tensile Steel Wire Braid Reinforcement & Synthetic Rubber Cover pipe with length of 330 mm end to end. Both sides of end fittings to be a straight female 12 mm swivel nuts type 316 SS, both end fittings to be ASME standard. Maximum working pressure 330 bar.	50	item	SS			Section 3.2.16			R -
	1/4" Flexible hose pipe single wire braided (with max pressure of 18Mpa) hose pipe with length of 330 mm end to end. One side of end fitting to be a straight female 12 mm swivel type 316 SS and the other end to be a 90° female 12 mm swivel type 316 SS, both end fittings to be ASME standard. To be pressure tested to 8Mpa.	50	item	SS			Section 3.2.16			R -
										R -

6.2	Instruments Fittings									
	a) The scope of work covers the supply and make use of instruments tubing:									
	12 mm hydraulic pipe clamp with polyproline support body, carbon steel weld base plate, top plate and M6 bolts.	300	item	SS			Section 3.2.16			R -
	90-degree elbow fittings for 12 mm tubing. Material Grade 316 stainless-steel with 12L nut and ferrule both sides, fittings to be according to ASME standard.	100	item	SS			Section 3.2.16			R -
	T-piece for 12 mm tubing. Grade 316 stainless-steel with 12L nut and ferrule all three sides fittings. Fittings to be according to ASME standard	100	item	SS			Section 3.2.16			R -
	Union fittings Grade 316 stainless-steel with 12L nut and ferrule for 12 mm tubing both sides. Fittings to be according to ASME standard.	100	item	SS			Section 3.2.16			R -
	½" Female BSPP to 12L male. Material Grade 316 stainless-steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	100	item	SS			Section 3.2.16			R -
	3/8" Male BSPP to 12L male Grade 316 stainless-steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	100	item	SS			Section 3.2.16			R -
	3/8" Male BSPP to 12L male ASTM SA-105N carbon steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	50	item	SS			Section 3.2.16			R -
	½" Male BSPP to 12L male Grade 316 stainless-steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	200	item	SS			Section 3.2.16			R -
	½" Male BSPP to 12L male ASTM SA-105N carbon steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	50	item	SS			Section 3.2.16			R -
	1/4" Male BSPP to 12L male Grade 316 stainless-steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	100	item	SS			Section 3.2.16			R -
	1/4" Male BSPP to 12L male ASTM SA-105N carbon steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	50	item	SS			Section 3.2.16			R -
	1/2" Male NPT to 12L male Grade 316 stainless-steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	100	item	SS			Section 3.2.16			R -
	1/4" Male NPT to 12L male Grade 316 stainless-steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	100	item	SS			Section 3.2.16			R -
	3/8" Male NPT to 12L male Grade 316 stainless-steel with nut and ferrule on the 12L side. Fittings to be according to ASME standard.	100	item	SS			Section 3.2.16			R -
	½" Male BSPP to 1/2" male BSPP grade 316 stainless steel. Fittings to be according to ASME standard	100	item	SS			Section 3.2.16			R -

	½" Male BSPP to 1/4" male BSPP grade 316 stainless steel. Fittings to be according to ASME standard	100	item	SS			Section 3.2.16			R -
	½" Male BSPP to 3/8" male BSPP grade 316 stainless steel. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	½" Male BSPP to 1/2" male NPT grade 316 stainless steel. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	½" Male BSPP to 1/4" male NPT grade 316 stainless steel. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	½" Male BSPP to 3/8" male NPT grade 316 stainless steel. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	1/2" Male NPT to ½" male NPT grade 316 stainless steel. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	1/2" Male NPT to ¼" male NPT grade 316 stainless steel. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	1/2" Male NPT to 3/8" male NPT grade 316 stainless steel. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	½" Female BSPP T-piece grade 316 stainless-steel fittings on all three sides. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	½" male BSPP grade 316 stainless steel blank stud. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	¼" male BSPP grade 316 stainless steel blank stud. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	3/8" male BSPP grade 316 stainless steel blank stud. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	¼" Male BSPP to 1/4" male BSPP grade 316 stainless steel. Fittings to be according to ASME standard	50	item	SS			Section 3.2.16			R -
	1/2" Forged Elbow. EN16Mo3 As per BS EN 10253- Forged Carbon Steel	50	item	Carbon Steel			Section 3.2.16			R -
	1/2" Teflon seal to fit 1/2" BSPP male fittings.	200	item	Carbon Steel			Section 3.2.16			R -
	1/2" Seal Bonded Washer (Dowty gasket seal plated carbon steel with buna O-ring).	200	item	Carbon Steel			Section 3.2.16			R -
	1/4" Seal Bonded Washer (Dowty gasket seal plated carbon steel with buna O-ring)	50	item	Carbon Steel			Section 3.2.16			R -
	3/8" Seal Bonded Washer (Dowty gasket seal plated carbon steel with buna O-ring)	100	item	Carbon Steel			Section 3.2.16			R -
										R -

6.3	Instruments Isolation Valves									
	a) The scope of work covers the supply and installation of instruments isoaltion valves:									
	BALL VALVE WITH FEMALE BSPP ENDS: 1/2" BSPP Grade 316 Stainless Steel Ball Valve with lockable handle. Max. allowable (Working) Pressure of 69 bar.	25	item	SS			Section 3.2.16			R -
	ISOLATION VALVE WITH FEMALE NPT ENDS: 3/8" NPT Stainless Steel Ball Valve with lockable handle. Max. allowable (Working) Pressure of 69 bar. Part Number: 521561	50	item	SS			Section 3.2.16			R -
	ISOLATION VALVE FEMALE BSPP ENDS: 1/2" both sides, mild steel	50	item	SS			Section 3.2.16			R -
	ISOLATION VALVE WITH BLEED VALVE: Pressure gauge Shut-off valve with vent screw (bleed valve). PN400 with 1/2" BSPP male inlet and 1/2" female outlet union nut, Carbon Steel	50	item	SS			Section 3.2.16			R -
	NEEDLE SHUT-OFF VALVES: Type S350 High Pressure Needle Valve 1/2" BSPP female both sides. PN400, 1.0460 Carbon Steel. Part number S350.03.104.	25	item	SS			Section 3.2.16			R -
	NEEDLE SHUT-OFF VALVES: Type S350 High Pressure Needle Valve 1/2" BSPP female both sides. PN400, 1.4571 Stainless Steel Steel. Part number S350.03.204	25	item	SS			Section 3.2.16			R -
	3-Piece Ball Valve (PEKOS FIG.K 809 SGSGV CL800 1/2" BSPP) Description: 3-piece, full bore, soft seat ball valve with 1/2" BSPP female flanges on both ends. Material: ASTM SA-105N (Flanges and Body); Grade 316 stainless steel (ball)	10	item	SS			Section 3.2.16			R -
	3-Piece Ball Valve (FIG.K 809 SGSGV CL800 1/2" BW). Description: 3-piece, full bore, soft seat ball valve with flanges prepared for butt welding a 1/2" pipe on both ends.Material: ASTM SA-105N (Flanges and Body); Grade 316 stainless steel (ball)	10	item	SS			Section 3.2.16			R -
										R -
TOTAL OF BILL NO. 05 (INSTRUMENT ASSESSORIES)										R -
	CONSUMABLES									
7.1	Cable Glands									
	a) The scope of work covers the supply and make use of cable glands and assessories:									
	20mm Gland Hole blanks plug	100	item	Rubber/ SS						R -
	25mm Gland Hole Blanks plug	100	item	Rubber/ SS						R -
	Size 0 Black Shrouds	500	item	Rubber						R -
	Size 0 Glands	500	item	SS						R -

	Size 00 Black Shrouds	500	item	Rubber						R -
	Size 00 Glands	500	item	SS						R -
	Size 1 Black Shrouds	500	item	Rubber						R -
	Size 1 Glands	500	item	SS						R -
	Size 2 Black Shrouds	500	item	Rubber						R -
	Size 2 Glands	500	item	SS						R -
	Size 3 Black Shrouds	50	item	Rubber						R -
	Size 3 Glands	50	item	SS						R -
	Size 4 Black Shrouds	50	item	Rubber						R -
	Size 4 Glands	50	item	SS						R -
										R -
7.2	<u>Cable Ties</u>									
	a) The scope of work covers the supply and make use of cable ties and assessories:									
	Black Cable Ties T120R	100	100/PKT	Nylon						R -
	Black Cable Ties T50R	100	100/PKT	Nylon						R -
	Black Cable Ties T30R	100	100/PKT	Nylon						R -
	Black Cable Ties T18R	100	100/PKT	Nylon						R -
	Black Cable Ties T16R	100	100/PKT	Nylon						R -
										R -
7.3	<u>Heat Shrink</u>									
	a) The scope of work covers the supply and make use of cable heat shrink and assessories:									
	Black Heat shrink (Shrink ratio 2:1) Size 12.7/6.4mm	2000	m	Polyolefin						R -
	Black Heat shrink (Shrink ratio 2:1) Size 19.1/9.5mm	2000	m	Polyolefin						R -
	Black Heat shrink (Shrink ratio 2:1) Size 9.5/4.7mm	500	m	Polyolefin						R -
	Black Screen Heat shrink (Shrink ratio 3:1) Size 1.5/0.5mm	4000	m	Polyolefin						R -
										R -
7.4	<u>Lugs</u>									
	a) The scope of work covers the supply and make use of cable lugs and assessories:									
	Pre-insulated Ring Lugs (Red). Size: 0.25-1.65mm². Product ID: 1R3	100	100/PKT							R -

	Pre-insulated Ring Lugs (Blue). Size: 1.04-2.63mm² Product ID: 2R35	100	100/PKT							R -
	Pre-insulated Hook Blade Lugs (Red). Size: 0.25-1.65mm². Product ID: 1HB3	100	100/PKT							R -
	Pre-insulated Hook Blade Lugs (Blue). Size: 1.04-2.63mm². Product ID: 2HB3	100	100/PKT							R -
	Insulated Bootlace Ferrules (Red). Size: 1.00mm². Product ID: E1010RD	100	100/PKT							R -
	Insulated Bootlace Ferrules (Black). Size: 1.50mm². Product ID: E1010BK	100	100/PKT							R -
	Insulated Bootlace Ferrules (Grey). Size: 2.50mm². Product ID: E1010GY	25	100/PKT							R -
										R -
7.5	<u>Terminals</u>									
	a) The scope of work covers the supply and make use of terminal and assessories:									
	WTR 4SL Spring Loaded Terminal	250	item			Weidmuller				R -
	Terminal numbers for WTR 4SL Spring Loaded Terminal		item			Weidmuller				R -
	Terminal Strip Marker	50	item			Weidmuller				R -
	WPE 2 or 4 Terminal blocks 2.5mm²	50	item			Weidmuller				R -
										R -
7.6	<u>Harting Plugs</u>									
	a) The scope of work covers the supply and make use of hurting plugs and assessories:									
	Harting plugs: Han A Hood Coupler 1 Lever M20, Category: Hoods/Housing, Series: Han A, Type: Housing, Part number 19 20 003 1750	100	item							R -
	Harting plugs: Han A Hood Top Entry 2 Pegs M20, Category: Hoods/Housing, Series: Han A, Type: Hood, Part number 19 20 003 1440	100	item							R -
	Harting plugs: Han 4A-STI-S, Category: Inserts, Series: Han A, Termination method: Screw termination, Number of contacts: 4, Part number 09 20 004 2611	100	item							R -
	Harting plugs: Han A 04 Pos. F Insert Screw, Category: Inserts, Series: Han A, Termination method: Screw termination, Number of contacts: 4, Part number 09 20 004 2711	100	item							R -
	Harting plugs: Han CGM-M M20x1,5 D.5-9mm, Category: Accessories, Series: Han CGM-M, Type: Cable Gland, Part number 19 00 000 5080	100	item							R -

	Harting plugs: Screw teathed M3x6 (PU 100pcs), Category: Accessories, Series: Han 3 A, Type: Fixing screws, Part number 09 20 000 9995	100	item							R -
										R -
7.7	Label									
	a) The scope of work covers the supply and make use of labels and assessories:									
	Labelling Type: 15mm Sleeves (Clear). Size: 1-2mm	10	BX							R -
	Labelling Type: 23mm Sleeves (Clear). Size: 1-2mm	10	BX							R -
	Labelling Type: PVC tags (yellow). Size: 15mm	10	BX							R -
	Labelling Type: PVC tags (yellow). Size: 23mm	10	BX							R -
	70X10 Cable Sleeves	10	BX							R -
	70X10 Yellow Cable Labels	10	BX							R -
										R -
7.8	Conduit									
	a) The scope of work covers the supply and make use of conduit and assessories:									
	PVC Coated Galvanised Steel, Black, 25 meters, 20mm Flexible Conduit TSP20/BL/25M	250	m							R -
	PVC Coated Galvanised Steel, Black, 25 meters, 32mm Flexible Conduit TSP32/BL/25M	250	m							R -
	Straight Fitting 20mm T/SP20/M20/A M20	50	item							R -
	Straight Fitting 32mm T/SP32/M32/A M32	50	item							R -
	Smooth Entry Bush 20mm T/SP20/20/C	50	item							R -
	Smooth Entry Bush 32mm T/SP32/32/C	50	item							R -
	Conduit Terminator 20mm T/SP20/E	50	item							R -
	Conduit Terminator 32mm T/SP32/E	50	item							R -
	Brass Female Couplers Metric Thread 20mm T/B/M20/C	50	item							R -
	Brass Female Couplers Metric Thread 32mm T/B/M32/C	50	item							R -
	Straight Fitting Swivel External Male Thread 20mm T/SP20/M20/B	50	item							R -
	Straight Fitting Swivel External Male Thread 32mm T/SP32/M32/B	50	item							R -
	Nickel Plated Brass - 45° Elbow T/SPL20/M20/C45	50	item							R -
	Nickel Plated Brass - 90° Elbow T/SPL20/M20/C90	50	item							R -
	Nickel Plated Brass - 90° Elbow T/SPL32/M32/C90	50	item							R -

	2-piece P1000 Clamp (with bolt and nylock nut) for TSP20 (Unistrut Channel Clamps 20mm) T15/20	1000	item							R -
	2-piece P1000 Clamp (with bolt and nylock nut) for TSP20 (Unistrut Channel Clamps 32mm) T25/30	1000	item							R -
	EX Thread Convertors 25mm to 20mm T/EXN/M25-M20/R	50	item							R -
	Clear Cable Spiral Wrapping (Bind) Ty-Rap	250	item							R -
										R -
7.9	<u>Panel Wire</u>									
	a) The scope of work covers the supply and make use of panel wires and assessories:									
	Earth (Green/ Yellow) Single Core Multi Stranded Panel Wire 1.5mm	200	m							R -
										R -
7.10	<u>Others</u>									
	a) The scope of work covers the supply of other assessories:									
TOTAL OF BILL NO. 06 (CONSUMABLES)										R -
	<u>TESTING AND COMMISSIONING</u>									
8.1	<u>Testing</u>									
	a) The scope of work covers the testing and certification of the following:									
	Cable drum test certificate									R -
	CoC for Electrical									R -
	Pressure test									R -
	NDT welding									R -
	AIA report									R -
										R -
8.2	<u>Commissioning</u>									
	a) The scope of work covers the calibration and testing of the following:									
	Pre- instruments configuration	1								R -
	Insulation resistance test (Instrument to Panel)	1								R -
	Instruments calibrarion	1								R -
	Loop checks	1								R -

										R -
TOTAL OF BILL NO. 07 (TESTING & COMMISSIONING)										R -
	LOGISTICS									
9.1	Transportation									
	a) The scope of work covers the packaging, collection and delivery of pre-assembled control cubicles and console:									
	Phase 1 Control Panels from Cape Town (Acacia Power Station) to Vanderkloof Power Station	826	km							R -
	Phase 2 Control Panels from Cape Town (Acacia Power Station) to Vanderkloof Power Station	826	km							R -
TOTAL OF BILL NO. 08 (LOGISTICS)										R -

Notes:

- Prices must exclude VAT.
- Eskom requires that a minimum of 15% of the price must be fixed. Price adjustment applies to the remaining 85%.
- CPA is applicable. The prices shall be fixed for the first twelve (12) months of the contract, thereafter indices shall apply for adjustment on each anniversary date of the contract.

PART 3: SCOPE OF WORK

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C3.1: **EMPLOYER'S WORKS INFORMATION**

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Description of the *works*

Executive overview

Vanderkloof Hydroelectric Power Station was first commissioned in 1976/7, and its equipment and components for electrical and control has been in operation for more than 40 years. The electrical and control equipment and components has surpassed its design life and have aged and therefore become obsolete.

Based on the approved concept design, the recommendation is to refurbish, replace and upgrade all obsolete equipment for the Control and Instrumentation, Excitation, LV switchgear, and Protection, Metering and Synchronising Scheme.

This document contains the Works Information for the Site Construction Works of the Control and Instrumentation upgrades for one unit and the station common plant. The document further illustrates the cabling works which interface to other disciplines.

The *Works* makes provision for the Site Construction which includes bill of materials, procurement, packaging, supply, delivery to site, transporting, off-loading, decommission, removal, floor preparation, assembly, installation, wiring, testing, and cold commissioning of components and structures related to the Control and Instrumentation Upgrade project. The *Works* include the cabling works, instrumentation impulse lines tubing, instrument bracket manufacturing, level measurement instrument chamber manufacturing, pipe work: removal, welding, testing and installation for the Control and Instrumentation project.

The *Works* interfaces to the following projects:

- Excitation System Replacement
- LV Switchgear Refurbishment
- Generator Protection, Metering and Synchronising Scheme Replacement.

The *Contractor* performs the Site Construction at the Vanderkloof Power Station within the prescribed dates and times as indicated by the *Employer*. The onus is on the *Contractor* to ensure that the Works is completed within the agreed period.

The *Works* covers the following power station building and outside plant areas of the station:

- Generating Unit (i.e. Draft Tube Area, Turbine Floor, Machine Hall, Telecoms Room, Generator Transformer yard).
- Station's Common Plant (i.e. Station Board Room, Station Transformer yard, Server Room, Strainer Room, Control Room, Penstock and Dam Wall).

The Works execution will be done during the Outage.

The Employer's objectives and purpose of the works are:

The *Employer's* objective is to accomplish the implementation of the Control and Instrumentation, Excitation, LV Switchgear, Protection, Metering and Synchronising Schemes refurbishment programme within the stipulated power station's planned outage (shutdown) time frames. This programme is an execution of the *Employer's* Life of Plant Plans (LOPP) needed to maintain the highest levels of reliability and performance for the remaining commercial life of the power station.

Therefore, the Site Construction works performed by the *Contractor* is an integral part of the deliverables of the programme.

Interpretation and terminology

The following definitions are used in this Works Information:

Definitions	Meaning given to the definition
Cold Commissioning	Means the functional test of each equipment Unit to be performed at the Construction Site without load in accordance with the Contract.
Consumables	Means all those items that are consumed, installed, added, or otherwise used in the process of performing the Works (but not limited to) rags, solvents, cable ties, lugs, heat-shrink, seals, O-rings, springs, and hydraulic fittings, etc.
Components	Means all materials (including instruments, cable trays, cables, hurting plugs, cable glands etc.), components, parts (including replacement parts), and accessories to be provided by the <i>Contractor</i> for incorporation into the plant.
<i>Contractor</i>	A person or firm that undertake a contract to provide construction works according to this Works Information and is not limited to supply of materials and skilled labour.
<i>Contractor's</i> Equipment	Means all apparatus, machinery, tools, instruments, materials, equipment, vehicles, storage container, and other things required for the performance of the services required for the Works excluding components, consumables, and any other things provided by the <i>Employer</i> .
Defects	Means any works provided under this Agreement which are not in accordance with the requirements of this Agreement.
<i>Employer</i>	'Eskom Holdings (Eskom) in the context of: <ul style="list-style-type: none"> • Owner

Definitions	Meaning given to the definition
	<ul style="list-style-type: none"> insurer of the Works paymaster a party to the contract
Good Industry Practise	Means the practices, methods, techniques, designs, skills, diligence, efficiency, reliability, and prudence which are generally and reasonably expected from reasonably skilled and experienced <i>Contractor</i> engaged in the same type of undertaking as envisaged under this Contract and which would be expected to result in the performance of its obligation by the <i>Contractor</i> in accordance with this Contract, Applicable Law as and Applicable Permits in reliable, safe economical and efficient manner.
Plant	Industrial site consisting of systems of technology used to perform specific set of functions.
Requirements	A singular documented physical or functional need that a particular design, product, or process aims to satisfy.
System	An organised, purposeful structure that consist of interdependent and interrelated equipment. i.e. pump system, bearing system, etc.
Unit	A hydro turbine, generator, transformer, and all relevant equipment operated together to produce electricity.

The following abbreviations are used in this Works Information:

Abbreviation	Meaning given to the abbreviation
A	Amperes
AC	Alternative Current
BS	British Standard
BSPP	British Standards Pipe Parallel
BSPT	British Standard Pipe Tapered
C&I	Control and Instrumentation
D	Depth
DIN	Deutsch's Institute für Normung
EN	European Standard
EL.	Elevation
H	Height
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
I/O	Input/Output
IP	Ingress Protection (IP rating)
ISO	International Organisation for Standard
kPa	Kilopascal
LV	Low Voltage
m.	Meters
m.a.s.l	Meters Above Sea Level
mm	Millimetre
MUC	Main Unit Controller
NDT	Non-Destructive Testing

Abbreviation	Meaning given to the abbreviation
NPT	National Pipe Tapered Thread
OEM	Original Equipment Manufacture
OTDR	Optical Time-Domain Reflectometer
PT	Penetrant Testing
PTFE	Polytetrafluoroethylene
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Plan
RIOC	Remote I/O Common
RIOG	Remote I/O Generator
RIOT	Remote I/O Turbine
SANS	South Africa National Standards
SHEQ	Safety, Health, Environment and Quality
SST	Stainless Steel
TBA	To be Announced
TSM	Temperature and Speed Monitoring
U*	Unit 1 or 2
UT	Ultrasonic Testing
V	Voltage
W	Width
WPQR	Welding Procedure Qualification Record
WPS	Welding Procedure Specification

Management and start up.

Management meetings

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

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register 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.

Documentation control

All contractual communications are through formal compiled letters or forms on the company's letterhead. The formal letters and or forms are attached to e-mails and not as a message in the e-mail itself. The receiver of the formal letters or forms signs off an acknowledgment of receipt of the communication and returns the acknowledgement of receipt to the sender of the formal communication.

Health and safety risk management

The *Contractor* shall comply with the health and safety requirements contained in this Works Information.

Environmental constraints and management

The *Contractor* shall comply with the environmental criteria and constraints stated in this Works Information.

- a) Eskom's goal is to ensure zero harm to the environment, and to ensure than any possible impact is mitigated or managed. The Duty of Care and implementation of best practice is critical during operations, and full communication on environmental issues is required at all times.
- b) All processes are subject to environmental review throughout the contract.
- c) The *Contractor* complies with all National and Local legislation requirements as well as Eskom procedures and policy.
- d) The following applies to promote Eskom's goal of zero harm to the environment:
 - Respect and care for the natural environment and for each other
 - Minimise or mitigate any impacts that may cause harm or pollution to the environment
 - Report immediately an environmental incident requiring action, such as a spill
- e) The Contractor develops a method statement/ operational plan for the management of waste material that is accepted by the Project Manager before site implementation

- f) The method statement on waste management includes the identification of possible waste streams, temporary storage and disposal options for each waste type, and contingency plans in the case of any environmental incident.
- g) The method statement on waste management includes / specifies:
- Demarcated storage areas are located in such a manner that it can provide optimum handling and transportation of waste material.
 - Stored in suitable labelled containers or drums / sealed if hazardous in bunded areas or spill platforms to prevent pollution or harm to the environment.
 - Duty of care and implementation of best practise.
- h) The Contractor provides Safety Data Sheets for all chemical or hazardous / potentially hazardous material brought onto site.

Quality assurance requirements

- a) Quality management for the *works* is in accordance with Eskom Quality Supplier Management Specification 240-105658000 (QM-58).
- b) The *Contractor* complies with the latest version of the ISO 9001 Quality Management System Requirements
- c) The *Contractor* defines the level of QA/QC or inspection imposed on his *subcontractors* and *Contractor's*.
- d) The programming of inspections, hold and witness points are agreed between the *Employer* and the *Contractor* prior to undertaking any of the *works*.
- e) The QCP's make provision for signatures indicating Completion by the *Contractor* and acceptance by the *Employer* at the end of each activity.
- f) The Quality Control Plan (QCP) manages the overall quality of the project. It lists detailed activities in order of execution where each activity is described and references the associated work packages. The work plan makes provision for signatures by the *Contractor* and acceptance by the *Employer* at the completion of each activity.
- g) The *Contractor* prepares and submits fitment/installation procedures with quality check sheets as well as the Quality Control Plan. Quality acceptance criteria must be included in these procedures.
- h) The *Contractor* defines the level of quality assurance or inspection imposed on his Sub-*Contractors* and suppliers.
- i) All technical design and implementation documentation and the QCP's are submitted to the *Employer* for acceptance prior to the *works* being executed.
- j) The *Contractor* is made aware of the requirement that all documents or designs submitted for review to the *Project Manager* for acceptance, requires a process of review.
- k) The *Contractor* documents all inspections as part of the quality assurance and control procedures. These documents are handed to the *Employer* as records.

Programming constraints

The Contractor submits a bar chart programme in MS Project detailing how the works will be executed within the stipulated dates. The programme indicates the Start date, Completion Date and duration of each activity.

Contractor's management, supervision and key people

The *Contractor* provides a detailed organisational structure and resource plan, clearly indicating the lines of authority and communication in the working area as well as outside of the working area for the *works*.

- a) The *Contractor* provides a list of all *subcontractors*, detailing their roles.
- b) The *Contractor* does not modify any plant or materials unless accepted by the *Project Manager*, prior to implementation.
- c) The *Contractor* notifies the *Project Manager* at least two weeks in advance of a Hold or Witness point on the *works* within the boundaries of South Africa unless otherwise agreed with the *Project Manager*

The *Contractor* does not operate any equipment on Site unless specific authorisation is obtained from the *Employer*.

Invoicing and payment

- a) Within one week of receiving a payment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* submits a tax invoice to the *Employer*, showing the amount due for payment equal to that stated in the *Project Manager's* payment certificate.
- b) The *Project Manager* to be copied in on all electronic invoices emailed.
- c) Failure to submit the invoice to the correct address could result in delays in payment.
- d) The *Contractor's* Tax Invoices comply with the requirements as stated in clause Z7 of the Contract Data
- e) Invoices are submitted electronically to:
 - Local Eskom Invoices - invoiceseskomlocal@eskom.co.za
 - Foreign Eskom Invoices - invoiceseskomforeign@eskom.co.za
- f) Details required when submitting invoices and additional data:
 - The subject line on your email should only contain your vendor number.
 - Each invoice in PDF should be named with your invoice number only.
 - All electronic invoices are sent in PDF format only.
 - Attach the proof of delivery to your invoice.
 - Where applicable, supporting documents is attached to the scanned PDF invoice as one attachment.
 - A copy of the signed assessment certificate.
 - CPA calculation sheet.
 - Retention Certificate where it is a retention invoice.
 - Any other appropriate documents, e.g.
 - For shipping invoices, please ensure the following documents are attached (The file should not be more than 10 Mega Bytes):

- Invoice (this should only reflect the shipping cost)
- Commercial invoice.
- Delivery notes.
- Your shipping costs calculation relevant to that invoice – not a generic calculation (The amount of the shipping costs calculation must balance on the amount on the invoice).
- Forwarding agent's invoice.
- The customs document.

g) Other requirements:

- For foreign invoices, suppliers will still be required to physically deliver hard copies of original documents to the respective Document Management centres even though the invoices have been submitted electronically.
- Ensure compliance with the tax requirements for submitting invoices electronically.
- Each PDF should contain one credit note, one debit note or one credit note only. More than one invoice can be submitted per email.
- Any CPA applicable is invoiced separately, so that if there are issues on the CPA, the rest of the invoices can be paid while the CPA issues are resolved.

h) Include the following information on the Invoice:

- Name and address of the *Contractor* and the *Project Manager*.
- The contract number and title.
- *Contractor's* VAT registration number.
- The *Employer's* VAT registration number 4740101508.
- Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT.
- *Contractor's* company registration number if applicable.
- *Contractor's* banking details.
- Name and address of recipient.
- Tax invoice number and date of issue.
- Description of goods/service provided.
- Quantity or volume of goods/services.
- Period time for which the Tax Invoice is being rendered.
- Relevant Task Order Number (commencing with a 45 prefix).
- Relevant line-item number.
- Statement whether value added tax is included or excluded.

Insurance provided by the Employer

- a) In terms of clause 85, before the *starting date* and on each renewal of the insurance required in terms of this contract, the *Contractor* is required to submit certificates which state that the insurance required by this contract is in force.
- b) Such insurances are those required in terms of the contract except to the extent stated in the contract the *Employer* is to provide any, or any part, of them.
- c) Failure to provide such certificates of insurance for the Project Manager's acceptance by the starting date or renewal date as the case may be, may result in the *Employer* arranging such insurance on the *Contractor's* behalf and at the *Contractor's* expense.

Contract change management

- a) Contract change management is managed in accordance with section 6 of the core clauses in ECC3. In summary, in the event that the Employer/Contractor notices a change, an event register is issued. If the event/change has cost implications, then a quotation is submitted with the event register.
- b) The Project Manager assesses the quotation and gives an instruction in writing to the Contractor.

Provision of bonds and guarantees

- a) The form in which a bond or guarantee required by the conditions of contract is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.
- b) 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.
- c) The *Contractor* provides the bonds and guarantees as agreed to within 2 weeks after the Contract Date.

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

To substantiate the Defined Cost of compensation events, the *Employer* requires the *Contractor* to keep records of amounts paid by him, in the following format:

Type of cost	Type of record
People employed by the <i>Contractor</i> (labour)	Signed time sheets and payslip
Accommodation	Substantiating documentation (actual paid invoices)
Material	Register and substantiating documentation of materials used /paid invoices
Equipment	Register and substantiating documentation of Equipment used /paid invoices

Training workshops and technology transfer

Formal training is conducted as part of this contract before completion of the works.

Engineering and the Contractor's design

Employer's Design

Site Characteristics

Vanderkloof is one of Eskom's hydroelectric power plants built in the Northern Cape Province, at the Vanderkloof Storage and Diversion Dam, on the Orange River. Vanderkloof Hydro Power Station has two generating units of 120MW each. Water is released from the storage dam via discharge and control structures to the inlet of the two generating units. The kinetic energy generated from the discharged water is converted to mechanical energy by means of Francis Turbines. The flow and arresting of water to the Francis Turbines are controlled by guide vanes. The turbines are connected to electrical generators which generate electricity into Eskom's national Interconnected Power System (IPS (Grid)). Vanderkloof generates during peak electricity demand times and in emergencies or when required by the national department of water affairs for dam level management.

The power station is situated approximately 220km west of Bloemfontein and 200km south of Kimberly, and there are tarred roads all the way to the powerhouse. The coordinates for the Power Station are 29°59'37"S;24°43'48"E.

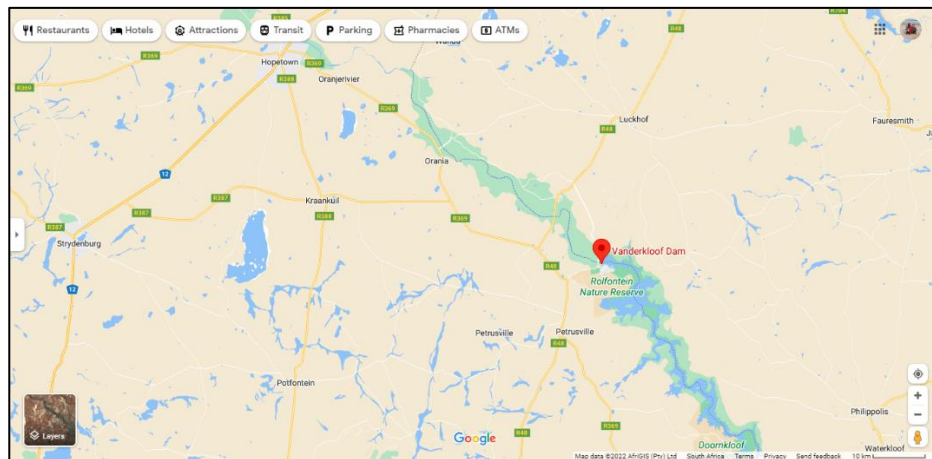


Figure 1: Location of Vanderkloof Power Station

Systems Description

The two synchronous generating units are fitted with electrical and control panels for monitoring and sequence controls. The interfaces between different systems are hardwired.

Racking design

The *Employer* has incorporated the design for cabling and racking works which interfaces between electrical systems, control system and field instrumentation into this Works Information. The design specifies the racking requirement, the type of cables (Low voltage, control and network communication) required, estimation of the lengths of cables to be removed, cable trays to be installed and the amount of cables to be installed.

The implementation of the scope for electrical system (Excitation, LV Switchgear, Protection, Metering and Synchronising Scheme) works not included herein this Works Information is performed by Others.

Capacity of trays

Cable tray sizes stated in the estimation work (see appendix B) herein are specified based on the volume of cables running in a specific route. Cross section area of each cable is calculated from its outer diameter (OD), these cross-section areas of cables running in the same tray are then added and this will give the total cross section area in solid form. Therefore, suitable tray size is the total cross section area of cables in solid form plus 50% of additional spare capacity and air between the cables.

That is, cable cross section area (mm²), $A = \pi \times (OD/2)^2$

Total cables cross section area, $B = \text{sum of cross sections of cables } A\text{'s in mm}^2$

Tray cross section area in mm² = $B + 20\% \text{ air} + 30\% \text{ spare tray capacity}$

Cable tray sizes selected were normalized to manufacturers' standard sizes, available space on the plant to install such a tray and future capacity consideration.

Tray types and sizes selected are as follows (Tray Width x lip Height x steel Thickness in mm):

- Welded steel wire mesh tray 50x50x4 (WWMD50)
- Perforated steel tray 75x38 x1.6 (MCT75)
- Perforated steel tray 75x38 x1.6 (HCT75)
- Perforated steel tray 305x75 x1.6 (MCT300)
- Perforated steel tray 457x75 x2.0 (HCT450)

Loading on support structure and strength thereof

The following table shows distributed weights per meter of cable trays selected for this design:

	Description	Thickness (mm)	Length (mm)	Mass (kg/m)
1.	WWMD50	4	3000	2.5

2.	MCT75	1.5	3000	4.69
3.	HCT75	1.5	3000	6.97
4.	MCT300	1.5	3000	11.73
5.	HCT450	2.0	3000	23.49

Trays are supported by strut channels and cantilever arms depending on the load to be supported.

Strut channels selected for this racking design are P1000, P1001, P2000, P4000 as shown here below.

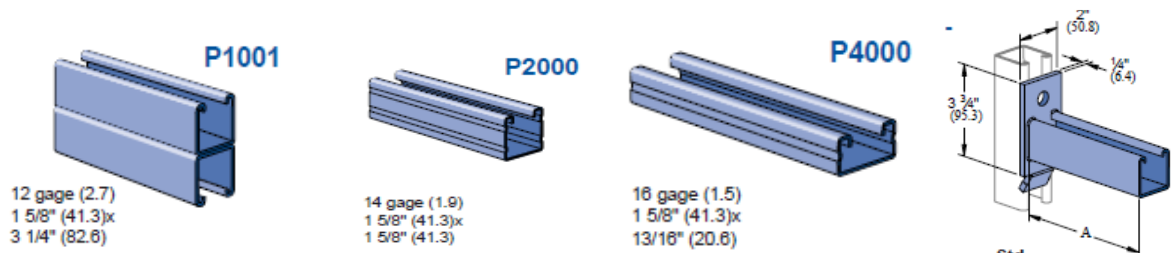


Figure 2: Cable trays support and cantilever

Cantilevers used on the design are Flat Plate Arm 200mm, 250mm and 350mm, and Full Double Arm 550mm constructed from P1000 and have the following design weight specifications:

Item	Description	Length (mm)	Unit Mass (kg)
1	Flat Plate Arm (P1000)	200	1.0
2	Flat Plate Arm (P1000)	250	1.2
3	Flat Plate Arm (P1000)	350	1.5
4	Full Double Arm (P1000)	550	2.97

The *Contractor* ensures that the OEM load specifications are not exceeded during installation.

Control Panels design

The control systems panels are located indoors within the power station building. The panels in the control room (EL. 1105MASL), and generator floor (EL. 1101MASL) will be replaced with similar size panels. Additional new panels will be installed on the turbine floor (EL. 1096.5MASL) and Lower Ground Basement (EL. 1143MASL).

The manufacturing and assembly of the control system panels including the control console is performed by Others. The design for control system panels provides the installation Works that the *Contractor* must perform (see Appendix B).

Field Instrumentation design

At Vanderkloof, the process sensors (instruments) determine the current states of the process. The field instrumentation uses the inputs to produce a measurement, for monitoring of various different process systems with medium such as oil, cooling water, and compressed air.

The Employer's design provides the assembly specification and diagram of different field instruments such as pressure, level, temperature, flow, and limit switches. These instruments will be installed on the systems such as, but not limited to the Penstock, Tailrace piping and Channel, Turbine System, Turbine Bearing Assemblies, Turbine Lubrication System, Sealing Water System, Turbine Control, Generator System, Generator Bearing Assembly, Generator Bearing Lubrication System and Piping System for Main Cooling Water (see Appendix F).

Parts of the works which the Contractor is RESPONSIBLE FOR

General Responsibilities of the Contractor

- a) The *Contractor* is required to supply the Works,
 - in accordance with the Works Information.
 - in accordance with all National and International Standards, as well as the *Employer's* Standards referenced in this Works Information.
 - in accordance with the Good Industry Practices, and
 - in accordance with the *Employer's* Safety, Health, Environmental, and Quality (SHEQ) policy.
- b) The *Contractor* takes full professional accountability and liability for the Scope of Work performed by the *Contractor*.
- c) The *Contractor* is responsible for transporting of all Components, Consumables, *Contractors* Equipment, *Contractor's* personnel, and other things required for the Works to Site.
- d) The *Contractor* is responsible for the procurement, packaging, loading, transporting, receiving, unloading, storing, and protecting all Components, Consumables, *Contractor's* Equipment, and other things required to perform their obligations stated in this Works Information.
- e) The *Contractor* is required to furnish its work personnel with such *Contractor's* Equipment as it is necessary to perform quality Works.

- f) In performing the Works, the *Contractor* uses appropriate skills and trained labour, having regard to the nature of the works to be performed. The skills required for this Works include, qualified electricians, mechanical artisans (fitters and turners), instrument mechanics (pipe bending and tubing) and coded welders.
- g) The *Contractor* submits, if requested to supply the *Employer* with relevant training records for the *Contractor's* personnel engaged or to be engaged in the performance of the Works to verify their ability to fulfil the task comprised in the Works.
- h) The *Contractor* submits, if requested to supply the *Employer* with the curricula vitae of the *Contractors* personnel engaged or to be engaged in the performance of the Works, which contains the experience of the *Contractor's* personnel from similar projects.
- i) The *Contractor* ensures that all Components, Instruments and Consumables used in the provision of the Works is in order and of good quality.
- j) The *Contractor* throughout the Term of contract maintains a permanent presence on Site, suitably experienced, trained and qualified personnel to perform the Works. The *Contractor's* team onsite includes a Supervisor/Site Representative who will be the *Employers* single point of contact for administering this contract.

Bill of Materials

The *Contractor* prepares a complete bill of materials using the *Employer* returnable list (see Appendix B) and any other requirements specified in this Works Information, covering all Components and Consumables to be used by the *Contractor* for the Works. The description of an item shall be complete but concise, listing only those items that are significant, such as ratings, type, and manufacturer. A unit of equipment, that is supplied with certificate of compliance, is not required to be broken down into more than one item on the parts lists.

Health & Safety Requirements

- a) A task-based risk assessment and mitigation strategy is submitted and approved by the Employer before start of the works.
- b) Work will commence as per Employer's safety regulations laid down in the contract specification and the project safety file.

- c) Mandatory safety gears will be used. All personal protective equipment (PPE) will be used as appropriate according to the nature of the task. For electrical works, provide non-conductive tools and PPE.
- d) Working on live apparatus or live power cables is not allowed.
- e) The Contractor ensures that adequate barricading and signage are provided around the affected area. Work will be executed through Permit to Work system.
- f) The Contractor always maintains cleanliness in the work areas. Housekeeping will be of good standard and all debris must be removed by end of each workday.
- g) The Contractor working at heights to wear their full body harness and should be anchored to a rigid point.
- h) No workers are allowed to stand on top of the step ladder; workers should stand two rungs below from top of the step ladder. A co-worker must hold step ladder while in use.
- i) Method statement and risk assessment to be daily briefed to all concerned personnel and signing on the Workers Register is required to commence with work.

Cables specification

- a) The *Contractor* supplies low voltage cables, Control and Instrumentation cables, Ethernet copper cables, rugged fibre optic patch leads and optical fibre cables.
- b) Before procurement of any cable, the *Contractor* supplies cable manufacturers ISO 9001 status and certification, cable type certificates, cable manufacturing specifications, typical manufacturing QC test certificates, cable marking examples for acceptance.
- c) The *Contractor* supplies cables which conform to the 240-56227443: Requirements for Control and Power Cables for Power Stations standard and the 240-54937450: Fire Protection & Life Safety Design standard.

Low voltage cables

- a) The cables used are PVC insulated with flame-retardant reduced halogen emission PVC outer sheath and bedding (emit a mass of not more than 15% halogen).
- b) The low voltage cables with PVC insulation, LHFR PVC sheath unarmoured will be of type BVV.
- c) The low voltage cables with PVC insulation, LHFR PVC sheath with round steel wire armoured around will be of type BVX.

- d) The BVV or BVX type of cables will be used for power supplies, protection circuit, voltage, and current transformer (i.e., 110/220V DC, 230V AC).
- e) The cables shall be manufactured to SANS 1507 and SANS 1411 Parts 1, 2, and 6. 8.3.3 Unarmoured and armoured power cables application.
- f) The type of low voltage cables used for this Works Information are:

Table 1: Low Voltage Cables Technical Data

Cable Type	Number of conductors	Rated area (mm ²) per conductor	Voltage Rating (V)	Mass (kg/m)	Overall Diameter (mm)
BVV02DCM	2	2.5	600/1000	0.40	11.3
BVV04DCM	4	2.5	600/1000	0.42	12.9
BVV03ECM	3	2.5	600/1000	0.56	13.1
BVX04DCM	4	2.5	600/1000	0.62	17
BVV04ECM	4	4	600/1000	0.64	14.6
BVX04ECM	4	4	600/1000	0.75	18

- a) Normal colour coding of cables cores to SANS 1507 Table 1 shall be used for cables with:
- 2 cores: Red – Black
 - 4 cores: Red – Yellow – Blue – Black
- b) The individual cores shall be numbered or ferruled and shall be glanded and terminated in sequence as set out by the *Employer*.
- c) All cables sheaths (low voltage cables) shall be black with colour traces or printing as follows:

Cable Trace Colour	Identifying Cable as Having
Blue	Low halogen emission, Flame Retardant Polyvinyl Chloride (LH PVC) bedding and sheath

Control and instrumentation cables

- a) For all digital and analogue signals where low-level signals apply, thermoplastic insulated overall screened twisted pair UVG control cables shall be used except for cables in this category which run, over long distance outside of the building or buried in the ground.

- b) The cores of cables shall be identified by the dielectric colour code as table below and the standard NWS 1525.

Single Conductor		Paired Cables		Triple Cable		
Conductor No.	Colour	Pair No.	Colours	Triple No.	Colours	
1	Blue	1	Blue/Red	1	Blue/	
2	Red				Red/	
3	Grey	2	Grey/Yellow		Grey	
4	Yellow			2	Yellow/	
5	Green	3	Green/Brown			Green/
6	Brown					Brown
7	White	4	Blue/Red	3	White/	
8	Black				Black/	
9	Not	used			Pink	

- c) Where several cores are group together in a cable, each core shall be identified by the colour in the table above, and the by marking as detailed below:
- Group 1 One ring of Orange
 - Group 2 Two rings of Orange
 - Group 3 Three rings of Orange
 - Group 4 Four rings of Orange
 - Group 5 Five rings of Orange
- d) The individual cores shall be numbered or ferruled and shall be glanded and terminated in sequence as set out by the *Employer*.
- e) Type UVG cables will have a voltage rating of 300/500V with a rated conductor area of 0.5mm² to 0.75mm² and signal level of 1A shall not be exceeded.
- f) The screen is 100% coverage of aluminium/polyester tape (38µm thickness), with multi-strand tinned copper drain wire.
- g) Screens and drain wires will be terminated on one end in accordance with circuit diagrams or instruction provided by the *Employer*.
- h) All cables sheaths (Control and Instrumentation cables) shall be black with colour traces or printing as follows:

Cable Trace Colour	Identifying Cable as Having
Blue	Low halogen emission, Flame Retardant Polyvinyl Chloride (LH PVC) bedding and sheath

i) The type of control and instrumentation cables used for this Works Information are:

Table 2: Control and Instrumentation Cables Technical Data

Cable Type	Number of Pairs	Number of Conductors	Rated area (mm ²) per conductor	Voltage Rating (V)	Mass (kg/100m)	Overall Diameter (mm)
UVG02ACM	2	4	0.5	300/500V	7.4	8.2
UVG02BCM	2	4	0.75	300/500V	25(est.)	12
UVG04ACM	4	8	0.5	300/500V	9.8	8.9
UVG04BCM	4	8	0.75	300/500V	25(est.)	14
UVG08ACM	8	16	0.5	300/500V	16	10.9
UVG08BCM	8	16	0.75	300/500V	45(est.)	18
UVG12ACM	12	24	0.5	300/500V	26.7	13.4
UVG12BCM	12	24	0.75	300/500V	50(est.)	21
UVG20ACM	20	40	0.5	300/500V	34.7	15.2
UVG02CCM	2	2	1.5	300/500V	25(est.)	9.9
UVH02ACM	2	4	0.5	300/500V	25(est.)	10
UVK01BCM	1	3	0.75	300/500V	25(est.)	10.9(est.)
UVM01BCM	1	3	0.75	300/500V	25(est.)	10.9(est.)
UVM12BCM	12	36	0.75	300/500V	100(est.)	40(est.)

Network Communication cables

a) The *Contractor* supplies industrial Ethernet cable type CAT6A with the specific features:

- STP, SF/FTP or S/FTP
- 26AWG/24AWG/23AWG
- PVC/PE/LSZH Jacket optional

- Speed up to 1000Mb/s over 100m of CAT6 cable.
- b) The *Contractor* supplies the shielded RJ-45 connectors which meet the standard EIA/TIA-568B or 568A. The boot for the RJ-45 should be of different colours i.e., yellow, blue, black, green, and grey.
- c) The *Contractor* supplies industrial Heavy-Duty Duct (HDD) Fibre Optic cable with the specific features:
 - Multicore (8 cores)
 - Multimode
 - OM4 fibre standard
 - Patch Panel connectors to be ST type.
- d) The *Contractor* supply Fibre Optic fly leads type ST-LC and ST-ST or LC-LC with specific features:
 - 2 cores
 - Multimode
 - OM4 fibre standard

Decommission Works

Decommissioning of the existing control and instrumentation equipment is a joint responsibility of the *Contractor* and the *Employer*.

The *Contractor* decommissions the specified plant and relocates it to the area identified by the *Employer*. All removed plant components remain the property of the *Employer*. The *Employer* provides a storage/ laydown area for all decommissioned materials.

The *Contractor* makes good (restores to match surfaces and finishes of surrounding) all areas where plant components and cabling were removed.

- a) The *Employer* provides supervision to the *Contractor* when removing wiring, terminations and marking of cables for removal or re-use.
- b) The *Contractor* performs the removal of wiring, terminations and marking of cables for removal or re-use.
- c) The *Contractor* removes cable glands and drops decommissioned cables into the cable tray and either removes the cables or cap them according to cable removal list. Capping and leaving redundant cables on the racks are the exception to the rules and is only allowed with acceptance of the *Employer*.
- d) The *Contractor* removes the specified decommissioned panels & cubicles and relocates it to an area identified by the *Employer*.
- e) The *Contractor* removes the specified decommissioned junction boxes and relocates it to an area identified by the *Employer*.

- f) The *Contractor* removes the specified decommissioned instruments and tubing and relocates it to an area identified by the *Employer*.
- g) The *Contractor* blanks the specified process pipework's as per *Employers* design requirements.
- h) The *Contractor* removes the existing Control Console section plates and its accessories inside the Control Console and relocate to area identified by the *Employer*. Note that the removal of the section plates requires a cut out through 6mm stainless steel on the existing frame. The sections are divided into top, middle and bottom plates for the Units and Station Control Console.
- i) The *Contractor* removes all redundant cable racks and relocates it to an area identified by the *Employer*.
- j) The *Contractor* catalogues and transports removed cables to the laydown area.
- k) The *Contractor* catalogues all capped cables, showing type, lengths, routing etc.

Racking installations

- a) The *Contractor* supplies industrial hot dip galvanised after manufacture to SANS 121:2001 or ISO 1461:2009 wire mesh, perforated return flange cable trays and other cable trays accessories. Only approved cable trays are allowed.
- b) The *Contractor* is responsible for the measurement, supply, and installation of the cable trays as per *Employer's* design.
- c) The *Contractor* performs cable racks loading calculation-based on cable routing lists provided by the *Employer*.
- d) The *Contractor* ensures that the installed cable trays interconnect between the different systems of the Work.
- e) Manufacturer's standard fittings are used, and if manufacturer fittings are inadequate as per the requirement's, fabricated fittings are used as per *Employer's* acceptance.
- f) The cable trays and their supports should be strong enough to meet the load requirements to support 150% rack capacity for intended cable types.
- g) Cable trays support structures are anchored into the existing concrete building structure according to the *Employer's* design and specification.
- h) Cable trays are installed neatly and are vertical, horizontal, or parallel with the features of the building.
- i) Joints are kept as close as possible to the support.

- j) A minimum space is maintained between installations of trays and the building structure in order to secure cables and for general maintenance purpose.
- k) Expansion joints are provided in the cable trays where it passes through the building expansion joint.
- l) Earth continuity is installed inside the cable tray and fixed to all joint and fitting connections. Separate bare copper 6mm² grounding cable for cable trays are provided by the *Contractor* and connected to the station earth bar by the *Contractor*.
- m) The *Contractor* applies cold galvanizing paint on all cut sections of the cable trays; deburr all cut edges. Galvanization painting as per ISO12944: Corrosion Protection Standards.
- n) Apply edging rubber with embedded clipping steel on all sharp edges and ends of the cable trays.
- o) The *Contractor* installs galvanized open ended 20mm bosal conduit from the main cable tray for routing cables to the instrument hating plug point. The conduit must be fixed with 20 mm raised metal hospital saddles. Distance between saddles will not exceed one metre. PVC end caps shall be utilised on all opened ended bosal conduits. Racking cantilever brackets are utilised for vertical or horizontal support where required (fig. 2 above). The estimated provision for each installation should be a six-metre length of conduit.
- p) After the completion of a section of the cable tray, a continuity test is performed to ensure earth continuity of the system.

Cabling installations

- a) The *Contractor* indicates the specific tests performed on the different type of cables and provides the type test certificates before the first delivery of the cables.
- b) All cables site test is in accordance with SANS 97, 1507, 1339, 1411 and other relevant standards.
- c) All cabling is inspected and tested by the *Contractor* prior to installation and again prior to termination. At each stage both insulation and continuity are tested. The *Employer* witnesses the testing.
- d) Cables having 110V grade insulation or higher are tested with a 1000V megger. For the acceptance of a cable, the insulation reading must not be less than 50MΩ.
- e) Prior to installing the cables in the cable trays, the *Contractor* examines the cable paths and ensures all areas are free of debris that may interfere with the cable installation. Surface areas of the cable tray components likely to come into contact with cable must not cause damage to the cable when installed correctly.

- f) The *Contractor* installs and routes cables on the cable trays as per cable installation list provided by the *Employer*. The *Contractor* uses suitable *Contractor's* Equipment (acceptable rollers) to pull the cable into the tray.
- g) The control and instrumentation cables are routed on cable trays that are separate from power cables. Network communication cables are routed in the wire mesh. Where the control and power cables are running close to each other, a separation of 1000mm must be maintained, and cross at 90o.
- h) Cables generally have pulling tension restriction which must not be exceeded. The maximum pulling tension can be obtained from the cable manufacturer.
- i) Cable should be placed and not dropped into the cable tray, cable ladder or wire mesh.
- j) Cables are strapped neatly and fastened to the cable trays using cable ties to prevent movement of the cables under normal use and during fault conditions. Generally, the spacing between cable fastening should be adequate to prevent cable bowing over time (every 500mm on every vertical or horizontal side mounted rack). Cable ties should be correctly sized and only tightened enough to secure the cable without indenting the insulation sheath.
- k) On vertical runs the fastening must be able to withstand the forces exerted by the weight of the cable. The cable weight should be supported in such a manner as to prevent damage to the cable tray or cables.
- l) Cable ties on the control and instrumentation cables must not be too tight. Any cable within a tied bundle must be able to move through that tie with slight resistance. Control and network communication cables cannot withstand the same heavy-duty 'lashing' as power cables. The tie must not be too thin as it may cut into the sheath of the cable.
- m) The minimum bend radius for cables should be maintained.
- n) The cable entry for the control panels is bottom or top depending on the location of the control cubicles.
- o) The slack on the cabling is kept to a minimum.
- p) No tee offs or joining of cabling is performed, other than at the terminals.
- q) The Contractor prepares cables for termination which includes supplying and fitting of cable numbers, fitting of glands, striping cable ends; heat shrinking of cable ends, cores & screens (in either black, blue or red heat shrink); lugging conductors, labelling conductors.

Fire Blocking of Cable Penetrations

The repair or sealing to existing and new fire blocking of any cable penetrations that are disturbed for the purpose of cable routing, is carried out by the *Contractor* according to the following requirements:

- a) Supply, deliver and offload the fire stopping (retardant) material which is necessary to conduct the repairs.
- b) Supplies third party test certificates for the proposed fire-stop material.
- c) Provide all necessary equipment, tools & material required to complete the fire stopping.
- d) Provide supervision and resources to complete the fire stopping.
- e) The work is performed by a SAQCC Accredited service provider.
- f) Persons competent in fire blocking of penetrations are used and proof of competency is required.
- g) All fire stops have a fire rating in accordance with SANS 1077 or equivalent of the fire rating up to the structure or partition, or two (2) hours, whichever is the greater against the spread of fire and smoke.
- h) Fire stop material meets Factory Mutual (FM) Approval, Underwriters Laboratory (UL) requirements.
- i) Fire stopping systems are required to have been fire tested to the requirements of SANS1077, IEEE 634, ASTM (American Society for Testing and Materials) E814.
- j) Fire stop material is non-toxic, asbestos free and lead free.
- k) Fire stop material is resistant to chemicals, oils, and lubricants.
- l) Fire stops are weather resistant and suitable for both indoor and outdoor use.
- m) Fire stops not to affect cable ratings.
- n) Any cables entering/leaving a wall, floor or penetration are coated on both sides of the wall/floor to a length of 2 meters.
- o) Fire stops must be capable of being easily re-opened to allow the installation of future services.
- p) Proprietary fire protection cable coating material, suitable for grouped electrical cables and of the fire-retardant intumescent type shall be used.
 - Proposed fire stop material that has extensively been used on Peaking sites include:
 - Product: Mineral Wool Panel – Mandoval Vermiculite
 - Product: Pyro-safe WB – Mandoval Vermiculite
- q) Cables shall be coated in lengths of two metres every 5 meters.

Plinth and wall preparation (Civil Works)

- a) The *Contractor* is responsible for the floor preparation and constructing of the plinth where necessary for the control panels (refer to section 8.2 Civil and Engineering Works).
- b) The *Contractor* repairs and restore floors to match the existing, where panels had been removed.
- c) The *Contractor* repairs and restore walls to match the existing, where junction boxes had been removed.
- d) The *Contractor* core drills the floor for accessing cables as per *Employers* requirements.
- e) The *Contractor* mounts the panel metal plinths where supplied/required.
- f) The *Contractor* seals and paints the plinths to match the surroundings and to ensure the IP rating of the panels.

Cubicles installations

- a) The *Contractor* installs new control cubicles on their correct position and fix with raw bolts as per panel installation list.

Description	Size (mm)	Cable Entry
Unit Main Unit Controller	2000(H) X 1600(W) X 800(D)	Bottom
Unit Turbine Governor Controller	1800(H) X 800(W) X 600(D)	Bottom
Unit Temperature and Speed Monitoring	1800(H) X 800(W) X 600(D)	Bottom
Unit Remote I/O Generator	2000(H) X 800(W) X 800(D)	Top
Unit Remote I/O Turbine	2000(H) X 800(W) X 800(D)	Top
Unit Remote I/O Common	2000(H) X 800(W) X 800(D)	Bottom
Station Control Panel	2000(H) X 800(W) X 800(D)	Bottom
Station Remote I/O Panel	2000(H) X 800(W) X 800(D)	Bottom
National Control Centre	2000(H) X 800(W) X 800(D)	Bottom

- b) The *Contractor* ensures correct levelling of panels.
- c) The *Contractor* ensures that the panels doors can be opened or closed easily.
- d) The *Contractor* ensures that the IP rating of the panels is maintained.

Junction Boxes installations

a) The *Contractor* supply and install new junction boxes which contains specification in the table below:

Table 3: Junction Boxes Technical Data

Specification	Description
Dimension	1000(H) x 800(W) x 250mm(D) ; 600(H) x 600(W) x 200mm(D)
Steel enclosure with galvanised plain mounting plate	Yes
Double door for 1000(H) x 800(W) x 250mm(D)	Yes
Single door for 600(H) x 600(W) x 200mm(D)	Yes
Door lock	Double bar
Colour	Powdered coated in RAL 1015 (Light Ivory)
M8 x 25 shouldered back-studs for installing mounting plate and step slides, leaving a space of 10mm.	Yes
Mounting plate	Galvanised micro-perforated plate
Gland plate with marking for easy drilling and to guarantee the maximum access surface.	Yes
Easily removable door	Yes
Door opening	120°
Earth stud inside the door and inside the enclosure, and earth strap.	Yes
Ingress protection	IP66 for the single door and IP55 for the double door according to IEC 60529

b) The junction boxes are installed with WTR 4SL spring loaded with link terminals.

Junction boxes are installed as per 240-56355815: Field Instrument Installation Standards for Junction Boxes and Cable Termination.

Control Consoles Section Plates installations

a) The *Contractor* installs newly manufactured Control Console section plates.

b) The *Contractor* ensures that the Control Console section plates is securely fixed to the frame.

Description	Size (mm)	Cable Entry
Unit Control Console	Top section 700(H) x 1950(W) Middle section 1081(H) x 1950(W) Bottom section 602(H) x 1950(W)	Bottom
Station Control Console	Top section 700(H) x 1950(W) Middle section 1081(H) x 1950(W) Bottom section 602(H) x 1950(W)	Bottom

Glanding installations

- The *Contractor* measures and supplies new gland plates where required. Punching/drilling of gland plates in accordance with gland plate design provided by the *Employer*.
- The *Contractor* supplies and install cable glands and shrouds.
- Cable gland holes are sized according to the manufactures specifications in order to maintain the IP rating of the panels or junction box.

Table 4: Cable Gland Technical Data

Gland Type	Gland Size	Dimension (mm)	Material
Compression	00		PVC Grey Polyamide
Compression	00	16/20	Nickel-plated brass
Compression	0	20	Nickel-plated brass
Compression	1	20	Nickel-plated brass
Compression	2	25	Nickel-plated brass
Compression	3	32	Nickel-plated brass
Compression	4	40	Nickel-plated brass
Armoured	1	20	Nickel-plated brass
Armoured	2	25	Nickel-plated brass

- Top entry cable glands are fitted with appropriate shroud.
- Appropriate glands are used for top entry to ensure a watertight installation between the gland and the gland plate. (IP 65 panel rating is retained).

- f) It is the *Contractors* responsibility to ensure cables are glanded such that cables don't cross each other. Cables must be neat and professional in all circumstances.

Wiring and Termination

- a) The *Contractor* wires all incoming cables to the control (cubicles) panels using the panel termination list provided by the *Employer*.
- b) The *Contractor* wires inside the junction boxes using the junction box termination list provided by the *Employer*.
- c) The *Contractor* wires all cables to the field instruments using the instruments termination list provided by the *Employer*.
- d) The connection between the field instrumentation and the control system is done using harting plugs to allow ease of maintenance. A short length cable (approximately half a meter) is used to connect the instrument and the other part of the harting plug.
- e) There is no bare wire or loose strands exposed between a lug and the insulation of the wire to which the lug is crimped.
- f) The use of an approved wire-stripping device is required, and stripping of insulation does not cause damage to conductors or the remaining insulation.
- g) All lugs are of the compression type.
- h) Lugs are compatible to the wiring. The same supplier lugs are used throughout the panels and junction boxes.
- i) Lugs must fit cross-area of the conductor to which they are crimped. The correct crimping tool is used.
- j) Bootlace ferrules are acceptable for signal wiring terminated on devices and modules. The correct crimping tool is used (minimum six di crimper).
- k) Where two conductors are connected to a terminal, lugs, and ferrules to be fitted in such a manner as to allow the wires to be terminated in parallel.
- l) Not more than two conductors (lugs) to be connected to any one side of a terminal.
- m) Wiring is neat, braced and placed in secure PVC grey slotted panel trunking to prevent vibration and the possibility of forces being exerted on termination arrangements. Stick on plastic bracing support is not allowed.
- n) Stripping of insulation is carried out so that there is no damage to the conductors or the remaining insulation.

- o) Stranded wire less than 6mm² to be terminated with pre-insulated crimped connectors of approved types.
- p) Dimensions of the tongue and terminal are compatible. No cutting or modification of the lugs is acceptable.
- q) A sample of each type of lug, wires, tools and finished connection is submitted to the *Employer* for approval before wiring commences.
- r) A hooked blade lug to be used on screw-clamped spring-loaded insertion type terminals.
- s) Torquing of termination connection to specification using calibrated torque wrenches.
- t) All spare cores on cables are ring lugged and connected to earth on one side.
- u) All spare cores are grouped and labelled with the cable number they belong to.

Network Communication Cabinet Works

- a) The *Contractor* supplies and installs Fibre Optic standard 8U rack wall mount patch panels, with an IP rating of 65 at the location identified by the *Employer*.
- b) The patch panels are installed with brush panels and fibre patch leads.
- c) The works requires splicing of Fibre Optic cables and issuing of OTDR test certificates.
- d) The installation complies with the 240-7073288: Measurement Methods and Test Procedures.
- e) OTDR to be done from both ends with Jump box.
- f) All Fibre Optic cable cores will be splices and terminated in the panels.
- g) Patch Panel connectors to be ST type.
- h) Patch (Fibre Optic) cables leaving panels to be Ruggedized.

Instrumentation Works

The Contractor procures, assembles, supplies, configures, bench tests all instruments and installs field instrumentation and its accessories that are suitable for the works and conforms with, the Employers detailed design drawings, standards for field instrumentation and mechanical works, DIN2353 standards and this Works Information, during cold commissioning the Contractor performs function test for each instrument verifying the process simulation to the HMI.

- a) Seals and flanges
 - Gaskets on the transmitters are compatible with the Hydraulic Oil.

- No asbestos gaskets are allowed.
- Hydraulic sealant is used at the coupling points where NPT fitting is to be installed.
- No Teflon tape is used for sealing on this system. NPT fittings are used on the couplings and Parallel threads will be used on the transmitter. Care must be taken when assembling the transmitter/manifold. The manifold has Teflon seals which will not interact with the hydraulic oil.
- Gaskets installed at flanges are selected based on the specifications of the water or oil involved.
- Gaskets are installed to allow ease of maintenance.
- Flanges are selected based on the current system design standards.
- By-Pass lines are to be installed so that frictional losses are minimized, and maintenance can be carried out easily where necessary.
- All flanges and fittings are torqued to manufacturer's recommendations.
- Seal bonded washers. (Dowty gasket seal plated carbon steel with buna O-ring)

b) Maximum pressure rating

- Manifolds – The manifold is rated to 4 times its operating value and complies with ASME standards.
- Instrument – The instrument installed have a burst pressure capacity which is similar setting as the safety valves for a pressurised vessel.
- Mechanical equipment – All fittings and couplings selected based on the maximum possible operating pressure and include a safety factor of at least two.

c) Existing pipe fitting and tubing

- Most of the existing impulse lines are copper tubing routed from tap-off point to instrument will be decommissioned.
- All existing tap-off points to be penetrant tested to assess the condition of the weld.

d) Pipes:

- All pipes to be used in all mechanical designs will conform to the EN standard as per the original plant design. The material of all pipes is P195GH Carbon Steel as per BS EN 10216-2. The Contractor is required to provide this material for pipes or an alternative carbon steel material superior to P195GH Carbon Steel as per BS EN 10216-2. If the Contractor submits an equivalent material to the specification (within the BS EN domain), the proposed material is reviewed for acceptance. If however, the Contractor submits a foreign material to the BS EN

domain, a PMA (particular material appraisal) is completed for this material and reviewed for acceptance. A 3.1 material certificate as per EN 10204 is supplied with the material. Refer to the tender technical evaluation criteria for more information on how the Contractor will be technically evaluated regarding the materials.

- Galvanising of pipework where necessary.
- All piping to be de-burred and flushed to remove any debris and swarf.
- Refer to the different drawings for size specifications of the pipes for the different systems.
- The piping for cooling water system is hot dip galvanised and coated to required stipulated colour in accordance with approved corrosion protection specification as supplied by the Contractor and approval by the Employer.

e) Flat Plates:

- All flat plates to be used in all mechanical designs will conform to the EN standard as per the original plant design. The material of all flat plates is P235GH carbon steel as per BS EN 10028-2. The Contractor is required to provide this material for flat plates or an alternative carbon steel material superior to P235GH carbon steel as per BS EN 10028-2. If the Contractor submits an equivalent material to the specification (within the BS EN domain), the proposed material is reviewed for acceptance. If however, the Contractor submits a foreign material to the BS EN domain, a PMA (particular material appraisal) is completed for this material and reviewed for acceptance. A 3.1 material certificate as per EN 10204 is supplied with the material. Refer to the tender technical evaluation criteria for more information on how the Contractor will be technically evaluated regarding the materials.
- The flat plates include all flat bars, square or rectangular bars, plates, flanges (blank and slip-on), angle irons and U-channels. The dimensions for each of these components is system specific and is indicated on the drawings.
- Refer to the different drawings for size specifications of all flat plate products for the different systems.

f) Branches:

- This section covers all systems where new branches will have to be welded. The nozzle/stub/branch will have to be manufactured for each system as per the required dimensions for each specific system. All stubs can be manufactured from the following billet as all dimensions will comfortably fall within this dimensional and material requirement:
 - Forged round bar

- Size: Ø30mm (OD) x 1m (Length)
 - Material: P235GH Carbon Steel as per BS EN 10273
- The Contractor is required to provide this material or an alternative carbon steel material superior to P235GH carbon steel as per BS EN 10273. If the Contractor submits an equivalent material to the specification (within the BS EN domain), the proposed material is reviewed for acceptance. If however, the Contractor submits a foreign material to the BS EN domain, a PMA (particular material appraisal) is completed for this material and reviewed for acceptance. A 3.1 material certificate as per EN 10204 is supplied with the material. Refer to the tender technical evaluation criteria for more information on how the Contractor will be technically evaluated regarding the materials.

g) Fittings

- All fittings, including carbon steel and stainless-steel fittings, is designed specifically for each different system and application. The pressure ratings of the fittings are compared to the system operating specifications and reviewed accordingly in terms of system operating medium, system pressure, temperature, material requirements, etc. The size and type of fittings are indicated on the detailed design drawings provided by the Employer for the respective subsystems.
- All carbon steel fittings are of the following material: ASTM SA-105N. A PMA is completed to use the ASME material on a BS designed system. If the Contractor submits an equivalent material to the specification (within the BS EN domain), the proposed material is reviewed for acceptance. If however the Contractor submits a foreign material to the BS EN domain, a PMA (particular material appraisal) is completed for this material and reviewed for acceptance. A 3.1 material certificate as per EN 10204 is supplied with the material. Refer to the tender technical evaluation criteria for more information on how the Contractor will be technically evaluated regarding the materials.
- All stainless-steel fittings are of the following material: 316 austenitic stainless steel. A PMA is completed to use the ASME material on a BS designed system. If the Contractor submits an equivalent material to the specification (within the BS EN domain), the proposed material is reviewed for acceptance. If however the Contractor submits a foreign material to the BS EN domain, a PMA (particular material appraisal) is completed for this material and reviewed for acceptance. A 3.1 material certificate as per EN 10204 is supplied with the material. Refer to the tender technical evaluation criteria for more information on how the Contractor will be technically evaluated regarding the materials.

- Refer to the different drawings for size specifications of the fittings for the different systems.

h) Tubing:

- The stainless-steel tubing is 12mm in outside diameter and has a 2mm wall thickness.
- The material of the tubing is 316 austenitic stainless steel. A PMA is completed to use the ASME material on a BS designed system. If the Contractor submits an equivalent material to the specification (within the BS EN domain), the proposed material is reviewed for acceptance. If however, the Contractor submits a foreign material to the BS EN domain, a PMA (particular material appraisal) is completed for this material and reviewed for acceptance. A 3.1 material certificate as per EN 10204 is supplied with the material.
- Tubing length will vary depending on the location of the instruments.

i) Manifolds :

- Manifolds have a $\frac{1}{2}$ Inch BSP female thread and a $\frac{1}{2}$ inch male BSP. All seals must be PTFE (Teflon). The manifolds have an isolation valve, vent valve and a vent pin. The valve should also be of the lockable type.

j) Location of instrumentation:

- The instrument will not be safety risk for routine inspection and will not pose a physical slipping risk and therefore injure an operator when doing routine inspection.
- All local indication is read easily while standing on ground level.
- The instrument is located in an area which can be accessed without the need for a High Voltage (HV) permit where practically possible.
- The instrumentation is installed in easy to reach locations and grouped together where possible as per Employers detailed design drawings.
- The transmitters are located at a reasonable height to ensure ease of maintenance.
- All representations of identical data will have the same format (decimal points) and units wherever the process data is displayed for operation use.

k) Support structure:

- Any support structure ensures minimal vibration is transferred to the transmitters.
- It ensures that the tubes are secured during operation of the hydraulic system.
- Non-slipcover plates are installed where required and handles available for easy access of equipment.

- The structure is correctly coated and painted according to the preferences of the Employer.

l) Welding and Non-Destructive Testing (NDT)

- The welding is done as per the Eskom Standard 240-106628253 (Standard for welding requirements on Eskom plant). The Contractor complies with section 8.5 in Eskom Standard 240-106628253 (Standard for welding requirements on Eskom plant) where it states that the Contractor is ISO 3834-2 accredited to be allowed to weld on Eskom Level 1 plant.
- The Contractor is in possession of a valid ISO 3834 – 2 Certificate. The Contractor submits all pages of the ISO 3834 – 2 certificates to the Employer for acceptance as part of the tender returnable documents. The ISO 3834-2 certificate should include material groups 1 and 8 as per ISO/TR 15608, construction standard EN 13480 and welding processes MMA (111) and TIG (141).
- The Eskom welding standard will apply to all systems. All carbon steels can be regarded as ISO/TR 15608 material group 1.2 for welding purposes. All stainless steels can be regarded as ISO/TR 15608 material group 8.1 for welding purposes.
- Qualified Welding Procedure Specifications (WPS) & Welding Procedure Qualification Record (WPQR). The Contractor is required to perform the following high-level welds as per the different designs: set-on stub fillet welds, bracket fillet welds, fillet welds for flanges, pipes and guide plates and butt welds. The Contractor submit WPS's and WPQRs for between 80% to 100% of all the required welds as per the design, specifically including the required butt welds. If the Contractor supplies between 80% and 100% of the WPS's, the Contractor will score 5/5 for this section. (The Contractor's WPS's and WPQRs to be signed off by IWE/IWT and the AIA; all destructive and non-destructive test results as required by the Welding Code BS EN 15614 must be submitted as proof of qualification).
- A potential sub-Contractor is scored as per the evaluation criteria stipulated for the Contractor, without any exceptions, except if an exception is clearly stated.
- The Contractor is responsible to prepare all components for welding.
- The Contractor provides NDT in terms of penetrant testing, ultrasonic testing and pressure testing as per the Works Information. NDT should be performed as per the Standard for Non-Destructive Testing (NDT) on Eskom Plant (Document number 240-83539994). A Level 3 NDE Technician is required to perform NDT on Eskom Plant. The Contractor must supply proof that they are an acceptable Eskom vendor for NDT purposes or are sub-contracting to an acceptable Eskom vendor for NDT purposes.

- Set-on Stub Fillet Welds
 - The condition of existing branches to be re-used is checked by performing penetrant testing to identify any surface weld defects. If the NDT indicate weld defects, the weld will have to be repaired or a new branch/stub/nozzle will have to be welded.
 - All new set-on stub welds are required to be penetration fillet welds, followed with 100% penetrant testing as NDT.
 - Quality level B (as per BS EN ISO 1517) is permitted as limits for weld imperfections.
 - The *Contractor* is required to send their WPS for the different required set-on stub fillet welds.
- Bracket Fillet Welds
 - 10% of all new fillet welds on the brackets is followed with penetrant testing as NDT.
 - Quality level D (as per BS EN ISO 1517) is permitted as limits for weld imperfections.
 - The *Contractor* is required to send their WPS for the different required fillet welds.
- Fillet Welds (Flanges, guide plates, etc.)
 - 100% of all new fillet welds on all other fillet welds (excluding brackets and set-on stubs) is followed with penetrant testing as NDT.
 - Quality level B (as per BS EN ISO 1517) is permitted as limits for weld imperfections.
 - The Contractor is required to send their WPS for the different required fillet welds.
- Butt Welds
 - All new butt welds are followed with penetrant testing and ultrasonic testing as NDT.
 - Quality level B (as per BS EN ISO 1517) is permitted as limits for weld imperfections.
 - The Contractor is required to send their WPS for the different required butt welds.
- Pressure Testing on Impulse Lines
 - Pressure testing to be performed on all systems to 1.25 times the system pressure as per the Pressure Equipment Regulations.
 - If the pressure test is not possible on systems categorised as SEP (or Not Regulated) according to SANS 347, a leak test is sufficient, which is performed under normal operating conditions of the specific system.

- Tube Bending NDT
 - Five samples of the same tubing (size and material) is bent prior to implementation of all tubes for the various systems. Wall thickness is recorded on the intrados and extrados of the bends, as well as ovality checks before approval is granted for all tubing to be implemented on all systems.
 - The minimum allowable wall thickness on the extrados is 1.37mm. The ovality is reviewed by using BS EN 13480-2 as reference.
- Branch Stub for Temperature probes
 - All stubs can be manufactured from the following billet as all dimensions will comfortably wall within this dimensional and material requirement:
 1. Forged round bar
 2. Size: Ø25mm (OD)
 3. Material: P235GH Carbon Steel as per BS EN 10273
 - The Contractor is required to supply this material or an alternative carbon steel material superior to P235GH carbon steel as per BS EN 10273. If the Contractor submits an equivalent material to the specification (within the BS EN domain), the proposed material is reviewed for acceptance. If however the Contractor submits a foreign material to the BS EN domain, a PMS is completed for this material and reviewed for acceptance. A 3.1 material certificate as per EN 10204 is supplied with the material.

m) Pressure transmitters:

- The installation of the transmitters includes pressure gauges on the same process line depending on the Employer's design.
- The Contractor procures components, manufactures, assembles and supplies support structure (mounting brackets) for the pressure transmitters as per detailed design drawings provided by the Employer and ensure that the structure do not interfere with instrumentation or maintenance activities. The Contractor conforms to the Employer's welding requirements.
- The Contractor to configure and bench test the pressure transmitters prior to the outage. The check sheets to be completed with the configuration information and bench tests results. Each instrument to be labelled with a calibration sticker with the initials of the person who performed the testing and the date of execution.

n) Level transmitters:

- The Contractor procures, assembles, supplies and installs standpipes, level instruments, valves, flanges necessary to complete the installation. The Contractor modifies the existing plant by cutting, drilling, welding, blanking etc. as necessary to install the new complete level devices.
- The level transmitters are installed with a standpipe chamber or stilling well.
- The standpipe or stilling well is of suitable dimension as per detailed design provided by the Employer to allow sufficient oil flow into the system and to be able to read accurate measurement.
- The standpipe chamber is installed with isolation valves to isolate the process medium from the instrument for maintenance purpose.
- Standpipes are installed with vent line and drain lines as applicable depending on the system.
- The Contractor to configure and bench test the level transmitters prior to the outage. The check sheets to be completed with the configuration information and bench tests results. Each instrument to be labelled with a calibration sticker with the initials of the person who performed the testing and the date of execution.

o) CW Flow transmitters

- The existing flowmeters will be replaced with new Electromagnetic flowmeters with a digital local display.
- Flowmeters are installed in a welded socket in the pipe. The Contractor is required to remove the existing pipe sections, clean, modify pipe work by cutting, welding existing and new pipe sections and flanges as per the Employer's design. Installs the new modified pipe sections and flow meter, aligns as per the Employer's design.
- The Contractor cleans the weld, performs NDT, corrosion protects, and provides weld and pressure test certificates.
- The Contractor paints, installs gaskets and installed the pipe section and instrument.
- The Contractor provides pre-manufactured spool pieces, with matching flanges with flow inserts, as per the Employers detailed design drawings where appropriate.
- The Contractor procures (four) and installs the spool pieces for the DWM2000 magnetic flowmeter that are pre-manufactured by the OEM for pipes that are DN40 in size.

- The Contractor removes, cleans, blanks-off, modifies, performs welds and weld tests, corrosion protects, pressures tests pipe sections on or off site that cannot be premanufactured to accommodate the new designs as per the Employer's design.
- The Contractor procures and installs insulating gasket, sleeve, and washers for galvanic insulation between stainless steel and carbon / mild steel pipe work.

p) Oil Flow

- Various oil systems are currently installed with multiple oil flow detectors. The Contractor is required to replace these devices with new flow switches. The installation will require the removal of existing pipe work, cleaning, cutting, welding and fitting of a welded-on stub and installs the new flow switch.
- Oil flow switches will follow the same welding requirements as the temperature probe stubs.

q) Temperatures

- Some Pt100 RTD with terminal head will be inspected and re-used. The Contractor will either replace the ceramic block for termination, or clean and cut the socket for the thermowell, weld a new socket, pressure test, and replace with the new probes.
- Where new probes are required, the Contractor will be required to cut, weld a stub, pressure test and installs a thermowell, and the new temperature probes.
- The Contractor to configure and bench test the temperature instruments prior to the outage. The check sheets to be completed with the configuration information and bench tests results. Each instrument to be labelled with a calibration sticker with the initials of the person who performed the testing and the date of execution.

r) Water in oil instruments

- Each oil system is currently installed with multiple water in oil detectors. The Contractor is required to replace these devices with new point level detection devices. The installation will require the removal of existing flanges, cleaning, cutting, welding and fitting of a new flange with a welded-on stub and installs the new probe.

s) Limits switches

- The plant is installed with limits switches for the brakes, guide vanes shear pins and guide vanes locks. The Contractor is required to replace the limit switches as per Employer's design.

Note: The basic design specification for the mechanical changes required to interface some of the instruments to the existing plant will be provided at a later stage when access to the plant is available for

verification. This part of the scope of work will require similar components and resources as defined for other instruments that have completed basic designs. The *Contractor* makes provision for this scope of work as part of this contract.

Pressure Instruments specification

The *Contractor* is responsible to supply the differential pressure transmitters which contains technical data as table below:

Table 5: Differential Pressure Transmitter Technical Data

Instrument features	Description
Model	EJX110A-JHS4G-919EB
Type	Differential pressure transmitter
Output signal	4-20mA with digital communication (HART protocol)
Measurement Span/Range	-50 to 500kPa (10 to 2000inH ₂ O)
Process connections	½NPT female process connector on the top of the 3-valve manifold
Bolts and nuts material	316L SST
Installation	Horizontal piping and left side high pressure
Amplifier housing	Cast aluminium alloy
Electrical connection	M20 female, two electrical connections and a blind plug
Integral indicator	Digital indicator with the range setting switch
Mounting brackets	304 SST 2-inch pipe mounting, flat type (for horizontal piping)
Manifold	S3/FTHAX-ZH. 3 Valve Direct Mount Manifold

The *Contractor* is responsible to supply the pressure transmitters which contains technical data as table below: Prior to procurement the *Contractor* verify the range measurement with the *Employer*.

Table 6: Gauge Pressure Transmitter Technical Data

Instrument features	Description
Model	EJX530A-JBS8N-019EF, EJX530A-JCS8N-019EF, EJX530A-JDS8N-019EF
Type	Pressure transmitter

Instrument features	Description
Output signal	4-20mA Output with digital communication (HART protocol)
Measurement Span/Range	B: -0.1 to 2MPa
	C: -0.1 to 10MPa
	D: -0.1 to 50MPa
Wetted parts materials	Process connection: 316 SST, Diaphragm: Hastelloy C-276
Process connection	G½ DIN 16 288 male
Bolts and nuts material	316L SST
Installation	Horizontal piping and left side high pressure
Amplifier housing	Cast aluminium alloy
Electrical connection	M20 female, two electrical connections with bind plug
Integral indicator	Digital indicator with the range setting switch
Mounting brackets	304 SST 2-inch pipe mounting
Manifold	P2/W4GW4GTV2AH-R. 2 Valve Block and Vent Gauge Valve

The *Contractor* is responsible to supply the pressure gauges which contains technical data as table below: Prior to procurement the *Contractor* verify the range measurement with the *Employer*.

Table 7: Pressure Gauge Technical Data

Instrument features	Description
Model	151.10
Type	Bourdon tube pressure gauge
Scale range	0 – 1500kPa
	0 – 3000kPa
	0 – 6000kPa
	0 – 10000kPa (10MPa)
Design	EN 837-1
Accuracy class	1.0
Nominal size	100mm

Instrument features	Description
Permissible temperature	Ambient: -20 to +60 °C
Ingress protection per IEC/EN 60529	IP 65
Process connection	Copper alloy, Lower mount G ½ B
Pressure element	Measuring System 316L
Dial	NS 50, 63: Plastic ABS, with pointer stop pin
Pointer	NS 50, 63: Plastic, black
Case	Stainless steel, natural finish. Sealing towards process connection with O-ring. With all scale ranges, the filling plug can be vented for internal pressure compensation.
Window	Glass, crystal clear
Ring	Crimped triangular bezel, stainless steel, glossy finish
Filling liquid	Glycerine

The *Contractor* is responsible to supply the pressure instruments accessories which contains technical data as table below: Prior to procurement the *Contractor* verify the range measurement with the *Employer*.

Table 8: Stainless Steel Instrumentation Quick Connect Body

Instrument features	Description
Part Number	SS-QC4-B-4PM
Body Material	316 Stainless Steel
Connection Size	1/4 inch
Connection Type	Male NPT
Series	QC4

Table 9: Stainless Steel braided flexible hose with Quick Connectors

Instrument features	Description
Part Number	SS-810-1-8
Tube Part Number	SS-4BHT--12

Instrument features	Description
Body Material	316 Stainless Steel
Connection 1 Size	1/2 inch
Connection 1 Type	Swagelok Tube Fitting
Connection 2 Size	1/2 inch
Connection 2 Type	Male NPT
Length	300

Level Instruments specification

The *Contractor* is responsible to supply the reed level transmitters which contains technical data as table below: Prior to procurement the *Contractor* verify the range measurement with the *Employer*.

Table 10: Reed Level Transmitter Technical Data

Instrument features	Description
Model	MPJ5-M280 and MPJ5-M505
Type	Reed Level Transmitter for the process industry.
Measuring principle	Continuous level measurement transmitter with reed measuring resolution of 5mm, inserted in round hollow float of 52x52mm and stopper at the end and head mounted transducer type: 2252.
Power supply	24V DC
Output signal	4-20mA
Process connection	½" BSP male tapered compression fitting
Measuring range	MPJ5-M280: 200mm with top dead-band of 100mm and bottom dead-band of 50mm.
	MPJ5-M505: 360mm with top dead-band of 100mm and bottom dead-band of 50mm.
Guide tube diameter	12mm
Maximum guide tube length	MPJ5-M280: 350mm
	MPJ5-M505: 500mm

Instrument features	Description
Head- mounted transmitter	PR 5343A 2-wire level transmitter (0 – 100kΩ)
Connection cable to transmitter	2-wire
Ingress protection per IEC/EN 60529	IP 65
Ambient Temperature	-40 °C to +120 °C
Float and guide tube material	Stainless steel

The *Contractor* is responsible to supply the reed sensor for bypass level indicators which contains technical data as table below: Prior to procurement the *Contractor* verify the range measurement with the *Employer*.

Table 11: Reed Sensor for Bypass Level Indicators Technical Data

Instrument features	Description
Model	MPJ5-M1500
Type	Reed sensor for bypass level indicators
Measuring principle	Sensor for continuous level measurement of liquids in bypass level indicators, with programmable and configurable head mounted. Installation of head-mounted transmitter in the connection housing possible.
Power supply	24V DC
Output signal	4-20mA
Process connection	½" BSP male tapered compression fitting
Measuring range	1400mm with top dead-band of 50mm and bottom dead-band of 50mm.
Guide tube diameter	14mm
Maximum guide tube length	1500mm
Head- mounted transmitter	PR 5343A 2-wire level transmitter (0 – 100kΩ)
Connection cable to transmitter	2-wire
Ingress protection per IEC/EN 60529	IP 65
Ambient Temperature	-40°C to +120°C

Instrument features	Description
Accessories	Steel pipe clamps for 60mm diameter pipe

The *Contractor* is responsible to supply the magnetic display for bypass level indicator which contains technical data as table below: Prior to procurement the *Contractor* verify the range measurement with the *Employer*.

Table 12: Magnetic Display for Bypass Level Indicator Technical Data

Instrument features	Description
Model	BMD-SA
Type	Magnetic display for bypass level indicator
Measuring principle	Display bar for visualisation of levels in combination with bypass level indicators. Measured value display by means of rollers or permanent magnets.
Chamber	OD 42 x 2mm
Chamber end top	Vent flange
Chamber end bottom	Flange with drain plug BSP½"
Process connection	Side-Side, Flange DN10 – DN25, PN40, DIN 2635
Distance centre-to-centre M...	
Material	Stainless steel 316Ti (1.4571)
Maximum pressure	64bar and 100bar
Float	Type ZTS35/18, material Titanium Grade 2, S.G. minimum 800kg/m³ max pressure 16bar.
Medium temperature	-200 ... +450 °C
Case	Aluminium
Length	1400mm
Display element	Plastic rollers, PBT, red/white
Indicator window	Polycarbonate profile
Ingress protection per IEC/EN 60529	IP 65

The *Contractor* is responsible to supply the magnetic switch for bypass level indicator which contains technical data as table below:

Table 13: Magnetic Switch for Bypass Level Indicator Technical Data

Instrument features	Description
Model	BGU
Type	Magnetic switch for bypass level indicator
Contact	Reed contact
Contact type	1 change-over contact
Switch behaviour	Bistable
Switching power	230V AC
Case	Stainless steel

The *Contractor* is responsible to supply the point level detectors which contains technical data as table below:

Table 14: Conductive Point Level Detection Technical Data

Instrument features	Description
Model	11375Z
Type	Conductive Point Level Detection
Measuring principle	Conductive
Characteristic / Application	One rod probe for high temperature and high pressure. Corrosion resistance
Supply / communication	Relay (FTW325)
Medium temperature	-40 °C to +200 °C
Operating pressure	Up to 50bar
Process connection	G½
Length	120mm
Sensor Length	50 to 2000mm
Minimum conductivity of medium	20µS/cm
Ingress protection	IP65

Instrument features	Description
Additional Device	
Model	FTW325
Device type	Transmitter
Power supply	20 to 60V DC
Mounting type	DIN rail
Switch output	SPDT
Module for non-hazardous area	Yes

Flow Instruments specification

The *Contractor* is responsible to supply the flow transmitters / switch which contains technical data as table below. Prior to procurement the *Contractor* verify the flow switch length with the *Employer*.

Table 15: Electromagnetic Flow Meter Technical Data 1

Instrument features	Description
Model	DWM2000
Type	Electromagnetic Flow Meter V741421C320100000
Output signal	4-20mA
Power supply (instrument terminal)	24V DC
Function	For monitoring flow velocity in pipes
Display units, 1 st line	m/s
Display units, 2 nd line	m ³ /h
User interface	2-line LCD indicator with 4 buttons keypad
Full-scale range	1,2,3,4,5,6,7 or 8m/s Programmable
Maximum allowed operating pressure	25bar
Ingress protection	IP 55
Electromagnetic compatibility	EN 50081-1; EN 50082-2
Housing without stainless housing	Aluminium with epoxy finish

Instrument features	Description
Sensor insulation	Ceramic [Zirconium oxide]
Spool piece	316L [1.4404] stainless steel
Cable entry	Nickel-plated brass
Gasket, sensor	FKM/ FPM
Gasket, housing cover	Perbunan

Table 16: Electromagnetic Flow Meter Technical Data 2

Instrument features	Description
Model	200B3DASSR2MXI
Type	Electromagnetic Flow Meter
Output signal	4-20mA
Power supply (instrument terminal)	24V DC
Meter Size	DN200
Signal Converter	Beta Converter
Lining Material	Durathane Rubber
Electrode Material	316 Stainless Steel
Converter Mounting	Integral Mounting

Table 177: Flow Switch Technical Data

Code	Description
Part Number	DTT31-A1B111AEX1AB
Flowphant T	DTT31
A Approval:	Non-hazardous area
1 Electrical Connection:	Plug ISO4400 M16x1.5
B Power Supply; Output:	18-30VDC; 1x switch PNP
1 Display:	Digital
1, Application; Measuring range:	Liquid, -20...85oC 0.03-3m/s

1 Adjustment;	On site
AE Process Connection:	G1/2 male thread ISO228, 316L
X1 Insertion Length L; Diameter D:	L-140 mm; D-6mm
Sensor:	Calorimetric principle.
Protection:	IP65

Temperature Instruments specification

The *Contractor* is responsible to supply the temperature transmitters which contains technical data as table below: Prior to procurement the *Contractor* verify the probe length with the *Employer*.

Table 8: Resistance Thermometer Without Thermowell Technical Data

Instrument features	Description
Model	TR10-H
Type	Resistance thermometer without thermowell
Sensor measuring element	Pt100
Sensor range	-196 to +600°C
Connection method	Dual element 2 x 3-wire
Validity limits of class accuracy per EN 60751	Class A
Connection head	BSS
Ingress protection	IP 65
Cable entry	Standard M20 x 1.5 or ½ NPT
Probe length	600mm (est.); 675mm with 150mm flexible rod
Protruded fixed threaded connection	Yes

The *Contractor* is responsible to supply the RTD (Resistance Temperature Detector) which contains technical data as table below: Prior to procurement the *Contractor* verify the probe length with the *Employer*.

Table 189: RTD Pt100 Sensor Technical Data

Instrument features	Description
Type	RTD
Sensor measuring element	Pt100
Sensor range	-50 to +400°C
Cable length	10m (est.) embedded steel braided cable.
Probe length	100mm (est.); 130mm (est.); 240mm (est.)
Probe diameter	5mm (est.)
Probe material	Stainless steel
Threads	M8 with nut
Electrical connection	3 wires
Accuracy	Class A

The *Contractor* is responsible to supply the Platinum Resistance Thermometer Pt100 RTD with Terminal Head which contains technical data as table below: Prior to procurement the *Contractor* verify the probe length with the *Employer*.

Table 20: Pt100 RTD with Terminal Head

Instrument features	Description
Type	RTD
Sensor measuring element	Pt100
Sensor range	-50 to +400°C
Probe length	50mm; 100mm; 200mm.
Probe diameter	5mm (est.)
Probe material	Stainless steel
Threads	G ½"
Electrical connection	3 wires
Tolerance Band	Class A
Head type	316 stainless steels, IP68

Instrument features	Description
Head accessory	Ceramic terminal block

The *Contractor* is responsible to supply the Thermowell for Pt100 RTD which as per table below:

Table 21: Thermowell

Type	Threaded or push-in/weld-in protection tube (Thermowell)
Material	Stainless Steel 316L
Process thread	G1/2 male
Connection to thermometer	G1/2 female
Total length	70mm, 120 mm
Head Length	20 mm
Insertion length	50mm, 100 mm
Tube dimension:	9.53 x 1.22 mm

Protective Earthing

- The *Contractor* earths all control panels, instruments (including instruments brackets), junction boxes and cables trays to the station earthing system and complies with the Earthing and Lightning Protection standard.
- The installation is earthed properly in accordance with the Installation and Mitigation Guidelines – Section 2: Earthing and Cabling.

Marking and Labelling of Cables and Core Tags

- The *Contractors* provides marking, printing, and labelling for the works provided under this Contract. Labelling is according 240-62629353: Specification for Panel Labelling Standard
- The *Contractor* labels all incoming cable to the control panels and junction box at the glanding point and at instrument glanding point.
- Cable identification numbers are permanently fixed to the cable at both ends. The *Contractor* supply the 70mm yellow labels and affix these to the cables using clear 70mm sleeve. The *Contractor* prints the cable numbers using the cable schedule provided by the *Employer*.

- d) The *Contractor* ensures that the cable numbers affixed to the cable are the same.
- e) The *Contractor* labels all wires with core-tags, which indicates the terminal strip and terminal numbers. All core-tag for the terminals is 23mm yellow PVC and the wiring on the panel doors are 15mm yellow PVC tags.
- f) The *Contractor* labels all field instruments using 70mm tags yellow labels and affix them using clear 70mm sleeves. The core tag used for the instruments are 15mm yellow PVC tag.
- g) Conductive stick-on labels are not acceptable.
- h) Horizontal Terminal Strip: Tag is readable from left to right.
- i) Vertical Terminal Strip: Tag is readable from bottom to top.

Junction boxes and Patch Panels Labelling

The *Contractor* labels the junction boxes and patch panels with the full KKS codes as provided by the *Employer*. The labelling (nameplate) is attached on the front of the junction boxes and patch panels. The labelling is according 240-71432150: Plant Labelling Standard. The labelling of the junction boxes and patch panels consist of the following:

- a) Material
 - The nameplate is created with white graflux and uses a slid in aluminium holder.
 - Colour coded plastic should be used for internal panels.
 - Label thickness: 1.5mm.
- b) Ergonomic Requirements
 - Consistency maintained when attaching labels on the panels.
 - Labels are fitted in a manner not to hamper routine operation and maintenance activities.
 - The location of labels on an item should ensure readability during normal operation of plant without compromising identity of exact equipment. If not possible, consult the Employer.
 - Labels are mounted so that the text runs in a horizontal plane reading from left to right to the nearest fixed point that is being described.

- c) Environmental Factors

All plant labels are as permanent as the normal life expectancy of the plant and be capable of withstanding the following environmental conditions:

- Rain
- Hail
- Temperature variance as required by plant
- Wind and Dust erosion
- Ultraviolet rays (sun)
- Corrosion.

d) Notation of KKS Code

Single spacing between unit, system, equipment, and components as per 240-71432150 standard is used in all labels.

e) Engraving

- Arial font is used on all labels.
- Standard vertical characters are used.
- Narrow (condensed), broad (extended) characters are not acceptable.
- Horizontal lines are evenly spaced amongst the height of the label.
- If the label description is too long to fit in one line and requires going over multiple lines, it should be spread evenly across the height of the label.
- All labels have character fill in black.
- Label Type EH – Junction Box label:

Fixing Method: Adhesive.

- Alphanumeric Characters: 10mm High.
- Description Characters: 10mm High.
- White background.

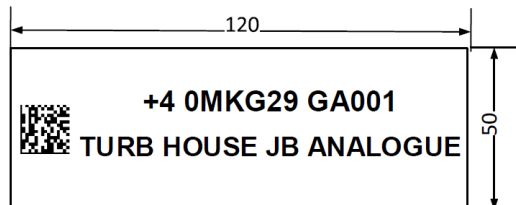


Figure 3: Example of Junction Box Labelling

Codification

- a) Vanderkloof Hydroelectric Power Station subscribes to the KKS codification. All drawings and equipment lists are coded according to the KKS codification including descriptions.
- b) The *Contractor* utilise the KKS codification when labelling Instruments and Components, which is provided with the detailed design drawings of the *Employer*.

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

Engineering Change Management process

The *Contractor* takes notes of the *Employer's* process of authorising the design which is the Engineering Change Procedure (240-53114026). Engineering changes includes any proposed change originating from engineering, *Contractors*, project management and construction management.

The Engineering Change Procedure applies to the *Employer's* personnel or *Contractor* performing engineering or change related work where the quality of the engineering work performed is the direct responsibility for the *Employer*. The process consists of:

- a) Concept Design
- b) Basic Design
- c) Detailed Design

The *Contractor* submits as a minimum the following data in neat files for acceptance by the *Employer* during the Technical Evaluation:

- a) Completed Relevant Technical Schedules B
- b) Deviation Schedule
- c) Bill of Materials
- d) Technical Datasheet of all Components, instruments, and its accessories.
- e) Example of Method Statement
- f) Example of Quality Control Plan including all intervention points.
- g) Proof of relevant work experience and skills.

Design Review Procedure

The *Contractor* is made aware of the Design Review Procedure (240-53113685). The process of the review consists of:

- a) Contract Review (technical clarification review)
- b) Design "Freeze" Review

Process for submission of documents

Where the *Contractor* performs the design, the *Contractor* submits all documentation according to the accepted engineering management plan. The process for the submission of documentation is described below and applicable to each end-of-phase design review:

- a) The *Contractor* submits the documents/drawings to the *Project Manager* with the appropriately reference Design Review Template.
- b) The *Employer's* Document Controller registers the documents
- c) The *Employer's* Document Controller supplies the documents/drawings to all relevant parties within the *Employer's* project team.
- d) The *Employer's* project team reviews the documents/drawings and submits all comments or inputs to the *Project Manager* and the *Project Manager* submits to the *Contractor* for consideration.
- e) The *Contractor* revises the design, documents and/or drawings to address the *Employer's* comments and resubmits to the *Project Manager*.
- f) Once all the *Employer's* comments have been addressed and no major deficiencies are found, the *Contractor* arranges a Design Review session.
- g) If no fundamental errors are found in the design during the Design Review session, the *Contractor* compiles the Design Review minutes or report and submits it to the *Project Manager*.
- h) The *Employer's* Document Controller registers the report.
- i) The *Employer's* project team reviews the *Contractor's* report/minutes. If the report/minutes are not acceptable, the *Contractor* revises the report/minutes and resubmits to the *Project Manager*.
- j) The *Project Manager* accepts the *Contractor's* design once the report/minutes are accepted by the *Employer's* project team.
- k) The *Contractor* submits all technical documentation and drawings for acceptance by the *Employer* prior to Site Construction Works.

Time Required for Acceptance of Designs

Where the *Contractor* performs the design, not later than one month after receipt, the *Project Manager* returns one copy of the drawing marked "Accepted"; "Accepted as Noted" or "Not Accepted", as may be appropriate. The notations "Accepted" and "Accepted as Noted" authorize the *Contractor* to proceed with the manufacture of the Plant covered by such drawings subject to the corrections, if any, indicated thereon. Where prints or drawings have been "Not Accepted" or "Accepted as Noted" the *Contractor* makes the necessary revisions on the drawings and submit further copies for acceptance in the same procedure as for the original submission of drawings.

General documentation requirements for acceptance of *Contractor's* design

Where the *Contractor* performs the design, the *Contractor* submits all documentation according to the accepted engineering design requirements and standards.

- a) All documentation complies with the latest Eskom's Classification and Designation of Technical Documentation Standard, 240-54179170; Eskom's Documentation Management Standard, 32-644 rev1, NRS 002.
- b) The documentation supplied is in South African English and SI units are used.
- c) The *Contractor* provides documentation in the electronic media using Microsoft Office, unless otherwise stated.
- d) The *Contractor* implements a comprehensive document management system of the control of all documents, revision status "as-designed", "as-manufactured", "as-commissioned" and "as-built".
- e) The *Employer* does not accept scanned electronic copies of documentation or drawings.
- f) The *Contractor* submits electronic copies of PDF drawings upon first issue and each time drawing updates are required.
- g) The final as-built drawing in an electronic format is submitted in MicroStation (DGN) or format that is compatible with MicroStation.
- h) Multilayer drawings are not acceptable.
- i) All documents and drawing submissions are prepared and signed-off by suitably qualified personnel.
- j) The *Employer* allocates numbers to the documentation and drawings, which the *Contractor* indicates on the documentation and drawings.
- k) The *Contractor* uses the pre-approved templates provided by the *Employer* for documentation and drawings. The drawings make provision for the Eskom border.
- l) All documentation required at the various acceptance stages are submitted in a hard copy and a software copy format.

Detail design documentation requirements for acceptance of the *Contractor's* design

- a) FAT procedures to be used for the junction boxes.

Site Construction documentation requirements for acceptance of the *Contractor's* Work

The *Contractor* submits all technical documentation acceptance prior to Site Construction Work which includes:

- a) Work Method Statements.

- b) Quality Control Plans and Check Sheets.
- c) Cable drum test certificate.
- d) Others certificate and reports as required.

Equipment required to be included in the works

The *Contractor* is to make use of the following minimum standard equipment in order to complete the *works*:

- a) Plier Crimping Tool for Bootlace Ferrule
 - Knipex Plier Crimping Tool for Bootlace Ferrule – 97 53 14, 0.08-10mm² 6 Di Crimper or
 - Phoenix Contact Plier Crimping Tool – 1212046, 0.14mm² to 6 mm² or
 - Hellermann Tyton YAC9 Bootlace Ferrule Crimper, 0.08-6mm² or Equivalent
- b) Wire Stripper
 - Hellermann Tyton Wire Stripper 1-3.2mm² or
 - RS PRO 170mm Wire Stripper 0.2mm-6mm or Equivalent
- c) Pre-insulated Lug Crimping Tool
 - Hellermann Tyton YYT1 Pre-insulated Terminal Crimper
- d) Torque Terminal Screwdriver
 - Phoenix Contact Torque Screwdriver, TSD-M 1,2Nm – 1212224 (0.3 → 1.2Nm) or
 - Wera ¼ inch Hex Pre-Settable Torque Screwdriver, 0.3 → 1.2Nm or Equivalent
- e) Multimeter
 - Fluke 789 ProcessMeter, 1A Multi-Function Calibrator or Equivalent
- f) Industrial Pipe Bender
 - Tube bender for 12mm (outside diameter) tubing/piping, 20mm and 25mm for the bosal conduit.
The Contractor provides the tube bender bend die size to the Employer for acceptance.
- g) Pipe Cutter
- h) Industrial Drill Machine
 - Hilti drill machine
 - Magnetic drill machine
 - Rotary hammer drill
- i) Grinder

j) Industrial Welding equipment

- Cutting torch
- Welding gas cylinder (Argon, Oxygen)
- All related equipment for welding requirements

k) The *Contractor* provides any other equipment not listed to perform the *Works*.

As-built drawings, operating manuals and maintenance schedules

General

- a) The *Contractor* submits, to the *Employer*, final As-built documentation of the *Works* within 60 days of completion of the *Works*.
- b) The *Contractor* submits three full sized hardcopies plus two electronic copies of the As-built documentation. The electronic copies are submitted on individual USB flash drives.
- c) The *Contractor* provides documentation in the electronic media using Microsoft Office or “searchable” PDF format.
- d) The *Employer* allocates numbers to the documentation and drawings, which the *Contractor* indicates on the documentation and drawings.
- e) The documentation is submitted in loose leaf binders to ISO format and normally A4 size. The use of oversize pages is kept to a minimum and does not exceed page height unfolded. Fixings are “D” ring and are of the snap close type. Post binders or other fixings are not acceptable. Binders do not exceed 80mm in overall thickness. The document identity appears on both the front cover and on the spine.

Manuals

- a) The *Contractor* provides technical manual for each equipment or component used in the works, which is supplied by the *Contractor*.
- b) The *Contractor* incorporates the operating description, all necessary technical data, design data, and drawings into the manuals.

Signed-off documentation

- a) Copies of all tests, indicating the results of all tests performed, are submitted to the *Employer*.
- b) The *Contractor* supplies the *Employer* with Instruction, Technical or Operating and Maintenance Manuals that includes:
 - i) Signed-off test certificates
 - ii) Signed-off Quality Control Plan and Check sheets

- c) The final issues of all manuals and drawings are submitted (4) weeks after Completion for acceptance by the *Project Manager*. All documentation duplicates reflect the original's quality.

Procurement

People

Minimum requirements of people employed on the Site

The *Contractor* ensures that all foreign personnel who are not South African citizens or permanent Residents comply with the relevant legislation to perform work within the Republic of South Africa. The *Contractor* ensures that there are at all times sufficient suitably qualified, experienced and skilled staff to carry out and supervise all activities.

BBBEE and preferencing scheme

The *Contractor* complies with and fulfils the *Contractor's* obligations in respect of the Broad Based Black Economic Empowerment (as per clause Z3) and Supplier Development and Localisation Obligations.

Subcontracting

Preferred subcontractors

None

Subcontract documentation, and assessment of subcontract tenders

The *Contractor* will provide the *works* as if he had not subcontracted and are liable and accountable for all actions of his subcontractors.

Limitations on subcontracting

The *Contractor* may be requested by the *Employer* to submit details of the qualifications and experience for each category of personnel and specialists for which a rate is submitted.

Attendance on subcontractors

Not applicable.

Plant and Materials

Quality

The *Contractor* procures, assembly and delivers all Components, Instruments and Consumables required for the Works, that are new and of the best quality, of the class most suitable for the purpose specified and governed by the national and international recognised standard: ASME, IEC, DIN and SANS. Other standards are submitted to the *Project Manager* for approval.

Procurement Process

The Procurement Process applies *Contractor* bidding for the related Works. The process consists of:

- a) Submission of the tender returnable
- b) Technical Evaluation
- c) Contract Award

Product Support

- a) All Components and devices supplied by the *Contractor* have a useful life of 12-15 years and are supported for by their respective OEMs over this period.
- b) The *Contractor* supplies a data book containing all the pertinent information for all items supplied including to but not limited to the following features:
 - OEM
 - OEM Part number specific to the variant of the item
 - Serial number
 - Technical data sheets
 - OEM's Operating manual
 - OEM's Installation manual
 - OEM's Maintenance manual
 - OEM's configuration manual
 - Configuration files
 - Hardware interface
 - Software for interfacing
 - Configuration licenses
 - Special programming tools
 - Special maintenance tools
 - OEM's warrantee certificates
 - Links to OEM Portals to verify items by serial number.

Defects correction

- a) The *Contractor* is responsible for all defects and/damage of the Works until and including the delivery to site, installation on the plant until handover.
- b) The *Contractor* offers a standard 52-week warranty/defect period on workmanship and 36 months on material used.
- c) The *Contractor* clearly states, in writing, the warrantee period on their product and the components supplied.
- d) During the warrantee period the faulty devices are to be investigated by the *Contractor* and a failure report provided to the *Employer* stating the reason for failure.
- e) The *Contractor* inspects the *Works* on or before the defects date and provides the *Employer* with an inspection report.
- f) The *Contractor* liaises with the *Employer* three months prior to the defects date to confirm availability.
- g) The *Contractor* corrects all defects and latent defects identified before the end of the defect's correction period.
- h) The *Contractor* ensures that commissioning spares are available on site at all times during the contract. Spares, as per the spares list shall be issued to the *Employer* before handover of any plant or subsystem.

Plant & Materials provided “free issue” by the *Employer*

The Contractor is required to collect the control system panels (cubicles), which were manufactured and supplied by Others, at Acacia Power Station in Cape Town (33°52'59"S;18°32'08"E) and deliver them to Vanderkloof Power Station (29°59'37"S;24°43'48"E). The Contractor ensures the proper packaging and caring of the goods while transporting and is liable for all damages until handover. All other Plant and Materials are to be provided by the Contractor.

***Contractor's* procurement of Plant and Materials**

- a) The *Contractor* procures and supplies Components, Materials and Consumables for *Works* using the bill of materials approved by the *Employer*.
- b) A Bill of Quantity for the works is provided for tender pricing purposes (see appendix B). It is the *Contractor's* responsibility to procure, store and manage Components, Materials and Consumables in an auditable manner providing the *Employer* with weekly/monthly feedback on quantities and cost.

- c) The *Contractor* ensures that all Components, Materials and Consumables are adequately transported and delivered to Site at least 45 days prior to the start of the *Works*.
- d) The *Contractor* submits a complete pre-delivery checklist to ensure all prerequisites have been complied with for the equipment to be transported to Site. The *Employer* signs off on the checklist prior to equipment being transported to Site.
- e) The *Contractor* indicates the type of transport used and mitigation measures in place to protect the equipment and materials from damage.
- f) The *Contractor* is responsible for offloading and movement of Components, Materials and Consumables to the storage area.

Spares and consumables

- a) The *Contractor* supplies consumables as per list in appendix B, and include any insignificant items that forms part of the consumables such as washer, raw bolts, welding rod, etc.
- b) The *Contractor* supplies critical spares, their quantities are listed in appendix C.
- c) The *Contractor* includes the itemised cost of the spares in the Tender and is part of the supply.
- d) The *Employer* performs an assessment of the spares list provided by the *Contractor* and from this select spares that are retained by the *Employer* and is used in the event of failure.

Marking Plant and Materials outside the Working Areas

N/A.

***Contractor's* Equipment (including temporary works)**

N/A.

Cataloguing Requirements by the *Contractor*

The *Contractor* catalogues all spare equipment provided using the *Employer's* template.

Construction

Temporary works, Site services & construction constraints

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

- a) Before work starts on Site, a Site inaugural meeting is held between the Contractor and the Employer, where details of the Works are discussed and clarified:
- The Contractor's Site Supervisor is on Site for the entire duration of the Works.
 - General access to the power station is controlled and Site induction must be completed before work will be allowed to start.
 - It is mandatory that the Contractor adheres to all security regulations in force during the period of the contract.
 - Before entry to the Site will be allowed, everyone will undergo an alcohol breathalyser test which needs to be passed.
 - There are five Life-saving Rules to which the Contractor is required to always adhere to.

Restrictions to access on Site, roads, walkways and barricades

The *Contractor* satisfies himself and comply with the Site conditions presented during induction.

The *Contractor* is required to comply with all Site restrictions pertaining to the Site's roads, walkways and barricades.

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

Normal working hours are as follows:

- Monday to Thursday (07:00 – 16:15).
- Friday (07:00 – 12:00).

Outage working hour is as follows:

- Monday to Saturday 07:00 – 17:30.
- Sunday (off day).

It is very important that the *Contractor* keeps records of his people on Site, including those of his *Sub-Contractors* which the *Project Manager* have access to at any time. These records may be needed when assessing compensation events.

Health and safety facilities on Site

The health and safety facilities on Site will be discussed in detail during the Site induction.

Environmental controls, fauna & flora, dealing with objects of historical interest

- a) The Contractor's attention is drawn to the fact that the Power Station is situated in a highly sensitive area with respect to the environment.
- b) The Contractor acquaints himself with all statutory and local environment regulations and adheres to these without exception.
- c) The Contractor complies with the Hazardous Chemical Regulations when using any hazardous chemicals, as well as complying with the requirements of the National Environmental Management Act 107 of 1998 as amended.

Title to materials from demolition and excavation

The *Contractor* has no title to plant and/or materials resulting from him carrying out the *Works*.

Cooperating with and obtaining acceptance of Others

The following NEC3 core clauses will apply 11.2 and 25.1.

Publicity and progress photographs

No notice boards, advertising rights, media relations, photography and progress photographs will be allowed without appropriate authorisation.

Contractor's Equipment

- a) The *Contractor* provides the *Employer* with a complete list of materials, tools, equipment, and machinery that does not permanently form part of the *Works* before bringing it to Site.
- b) The *Contractor's* portable electrical tools are checked by the *Employer* prior to use.
- c) Any electrical Plant or appliance used by the *Contractor* conforms to the applicable South Africa safety standards and is maintained in a safe and proper working condition.
- d) The *Employer* has the right to stop the *Contractor's* use of any electrical appliance that is being used unsafely or not complying with the relevant legislation or regulations.
- e) The *Contractor* provides and maintains all test and measuring equipment required for all tests to the required accuracy.
- f) The type and class of equipment used is subject to the acceptance by the *Employer*.

- g) The *Contractor's* measuring equipment is accompanied by valid calibration certificates from an approved authority.

The *Project Manager* may at any stage during the contract require such equipment to be checked by an approved laboratory or South Africa Bureau of Standards.

Equipment provided by the *Employer*

The *Employer* will make available his fixed overhead cranes. Only authorised personnel allowed to operate these. The Power Station has one main overhead crane in the "Machine Hall". The crane consists of a 100t main hoist which is operated via a Cabin and a 25t auxiliary hoist on the same crane, which is operated via the cabin or remote control. No mobile crane (forklift) is available on site.

- a) It is the *Contractor* responsibility to ensure that all necessary arrangement and preparation are made for the use of this crane.
- b) The *Contractor* ensures that the crane is capable of handling the loads to be lifted and any limitation with respect to height and operation.
- c) The *Contractor* notes that there is only one crane that service all units, and that the crane may be required for other work during the outage (shutdown).
- d) The *Employer* provides a qualified crane operator. The crane is operated only by the *Employer*.

Scaffolding is supplied by Others who perform the erection, securing, modification and dismantling. The *Contractor* organises where the scaffolding should be erected when required.

Site services and facilities

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

Before work starts on Site, a Site inaugural meeting is held between the *Contractor* and the *Employer*, where details of the Works are discussed and clarified:

- The *Contractor's* Site Supervisor is on Site for the entire duration of the *Works*.
- General access to the power station is controlled and Site induction must be completed before work will be allowed to start.
- It is mandatory that the *Contractor* adheres to all security regulations in force during the period of the contract.
- Before entry to the Site will be allowed, everyone will undergo an alcohol breathalyser test which needs to be passed.
- There are five Life-saving Rules to which the *Contractor* is required to adhere to at all times.

Electricity Supply

- a) All points of supply are provided in terms of availability and location. The *Employer* indicates which supply points may be used.
- b) 220V AC electrical supply is generally available in the power station complex.
- c) 380V AC supply is also available- the *Contractor* ensures they have the correct matching plugs.
- d) The *Contractor* verifies extension lead requirements.

Water Supply

- a) All points of supply are provided in terms of availability and location.
- b) The *Employer* indicates which supply points may be used.

Compressed Air Supply

- a) All points of supply are provided in terms of availability and location.
- b) The *Employer* indicates which supply points may be used.
- c) The *Contractor* verifies compressed air hose requirements.

Area for Site establishment and Storage

- a) A Site Establishment and storage area is indicated to the *Contractor* by the *Employer*.
- b) Security to the *Contractor's* storage area and facility is the responsibility of the *Contractor*.
- c) The area allocated to the *Contractor* is reinstated to its former condition on handover of the Works.

Sanitary facilities

The *Contractor* makes use of the *Employer's* facilities in the power station.

Office Space

- a) The *Employer* is not able to offer office space to *Contractors* for the period of work on Site.
- b) Parking space is available outside of the station building for the *Contractor* to utilise for temporary office space.
- c) A power supply of 230V AC, 10Amps is available to the *Contractor* for office space outside of the station building.

- d) Ablution facilities are not available, and the *Contractor* provides its own Ablution facilities.

Telecommunications

Telephone connections are not available. The *Contractor* makes provision for his own Telecommunication requirements.

Others

The *Contractor* shall provide everything else necessary for Providing the Works.

Facilities provided by the *Contractor*

- a) The *Contractor* provides, erects and maintains for own use, adequate size office accommodation and stores together with such, lighting and heating as may be required in the area designated by the *Project Manager*.
- b) The *Contractor* is to dismantle and clear off site all such temporary structures and associated foundations and infrastructure. The *Contractor* provides facilities as deemed necessary.
- c) The *Contractor* should make provision for accommodation, vehicles, kitchen - and office space (mobile container) and Equipment etc.
- d) The *Contractor* removes all this Equipment and waste which was generated during the installation and commissioning within 24 hours after Completion.

Existing premises, inspection of adjoining properties and checking work of Others

Not Applicable.

Survey control and setting out of the works

- a) The *Employer* evaluate the *Contractor's* civil works changes required to existing and new floorplan with regards to the type of concrete used, core drilling, paint and weight distribution.
- b) The *Contractor* is responsible to survey the Works to ensure that the work to be performed allow for sufficient space for installation.

Excavations and associated water control

Not Applicable.

Underground services, other existing services, cable and pipe trenches and covers

The *Contractor* minimises interference of any nature with regards to existing services, cable and pipe trench covers. In the event that the *Contractor* damages one of the above, the penalty would be for the *Contractor*.

Control of noise, dust, water and waste

Not Applicable.

Sequences of construction or installation

All activities are performed according to the Programme accepted by the *Employer*.

Giving notice of work to be covered up

Not Applicable.

Hook ups to existing works

- a) The machine hall panels are installed in the space attached to the generator enclosure. The generator enclosure is built up of beams that can restrict the installation of new panels.
- b) The existing racking will be used to attach the extension of the new rack.

Completion, testing, commissioning and correction of Defects

Work to be done by the Completion Date

On or before the Completion Date the *Contractor* shall have done everything required to Provide the Works. The *Project Manager* cannot certify Completion until all the work has been done and is also free of Defects which would have, in his opinion, prevented the *Employer* from using the works and Others from doing their work.

Performance tests after completion

Not Applicable

Access given by the *Employer* for correction of Defects

Should defects or damage be noted after completion of the Works, the *Employer* will grant the *Contractor* access to the site to correct the defects.

Use of the works before Completion has been certified

The *Employer* may use any part of the works before Completion has been certified but in doing so the *Employer* takes over the part of the works except if the use is for a reason stated in the Works Information.

Materials facilities and samples for tests and inspections

- a) The *Contractor* is responsible for and provides all necessary apparatus, equipment, materials, and labour to carry out the tests to the *Employer's* satisfaction.
- b) The *Contractor* provides but not limited the following equipment for the onsite testing (with valid calibration certificates):
 - Insulation resistance tester
 - Multimeter
 - Tools
 - Dry block (Temperature) calibrator
 - Process calibrator (multifunction)
 - Oscilloscope
 - Portable Flow meter
 - Hand Pump with pressure module
- c) Should the *Contractor* make use of a component that is not listed in the approved list of components, the component may be subjected to testing which may include destructive testing. The *Contractor* provides the component at his cost.
- d) The *Contractor* provides installation certificates and reports which includes:
 - Welding certificate.
 - Pressure test certificate.
 - AIA reports
 - COC for panel heating, lighting and 220V AC utility circuits.

Commissioning

Cold Commissioning

The purpose of the cold commissioning is to ensure that all the Plant and Materials are correctly installed. The provisions of the project commissioning project must be strictly adhered to as well as the other requirements described:

- a) The *Contractor* certify that the plant is wired in accordance with the schematic wiring and termination diagrams issues to him/her, updated where necessary, to represent true record of the cabling and terminations as installed.
- b) The *Contractor* performs the point-to-point loop insulation resistance check and blue lining of drawings for all wiring and labelling including conformance to the standards and requirements.
- c) The *Contractor* performs meggering/ insulating testing of all power cables.
- d) The *Employer* conduct quality control check which includes:
 - Verification of panels (panel erection checks).
 - Verification of cabling (cabling erection checks).
 - Verification of instruments installation

Hot Commissioning

Hot commissioning and testing proceed only after all defects identified on cold commissioning had been cleared and the Employer had performed a safety clearance (certificate) for the works. The Employer performs power supplies checks (using Employer's DC supply check procedure) and powering of C&I equipment. The Employer prepare documentation for simulation of PLC I/O modules and perform verification with the assistance of the Contractor. The test includes:

- Verification of analog input signals (loop checks from field instruments to the control system).
 - Pressurize pressure transmitter using calibrated external hand pump at different setpoint and compare the readings between the process calibrator, control system, trends and HMI graphical representation.
 - Insert temperature probes into a calibrated dry block and heat up to different setpoints and compare the readings between the process calibrator, control system, trends and HMI graphical representation.
 - Physically adjust the medium levels and compare the local indications with the process calibrator, control system, trends and HMI graphical representation.

- Open valves, run pumps to simulate the normal process flows and compare results to a calibrated external flow meter, with control system, trends and HMI graphical representation.
- Activated field limit switches and compare results with the control system, trends and HMI graphical representation.
- Verification of analog output signals (loop checks from control system to the field instruments).
- Verification of digital input signals (loop checks from field devices and other systems to the control system).
- Verification of digital output signals (loop checks from the control system to the field devices or other systems).

Start-up procedures required to put the *works* into operation

- a) The *Contractor* is onsite for power-up and thereafter to commence with verification, testing, commissioning and optimisation activities to obtain a fully functional systems.

Take over procedures

- a) The *Contractor* provides signed off check sheets, and up to date and Execution QCP as evidence that system is completed and commissioned successfully. The *Contractor*, plant safety officer, production representative, engineering representative will perform a plant walk down and complete acceptance documents before handover.

Access given by the *Employer* for correction of Defects

Access, depending on availability, will be granted to the *Contractor* for correcting defects.

Performance tests after Completion

The *Contractor* performs any testing that may need to be repeated to verify the performance.

Training and technology transfer

The *Contractor* provides operator, maintenance and engineering training on the installed equipment/systems. Training includes demonstration on the installed equipment.

Operational maintenance after Completion

Not Applicable.

Plant and Materials standards and workmanship

Investigation, survey and Site clearance

- a) The *Contractor* is responsible for taking measurement and clarify the scope on site.
- b) Site access and access to the plant equipment is restricted. The *Contractor* makes prior arrangements with the *Employer* for access.
- c) No dismantling, movement, or sampling of the existing equipment and/or structure is permitted.

Civil engineering and structural works

- a) The construction of civil structures is in accordance with the standardized specification for civil engineering design and construction. Structural design and construction conform to the Eskom Structural Design and Engineering Standard 240-56364545.
- b) The construction of the concrete works is in accordance with SANS 2001 CC1: Concrete Works (Structural) and SANS 1200 series specifications for civil construction.
- c) The design of civil engineering works meets the requirements of the permissible floor loading criteria and O&M Manuals.
- d) Where holes are required through concrete, in the case of reinforced concrete the indicated positions where core drilling will be carried out must be done without obstructing the rebar. Holes are drilled through concrete only where it is acceptable and does not compromise the structural integrity. The *Contractor* takes adequate measures to locate rebar ensuring that it is safe to core. The reinforcement and concrete drawings are analysed when selecting core positions. If it is required that reinforcement be maintained, a scan (Concrete Ground Penetrating Radar System) is performed to determine the position of the rebar, embedded objects, and features. Holes through concrete are sleeved with PVC sleeve.
- e) Floor repairs and preparation is in accordance with SANS 10400-J. Appropriate grouting is used for levelling, cavities, and gaps. Proprietary grout to be cement-based and must match the existing.
- f) Anchor bolts can be made of Grade 4.8 or Grade 8.8 which are designed to resist tension and shear. Anchor bolt systems are in accordance with the manufacturer's recommendations.
- g) The *Contractor* is required to provide a detailed Quality Control Plan and Construction Method Statement for related civil works.
- h) The *Contractor* provides the preliminary design of all civil engineering work for review and acceptance by the *Employer*.

Electrical and Mechanical engineering Works

6.3.1 Standards

Numerous documents such as standards and specifications are referenced within this [Works Information](#). All these referenced documents including the normative references which must be adhered to during the implementation of the *works*.

Where a SANS, IEC or any other standard referenced has been replaced by a newer standard, the *Contractor* is required to adhere to the latest revision of the newer standard. Where a SANS, IEC or any other standard referenced is composed of several parts, all applicable parts are to be adhered to.

All national and international standards referenced are not bound in this document but are obtained by the *Contractor* at his/her own expense. Documents developed by the *Employer* as referenced of this [Works Information](#) are provided to the *Contractor* on request or after the contract is awarded.

The following specifications are required to be complied to:

Document Number	Document Title
240-56227443	Requirements for Control and Power Cables for Power Stations Standard
240-56355754	Field Instrument Installation Standard
240-56355815	Field Instrument Installation Standards for Junction Boxes and Cable Termination
240-56355731	Environmental Conditions for Process Control Equipment Used at Power Stations
240-56356396	Earthing and Lightning Protection Standard
240-54937450	Fire Protection & Life Safety Design Standard
240-62629353	Specification for Panel Labelling Standard
240-109607332	Plant Labelling Abbreviation Standard
240-70413291	Specific for Electrical Terminal Blocks
240-7073288	Measurement Methods and Test Procedures
240-71432150	Plant Labelling Standard

Document Number	Document Title
240-75655504	Corrosion Protection Standards for the New Indoor and Outdoor Eskom Equipment, Components, Materials and Structures Manufactured from Steel
240-106628253	Standard for Welding Requirements on Eskom plant
240-83539994	Standard for Non-Destructive Testing (NDT) on Eskom Plant
240-87660096	Non-Destructive Testing Inspection Qualification Standard
240-83539806	Manual Ultrasonic Wall Thickness Testing on Eskom Power Plants Standard
BS EN 10028	Flat products made of steels for pressure purposes.
BS EN 10216	Seamless steel tubes for pressure purposes.
BS EN 10273	Hot rolled weldable steel bars for pressure purposes with specified elevated temperature properties.
BS EN 13480	Metallic industrial piping.
GGG 1427	Instrument Piping for Fossil and Hydro Power Stations
IEC 60297	Mechanical Structure for Electronic Equipment
IEC 60801-2	Electromagnetic Compatibility for Industrial-process Measurement and Control Equipment – Part 2: Electrostatic Discharge Requirements
IEC/TR 61000-5-2	Installation and Mitigation Guidelines – Section 2: Earthing and Cabling
ISO12944-5	Corrosion Protection Standards
SANS 10142-1:2017	The wiring of premises Part 1: Low-voltage installations
SANS 1091	National colour standard
SANS 1411-1:2008	Materials of insulated electric cables and flexible cords Part 1: Conductors
SANS 1411-4:2008	Materials of insulated electric cables and flexible cords Part 4: Cross-linked polyethylene (XLPE)
SANS 1411-5:2008	Materials of insulated electric cables and flexible cords Part 5: Halogen-free, flame-retardant materials
SANS 1411-6:2008	Materials of insulated electric cables and flexible cords Part 6: Armour
SANS 1507-1:2015	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 1: General
SANS 1507-2:2015	Electric cables with extruded solid dielectric insulation for fixed installations

Document Number	Document Title
	(300/500 V to 1 900/3 300 V) Part 2: Wiring cables
SANS 1507-4:2015	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 4: XLPE Distribution cables
SANS 1507-5:2015	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 5: Halogen-free distribution cables
SANS 1803-1:2009	Lugs and ferrules for insulated electric cables Part 1: Copper conductors
SANS 60793-1-40:2001	Measurement Methods and Test Procedures
SANS 60811-1-4	Common Test Methods for Insulating and Sheathing Materials of Electric and Optical Cables
SANS 121:2011	Hot Dip Galvanised Coating on Fabricated Iron and Steel Articles – Specification and Test Methods
32-727	Eskom Safety Policy

Workmanship

The *Contractor* demonstrates high-level of skills, professionalism and expertise when planning and executing the Work. The work to be delivered should meet a standard of quality that is acceptable by the *Employer* and should be functional, safe, and usable.

List of drawings

Drawings issued by the *Employer*

This is the list of drawings issued by the *Employer* at or before the Contract Date and which apply to this contract.

Note: Some drawings may contain both Works Information and Site Information.

Drawing number	Revision	Title
Cable racking and Panel location diagrams		
0.39/491		Plant Layout Station Level 1096,5 m.a.s.l
0.39/826		Station Electrical Power System Cable Layout
0.39/1292		Control Block & Surface Building Panel Layout
Unit panel layout specification and termination diagrams		
18.39/U*/2735	0a	Unit Main Unit Controller
18.39/U*/2736	0a	Unit MUC Remote I/O Generator
18.39/U*/2737	0a	Unit MUC Remote I/O Turbine
18.39/U*/2738	0a	Unit MUC Remote I/O Common
18.39/U*/2739	0a	Unit Control Console
18.39/U*/2740	0a	Unit Turbine Governor Control
18.39/U*/2741	0a	Unit Temperature & Speed Monitoring
Junction box layout specification and termination diagrams		
18.39/U*/2743	0a	Unit Generator Junction Box
18.39/U*/2744	0a	Unit Turbine Pit Junction Box
Station panel layout specification and termination diagrams		
18.39/2745	0a	Station Controller
18.39/2746	0a	Station Remote I/O

Drawing number	Revision	Title
18.39/2751	0a	Station Control Console
18.39/2747	0a	National Control Centre interface
18.39/2748	0a	Standby Control Centre interface
Pressure instrument assembly diagrams		
18.39/U*/2754	0a	Unit Governor Air Oil Receiver Pressure Transmitters and Brackets
18.39/U*/2755	0a	Unit Governor Actuator Oil Pressure Transmitters and Brackets
18.39/U*/2757	0a	Unit Thrust Bearing HP Oil Pressure Transmitters and Brackets
18.39/U*/2758	0a	Unit Turbine Bearing Oil Pressure Transmitters and Brackets
18.39/U*/2756	0a	Unit Guide Vane Servo Motor 1 Opening and Closing Pressure Transmitter and Brackets
18.39/U*/2759	0a	Unit Main Cooling Water Inlet Pressure Transmitters and Brackets
18.39/U*/2760	0a	Unit Shaft Seal Water Pressure Transmitter and Bracket
18.39/U*/2761	0a	Unit Penstock Water Pressure Transmitter and Bracket
18.39/U*/2762	0a	Unit Main Strain Water Inlet Differential Pressure Transmitters and Brackets
18.39/U*/2764	0a	Unit Dam Level Water Pressure Transmitters and Brackets
18.39/U*/2763	0a	Unit Brake Air Pressure Transmitters and Brackets
18.39/U*/2753	0a	Unit Governor Air Pressure Transmitter and Bracket
18.39/U*/2598	0a	Unit Draft Tube Pressure Transmitter and Bracket
Level instrument assembly diagrams		
18.39/U*/2765	0a	Unit Governor Receiver Air Oil Level Transmitter
18.39/U*/2766	0a	Unit Governor Sump Oil Level Transmitter
18.39/U*/2767	0a	Unit Turbine Guide Bearing Sump Oil Level Transmitter
18.39/U*/2768	0a	Unit Thrust & Guide Bearing Sump Oil Level Transmitter
18.39/	0a	Station Head Tank Water Level Transmitter

Drawing number	Revision	Title
Flow instrument assembly diagrams		
TBA1	0a	Unit Main Cooling Water Inlet Flowmeter Spool Piece
TBA2	0a	Unit Main Cooling Water Outlet Flowmeter Spool Piece
TBA3	0a	Unit Thrust & Guide Bearing Cooling Water Inlet Flowmeter Spool Piece
TBA4	0a	Unit Turbine Bearing Cooler 1A/ 1B Cooling Water Outlet Flowmeter Spool Piece
TBA5	0a	Unit Governor Oil Cooler Cooling Water Outlet Flowmeter Spool Piece

APPENDIX A: SCHEDULES A AND B

SCHEDULE A: PARTICULARS OF *EMPLOYER'S* REQUIREMENTS

SCHEDULE B: GAURANTEES AND TECHNICAL PARTICULARS OF PLANT AND MATERIALS OFFERED

Notes with regards to the completion of the schedule

Where there is insufficient space provided in Schedule B, particulars must be furnished on a separate sheet marked with the number of the Schedule A item referred to.

If a blank space is left in Schedule B next to the *Employer's* requirements listed in Schedule A it is assumed that the Tenderer does comply with this requirement.

Where the Tenderer does not comply with the *Employer's* requirements these deviations must be clearly stated on Schedule B.

Datasheets: Actual OEM datasheets must be submitted, in hard copy as part of the tender documentation

Method Statement: Actual Method Statement must be submitted, samples from other similar projects are acceptable provided it is appropriate.

NB: Soft copies of documents and data sheets will not be accepted for evaluation.

	Technical Schedules	Weighting			
1	Cabling and Racking	20%	100%	Schedule A	Schedule B
1.1	Tenderer supplies the required industrial cable racks as per <i>Works Information section 3.1.3 and 3.2.6</i>		25%	Datasheets	
1.2	Tenderer supplies the required industrial cable wire mesh as per <i>Works Information section 3.1.3 and 3.2.6</i>		15%	Datasheets	
1.3	Tenderer supplies the required cable rack earthing as per <i>Works Information section 3.1.3 and 3.2.6</i>		10%	Datasheets	
1.4	Tenderer supplies the required low voltage cables as per <i>Works Information section 3.2.4.1 and 3.2.7</i>		15%	Datasheets	

	Technical Schedules	Weighting			
1.5	Tenderer supplies the required control and instrumentation cables as per <i>Works Information section 3.2.4.2 and 3.2.7</i>		20%	Datasheets	
1.6	Tenderer supplies the required network communication cables as per <i>Works Information section 3.2.4.3 and 3.2.7</i>		15%	Datasheets	
2	Components and Consumables	4%	100%	Schedule A	Schedule B
2.1	Tenderer supplies the required Components as per <i>Works Information appendix B</i>		50%	Datasheets	
2.2	Tenderer supplies the required Consumables as per <i>Works Information appendix B</i>		50%	Datasheets	
3	Instrumentation Works	20%	100%	Schedule A	Schedule B
3.1	Tenderer supplies the required pressure transmitters as per <i>Works Information section 3.2.16.1</i>		10%	Datasheets	
3.2	Tenderer supplies the required differential pressure transmitters as per <i>Works Information section 3.2.16.1</i>		8%	Datasheets	
3.3	Tenderer supplies the required pressure gauge as per <i>Works Information section 3.2.16.1</i>		5%	Datasheets	
3.4	Tenderer supplies the required Reed Level transmitters as per <i>Works Information section 3.2.16.2</i>		10%	Datasheets	
3.5	Tenderer supplies the required Reed Sensor for Bypass level indicators as per <i>Works Information section 3.2.16.2</i>		10%	Datasheets	
3.6	Tenderer supplies the required Magnetic Display for Bypass Level Indicator as per <i>Works Information section 3.2.16.2</i>		10%	Datasheets	
3.7	Tenderer supplies the required Magnetic Switch for Bypass Level Indicator as per <i>Works Information section 3.2.16.2</i>		4%	Datasheets	

	Technical Schedules	Weighting			
3.8	Tenderer supplies the required Conductive Point Level Detection as per <i>Works Information section 3.2.16.2</i>		4%	Datasheets	
3.9	Tenderer supplies the required Electromagnetic Flow Meter as per <i>Works Information section 3.2.16.3</i>		5%	Datasheets	
3.10	Tenderer supplies the required Temperature instruments as per <i>Works Information section 3.2.16.4</i>		5%		
3.11	Tenderer supplies the required tubing and fittings as per <i>Works Information 3.2.16</i> and attached drawings		10%	Datasheets	
3.12	Tenderer supplies the required manifolds as per <i>Works Information 3.2.16</i> and attached drawings		5%	Datasheets	
3.13	Tenderer supplies the required isolation valves as per <i>Works Information 3.2.16</i> and attached drawings		5%	Datasheets	
3.14	Tenderer supplies the required instruments accessories as per <i>Works Information section 3.2.16</i> and attached drawings		5%	Datasheets	
4	Junction Boxes	5%	100%	Schedule A	Schedule B
4.1	Tenderer supplies Junction Boxes as per <i>Works Information section 3.2.11</i>		100%	Datasheet	
5	Network Cabinet and Server Racks	10%	100%		
5.1	Tenderer supplies the required Network Cabinet as per <i>Works Information section 3.2.15</i>		100%	Datasheet	
6	Dispatch, Delivery and Offloading	2%	100%	Schedule A	Schedule B
6.1	Tenderer to ensure equipment is adequately protected during transportation and delivery to site		50%	Yes	
6.2	Tenderer to inspect equipment for any damages prior to installation		50%	Yes	
7	Decommissioning	5%	100%	Schedule A	Schedule B

	Technical Schedules	Weighting			
7.1	Decommissioning of cables and placing in allocated area as per <i>Works Information section 3.2.5</i>		20%	Method statement	
7.2	Decommissioning of panels and placing in allocated area <i>Works Information section 3.2.5</i>		15%	Method statement	
7.3	Decommissioning of junction boxes and placing in allocated area <i>Works Information section 3.2.5</i>		5%	Method statement	
7.4	Decommissioning of instrument, tubing and placing in allocated area <i>Works Information section 3.2.5</i>		20%	Method statement	
7.5	Decommissioning of control console section plates and placing in allocated area <i>Works Information section 3.2.5</i>		10%	Method statement	
7.6	Blanking of process pipework's <i>Works Information section 3.2.5</i>		5%	Method statement	
7.7	Provide catalogue of all decommissioned items <i>Works Information section 3.2.5</i>		5%	Method statement	
7.8	Manage decommissioning and implementation Impairment plan for the <i>Works</i>		10%	Method statement	
7.9	Site of decommissioned devices, panels, junction boxes and other equipment repaired to match surrounding environment as per <i>Works Information section 3.2.5</i>		10%	Method statement	
8	Installation	20%	100%	Schedule A	Schedule B
8.1	Tenderer supplies installation procedures and scope of work for acceptance by <i>Employer</i>		5%	Sample	
8.2	Tenderer supplies a complete quality control plan and check sheets for acceptance by <i>Employer</i>		15%	Sample	
8.3	Tenderer supplies a bar chart program for acceptance by <i>Employer</i>		5%	Sample	
8.4	Tenderer supplies a Safety File for acceptance by <i>Employer</i>		5%	Yes	

	Technical Schedules	Weighting			
8.5	Tenderer repair and sealing fire blocking of cables penetration as per <i>Works Information section 3.2.8</i>		5%	Method statement	
8.6	Tenderer to prepare plinth as per <i>Works Information section 3.2.9</i>		10%	Method statement	
8.7	Tenderer install panels as per <i>Works Information section 3.2.10</i>		15%	Method statement	
8.8	Tenderer supplies and install junction boxes as per <i>Works Information section 3.2.11</i>		15%	Method statement	
8.9	Tenderer supplies and install network cabinet as per <i>Works Information section 3.2.15</i>		15%	Method statement	
8.10	Tenderer assembly, supplies and install instruments and its accessories as per <i>Works Information section 3.2.16</i>		10%	Method statement	
9	Site Testing and Commissioning	10%	100%	Schedule A	Schedule B
9.1	Tenderer to provide testing certificate as per <i>Works Information</i> , i.e. Cable drum test certificate, COC for electrical, NDT welding certificate, pressure test certificate, AIA report		55%	Sample of Certificates	
9.2	Tenderer to commission the Works on site as per <i>Works Information section 5.2</i>		5%	Yes	
9.3	Tenderer to submit detailed QCP for testing		40%	Sample of QCP	
10	Maintenance and Spares	2%	100%	Schedule A	Schedule B
10.1	Tenderer to provide spares for Consumables, Components, and Instruments		50%	Yes	
10.2	All spare instruments are configured		50%	Yes	
11	Documentation	2%	100%	Schedule A	Schedule B
11.1	All documentation complies with procedure 240-86973501		7%	Yes	
11.2	<i>Employer</i> does not accept scanned electronic copies of documentation or drawings		6%	Yes	

	Technical Schedules	Weighting			
11.3	Tenderer provides documentation in electronic media using Microsoft Office and “searchable” PDF format		4%	Yes	
11.4	Tenderer uses the templates provided by the <i>Employer</i> for documentation and drawings		6%	Yes	
11.5	Tenderer provides operating and maintenance manuals of the Works		10%	Yes	
11.6	Tenderer provides a Works plan using Microsoft Office Project		10%	Yes	
11.7	Tenderer provides technical quality control documentation		10%	Yes	
11.8	Provide all settings document for all configurable devices		10%	Yes	
11.9	Provide all settings backups of all installed configurable devices		10%	Yes	
11.10	Provide software and hardware to access all configurable devices, for the purposes of the <i>Employer</i> to load backups to restore the system in event of failure.		7%	List	
11.11	Tenderer compiles a comprehensive commissioning report including all test procedures		10%	Yes	
11.13	Tenderer provides proof of warranty redeemable by Eskom from date of purchase		10%	Yes	
Schedule A&B Scoring		100%			

APPENDIX B: SUMMARY OF DELIVERABLES

Refer to the spreadsheet attached to this NEC document

APPENDIX D: LOOP CIRCUIT DIAGRAMS

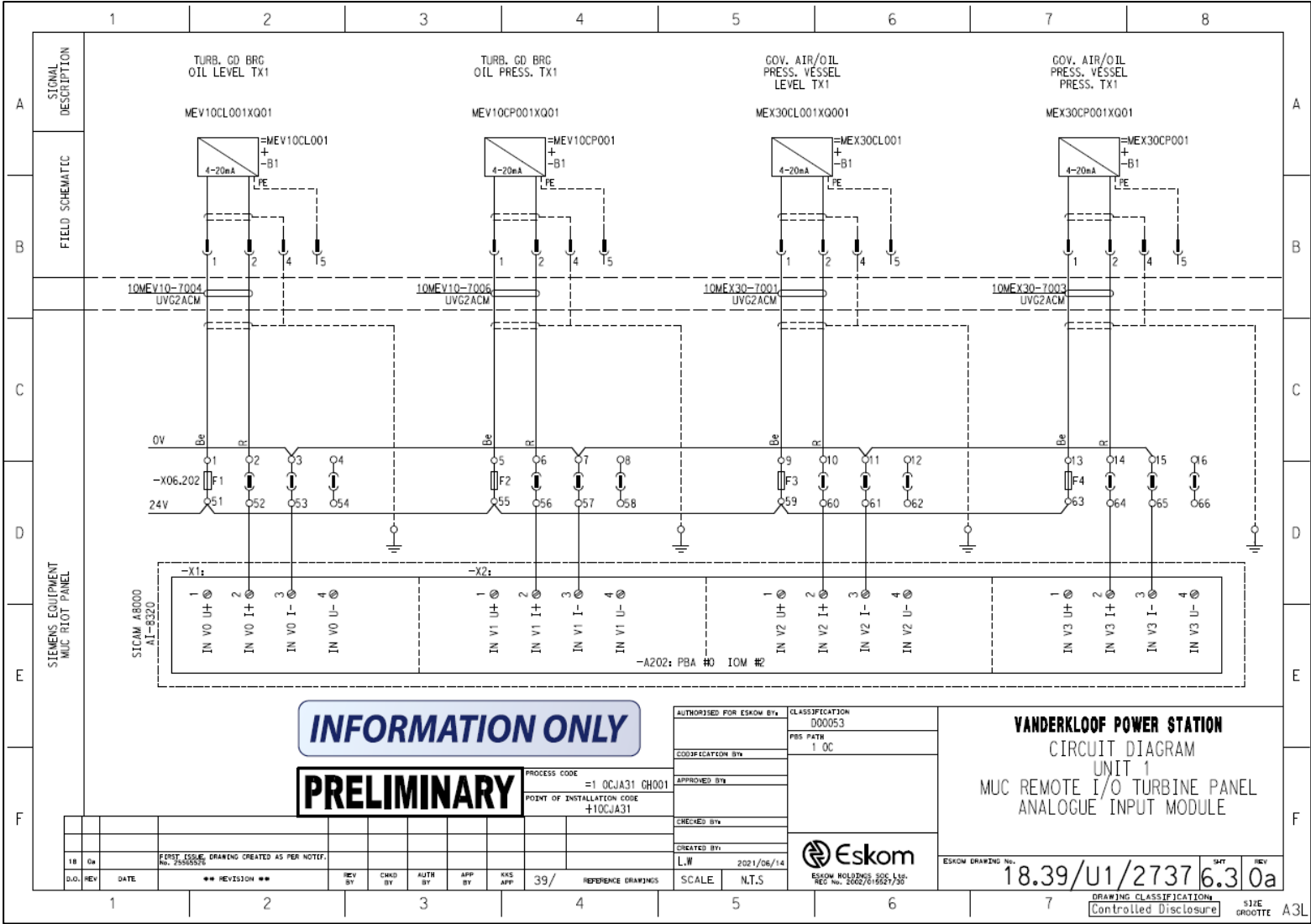


Figure 5: Circuit Diagram Analogue Input Module

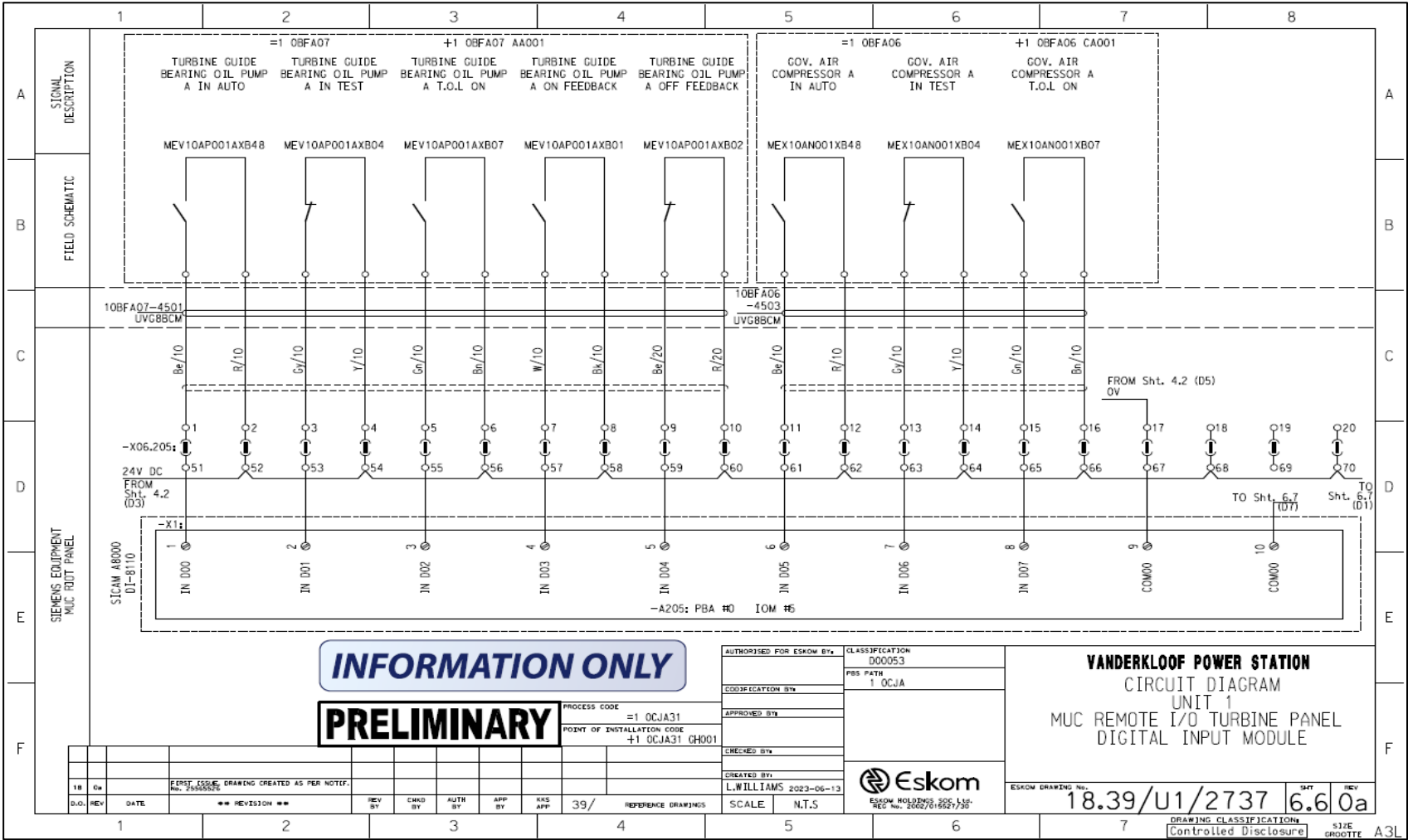
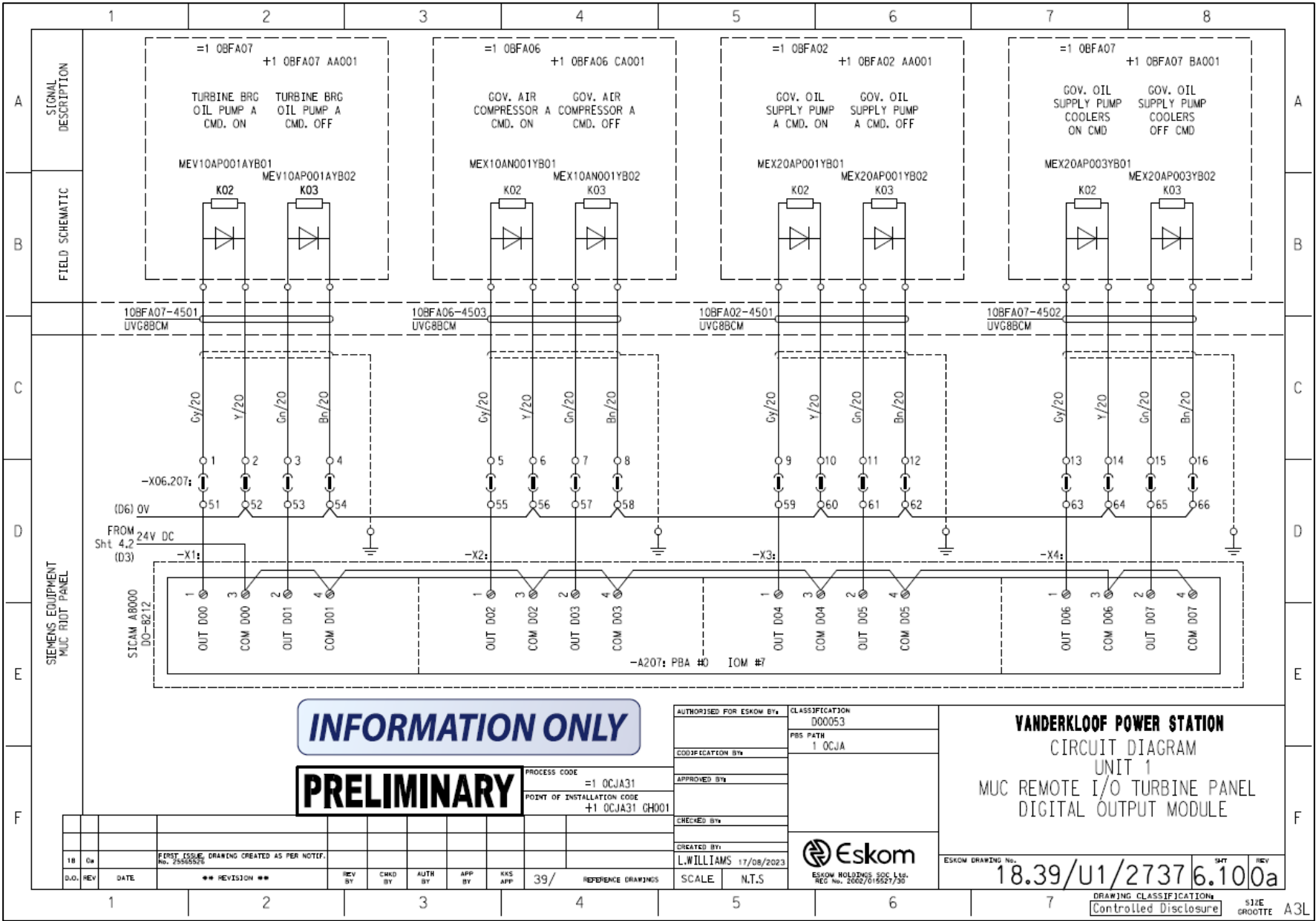


Figure 6: Circuit Diagram Digital Input Module 1st Section





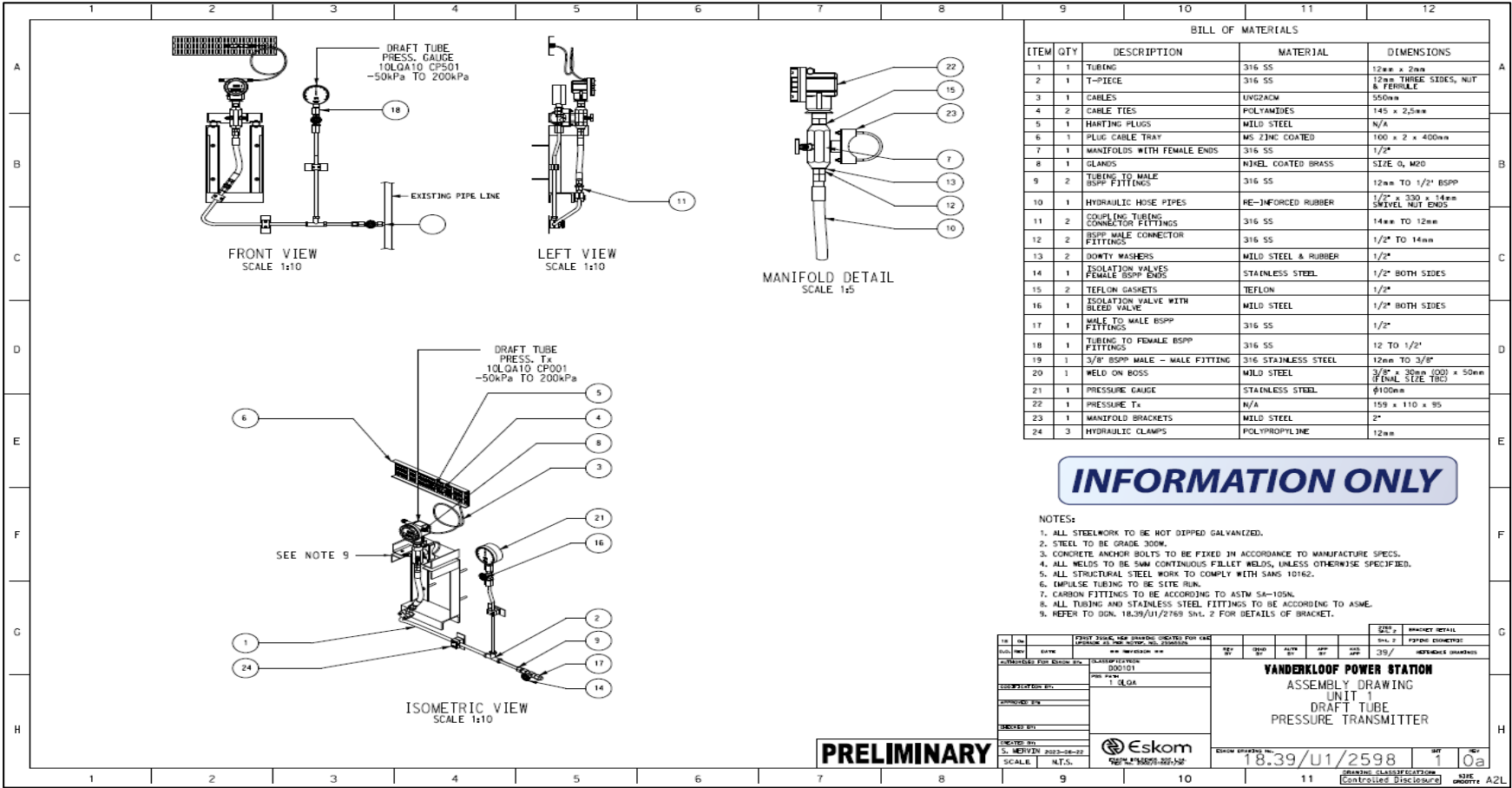


Figure 9: Assembly Drawing Single Pressure Transmitter and Gauge

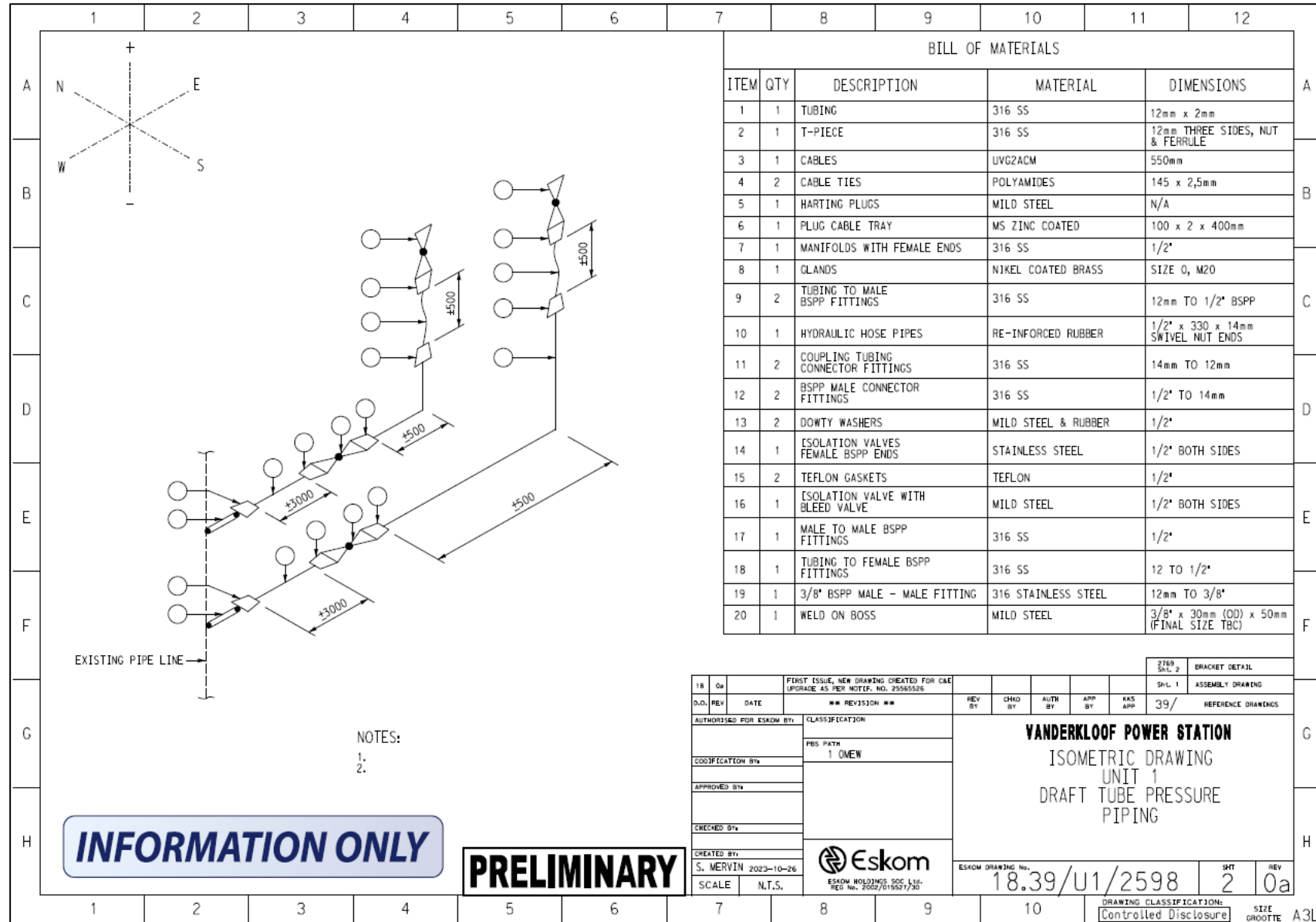


Figure 10: Isometric Drawing Single Pressure Transmitter and Gauge piping

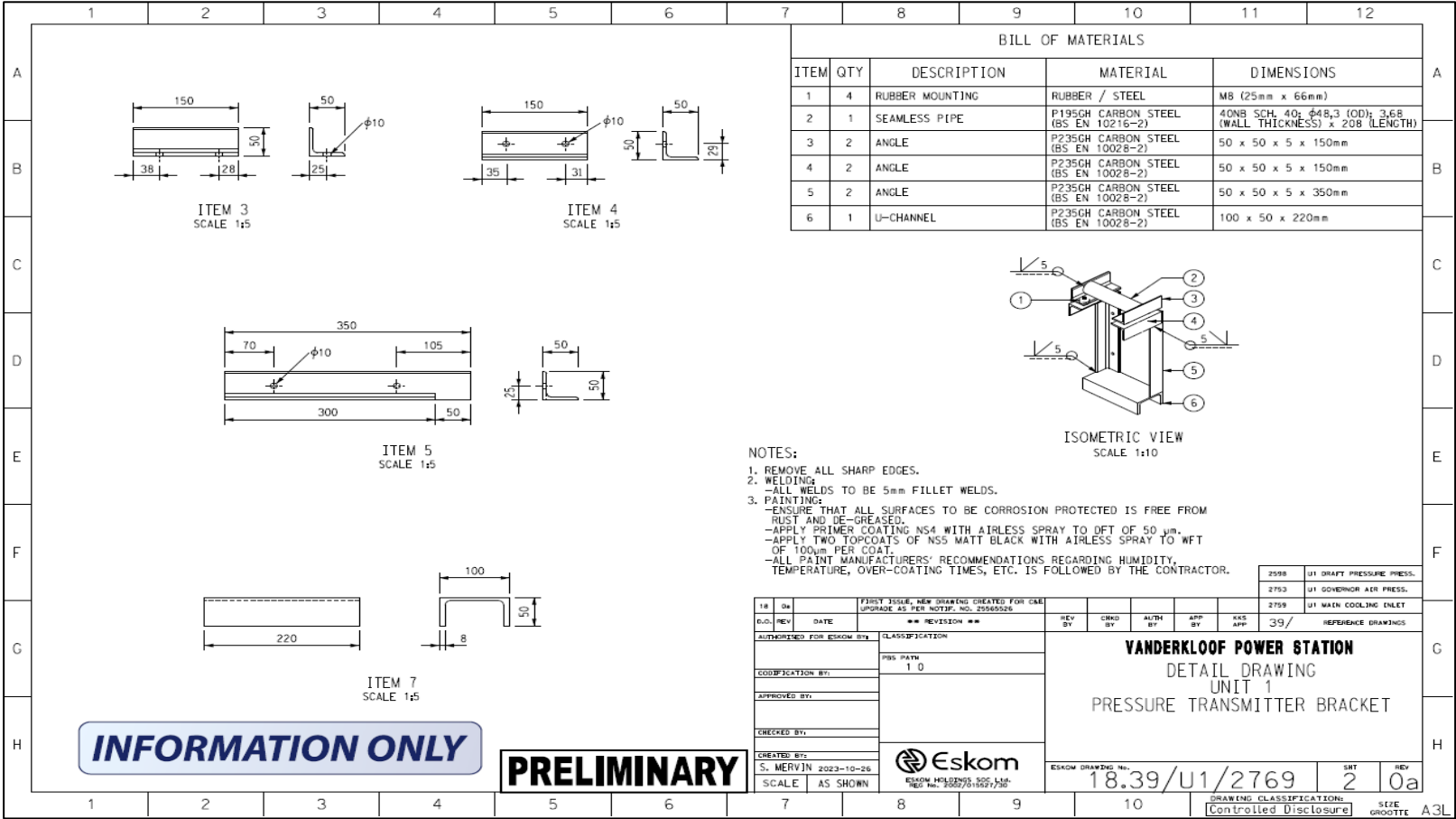


Figure 11: Detail Drawing Single Pressure Transmitter Bracket

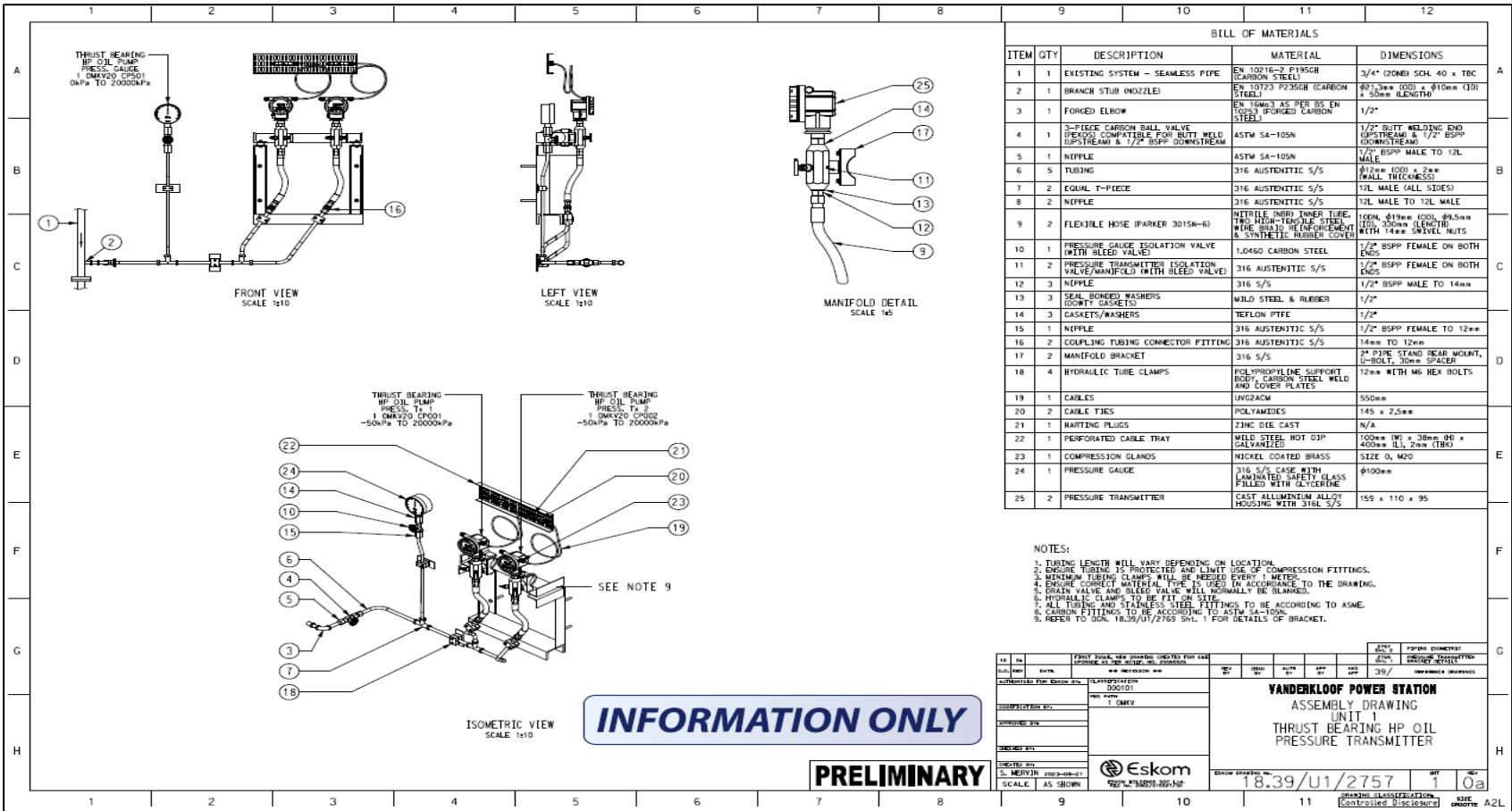


Figure 12: Assembly Drawing Redundant Pressure Transmitter and Gauge

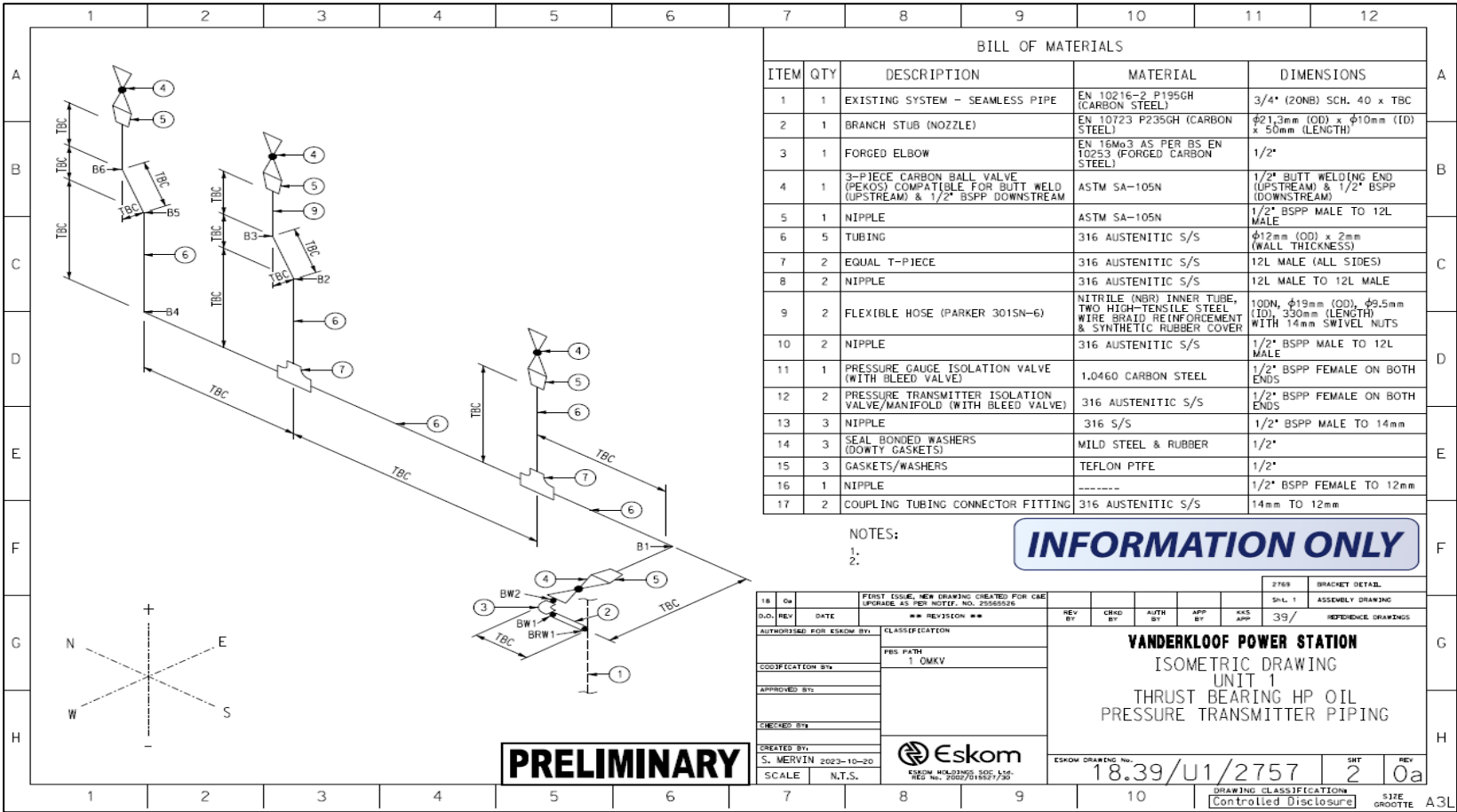


Figure 13: Isometric Drawing Redundant Pressure Transmitter and Gauge piping

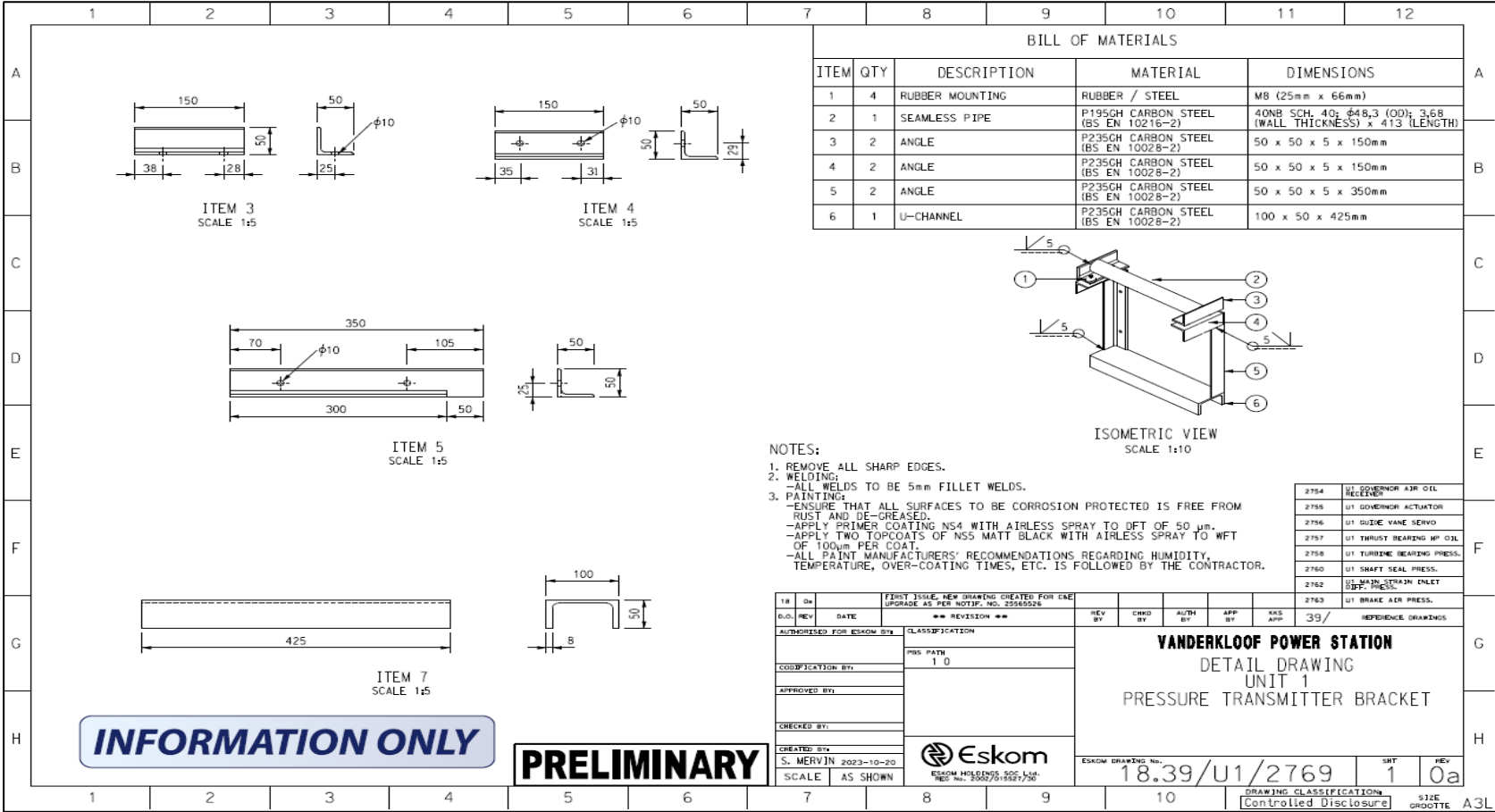


Figure 14: Detail Drawing Redundant Pressure Transmitter Bracket

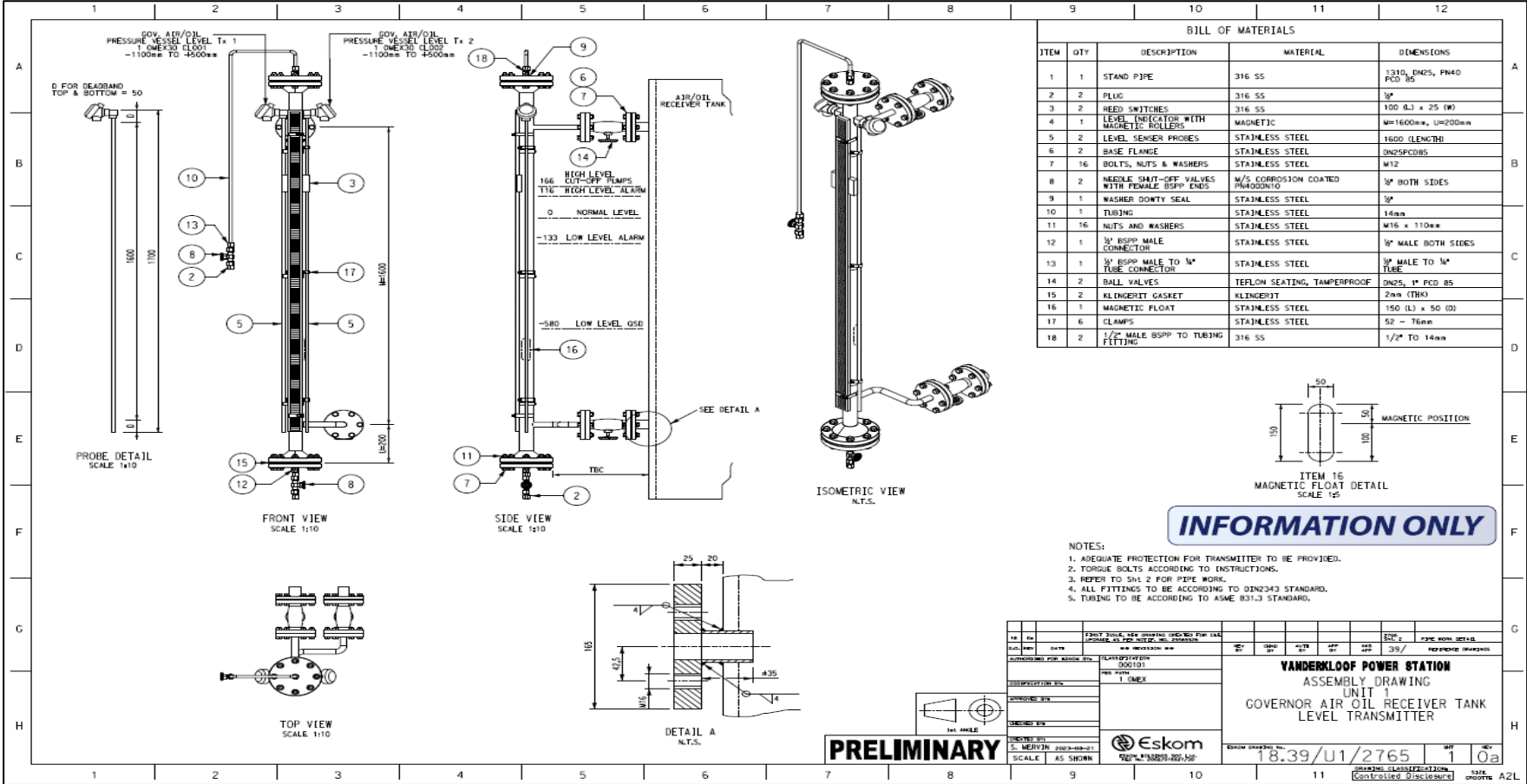


Figure 15: Assembly Drawing Stand-pipe Level Transmitter for Pressurised Air Oil Receiver

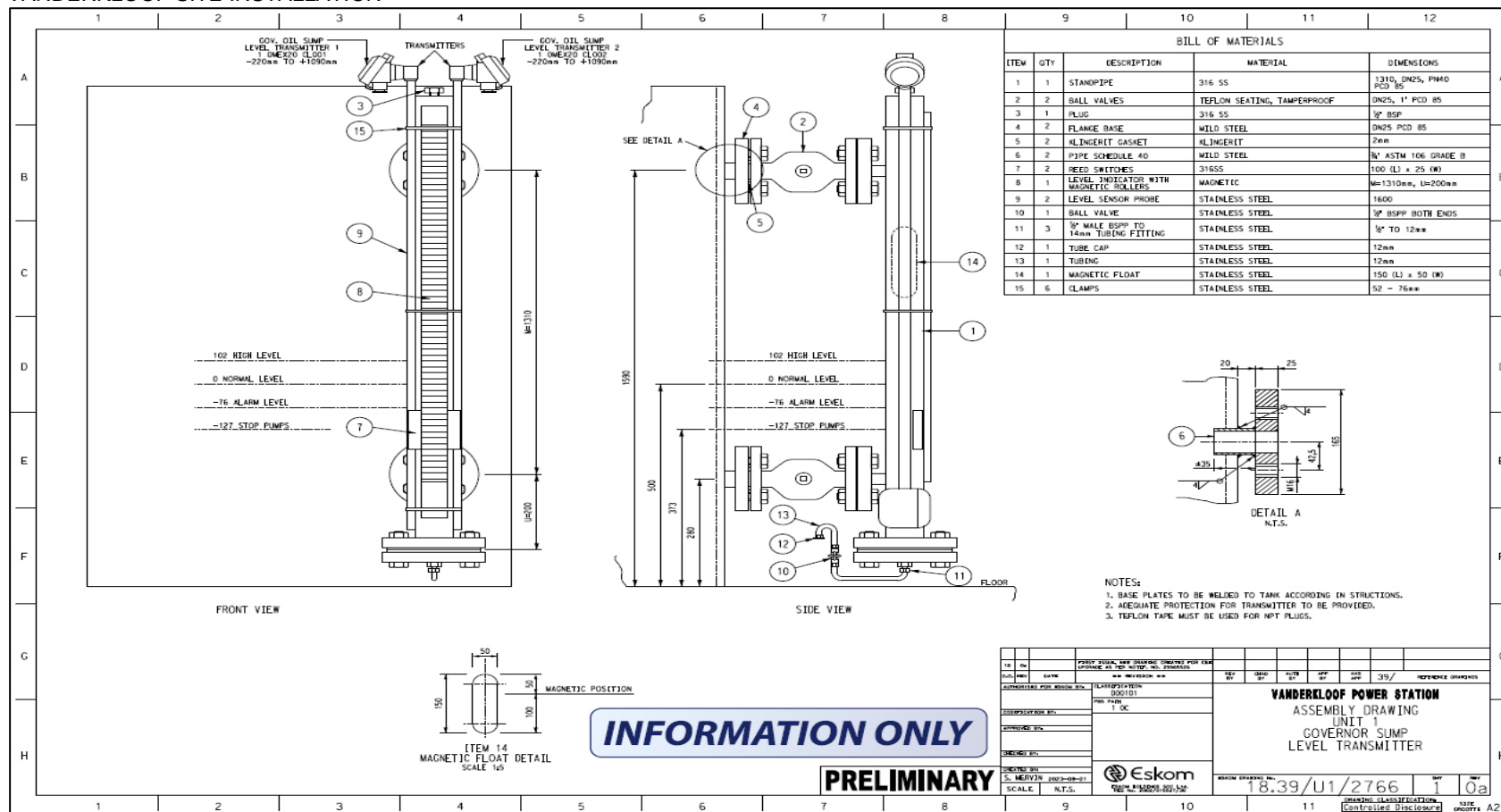


Figure 16: Assembly Drawing Stand-pipe Level Transmitter for Oil Sump

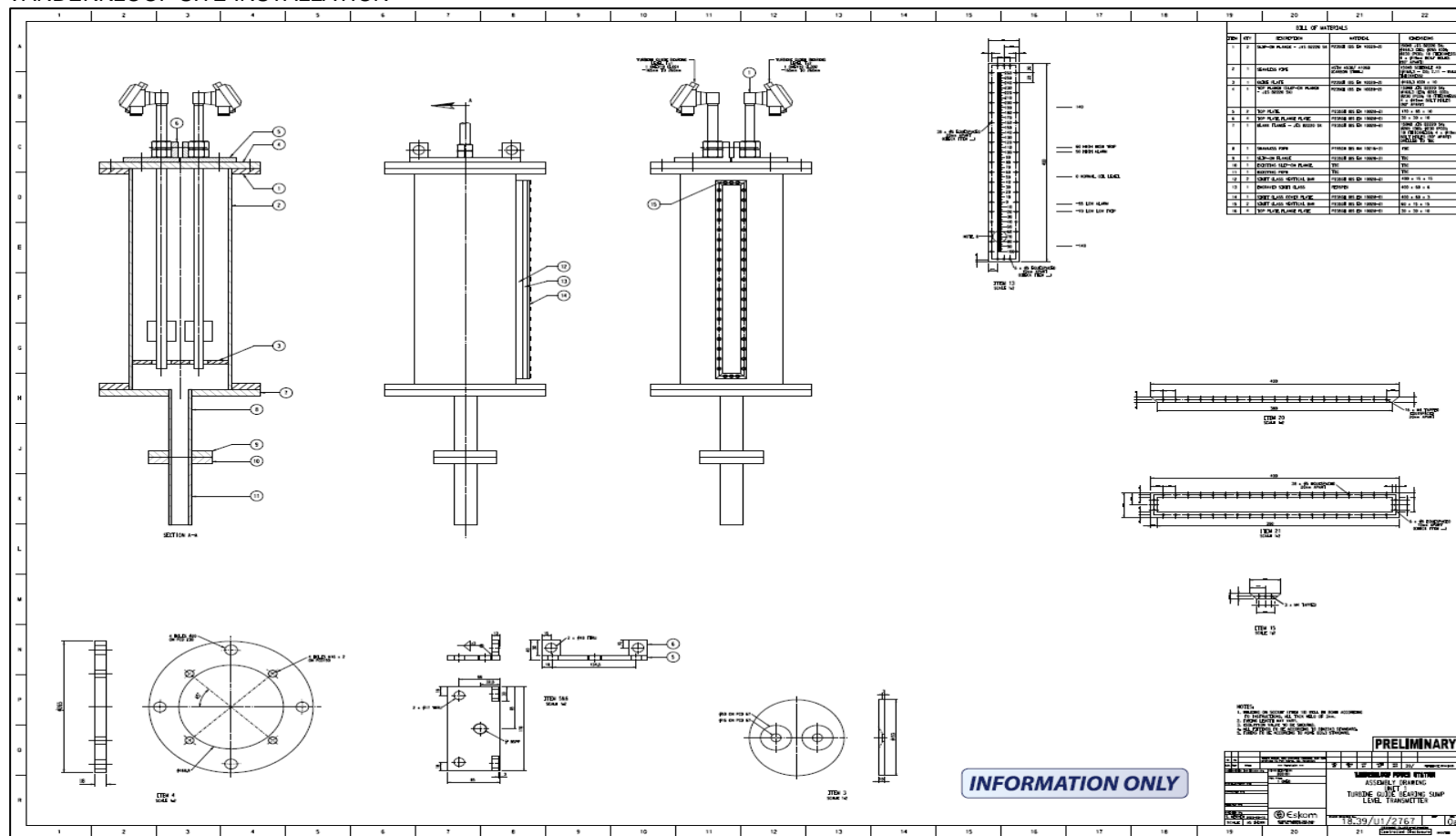


Figure 17: Assembly Drawing Level Transmitter Chamber for Oil Sump

