



NEC3 Supply

Short Contract (SSC3)

A contract between Eskom Holdings SOC Ltd (Reg No. 2002/015527/30)

and CONTRACTOR DETAILS

for **The Once Off Purchase for The Supply and Delivery of Eight (X8) Secondary Relay Injection Sets for PTM Departments at Kendal, Koeberg, Kriel, Matla, Matimba, Arnot, Kusile And Tutuka Power Stations.**

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Contract Number:

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C1 Agreements & Contract Data

C1.1 Form of Offer and Acceptance

Offer

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

The Supply and Delivery of Eight (X8) Secondary Relay Injection Sets for PTM Departments at Kendal, Koeberg, Kriel, Matla, Matimba, Arnot, Kusile and Tutuka Power Stations.

The tenderer, identified in the signature block below, has

<i>either</i>	examined the documents listed in the Tender Data and addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Tender.
<i>or</i>	examined the draft contract as listed in the Acceptance section and agreed to provide this Offer.

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 Supplier 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.

The offered total of the Prices exclusive of VAT is	R
Value Added Tax @ 15% is	R
The offered total of the Prices inclusive of VAT is	R
Amount In Words (Excl. VAT)	

This Offer may be accepted by the Purchaser by signing the form of Acceptance overleaf 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 Supplier in the conditions of contract identified in the Contract Data.

Signature

Name

Capacity

Date

Address:

For the Tenderer:

Witness

Name

Signature

Date

Acceptance

By signing this part of this Form of Offer and Acceptance, the Purchaser identified below accepts the tenderer's Offer. In consideration thereof, the Purchaser shall pay the Supplier 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 Purchaser 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 1 Agreements and Contract Data, (which includes this Form of Offer and Acceptance)

Part 2 Pricing Data

Part 3 Scope of Work: Goods 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 Tender Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the Purchaser 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, which must be signed by the duly authorised representative(s) for both parties.

The tenderer shall within one week of receiving a completed copy of this Agreement, including the Schedule of Deviations (if any), contact the Purchaser'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 copy of this document, including the Schedule of Deviations (if any) together with all the terms of the contract as listed above.

Unless the tenderer (now *Supplier*) within five working days of the date of such receipt notifies the Purchaser 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

Name

Capacity

Date

Address:

For the purchaser:

Witness

Name

Signature

Date

Schedule of Deviations

Note:

1. To be completed by the Purchaser prior to award of contract. 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 Purchaser 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		

By the duly authorised representatives signing this Schedule of Deviations below, the Purchaser 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 Purchaser 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 Purchaser

Signature

Name

Capacity

Date

On behalf of:

Witness

Name

Signature

Date

C1.2 Contract Data

Data provided by the *Purchaser*.

Completion of the data in full is essential to create a complete contract.

Clause	Statement	Data
General		
10.1	The <i>Purchaser</i> is (Name):	Eskom Holdings SOC Limited (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
	Tel No.	013 693 3554
	E-mail address	NiranjR@eskom.co.za
11.2(4)	The <i>delivery date</i> is	TBA
11.2(5)	The Goods Information is in	the document called 'Goods Information' in Part 3 of this contract.
11.2(8)	The <i>goods</i> are	Secondary Relay Injection Sets (X8)
12.2	The <i>law of the contract</i> is	South Africa
13.2	The <i>period for reply</i> is	2 days
15.1	The <i>premises</i> are	Eskom Park Main Building PTM C/o Visagie and Langenhoven St Witbank (eMalahleni)
23.1	The <i>Purchaser</i> requires the <i>Supplier</i> to Provide the Goods when instructed by batch Order.	N/A
23.1	If the <i>goods</i> are instructed by Batch Order,	N/A
	the batch order interval is	_____
	the end date is	_____
	the quantity range of <i>goods</i> in a batch is	from _____ to _____
30.1	The <i>starting date</i> is.	TBA
41.1	The <i>defects date</i> is	TBA
42.2	The period for the correction of Defects after Delivery is	5 years
50.1	The <i>assessment day</i> is the	N/A
50.5	The <i>delay damages</i> are	N/A
51.2	The interest rate on late payment is	N/A

86.1	The <i>Supplier's</i> liability to the <i>Purchaser</i> for indirect or consequential loss, including loss of profit, revenue and goodwill is limited to	Zero
86.2	The <i>Supplier</i> is not liable to the <i>Purchaser</i> for loss of or damage to the <i>Purchaser's</i> property in excess of	The value of the goods.
93.1	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).
93.2(2)	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 Institution of Civil Engineers (UK) or its successor body (See www.ice-sa.org.za).
93.4	The <i>tribunal</i> is: If the <i>tribunal</i> is arbitration, the arbitration procedure is	arbitration. the latest edition of Rules for the Conduct of Arbitrations published by The Association of Arbitrators (Southern Africa) or its successor body.
11.1	The <i>conditions of contract</i> are the NEC3 Supply Short Contract (April 2013)^{1 2} and the following additional conditions.	
X3	Multiple Currency	
	X3.1 The Purchaser will pay for these items in the currencies stated.	
	X3.1 The exchange rates are those published inon (date)	
X3.1	The items will be paid in the other currency - to a foreign Bank account nominated by the Supplier	
	- to a valid SARB approved CFC account in South Africa	
	- in accordance with an alternative payment method agreed with the Purchaser before the Contract Date.	
Z1	Cession delegation and assignment	
Z1.1	The <i>Supplier</i> does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the <i>Purchaser</i> .	
Z1.2	Notwithstanding the above, the <i>Purchaser</i> may on written notice to the <i>Supplier</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 and the Electricity Distribution Industry.	

¹ Can be obtained from Engineering Contract Strategies on www.ecs.co.za, Tel 011 803 3008, Fax 086 539 1902

² If the December 2009 edition is being used, replace April 2013 with December 2009

Z2 Change of Broad Based Black Economic Empowerment (B-BBEE) status

- Z2.1 Where a change in the *Supplier's* legal status, ownership or any other change to his business composition or business dealings results in a change to the *Supplier's* B-BBEE status, the *Supplier* notifies the *Purchaser* within seven days of the change.
- Z2.2 The *Supplier* is required to submit an updated verification certificate and necessary supporting documentation confirming the change in his B-BBEE status to the *Purchaser* within thirty days of the notification or as otherwise instructed by the *Purchaser*.
- Z2.3 Where, as a result, the *Supplier's* B-BBEE status has decreased since the Contract Date the *Purchaser* may either re-negotiate this contract or alternatively, terminate the *Supplier's* obligation to Provide the Goods.
- Z2.4 Failure by the *Supplier* to notify the *Purchaser* of a change in its B-BBEE status may constitute a reason for termination. If the *Purchaser* terminates in terms of this clause, the procedures on termination are the same as for Reason 3 identified in clause 90.3.

Z3 Waiver and estoppel: Add to clause 12.3:

- Z3.1 Any extension, concession, waiver or relaxation of any action stated in this contract by the Parties, or the *Adjudicator* does not constitute a waiver of rights and does not give rise to an estoppel unless the Parties agree otherwise and confirm such agreement in writing.

Z4 Provision of a Tax Invoice and interest. Add to clause 51

- Z4.1 The *Supplier* provides the *Purchaser* with a tax invoice in accordance with the *Purchaser's* procedures stated in the Goods Information, showing the correctly assessed amount due.
- Z4.2 If the *Supplier* does not provide a tax invoice by the time required in this contract for his assessment of each amount due, the time by when the *Purchaser* 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 *Purchaser* in terms of core clause 51.2 is then calculated from the delayed date by when payment is to be made.
- Z4.3 The *Supplier* (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 *Purchaser's* VAT number 4740101508 on each invoice he submits for payment.

Z5 Purchaser's limitation of liability

- Z5.1 The *Purchaser's* liability to the *Supplier* for the *Supplier's* indirect or consequential loss is limited to R0.00 (zero Rand)
- Z5.2 The *Supplier's* entitlement under the indemnity in 83.1 is provided for in 60.1(8) and the *Purchaser's* liability under the indemnity is limited.

Z6 Termination: Add to clause 90.2 before (Reason 1)

- Z6.1 or had a judicial management order granted against it.

Z7 Addition to clause 50.5

- Z7.1 If the amount due for the *Supplier's* payment of *delay damages* reaches the limits stated in this Contract Data (if any), the *Purchaser* may terminate the *Supplier's* obligation to Provide the

Goods using the same procedures and payment on termination as those applied for Reason 3. Identified in clause 90.3.

Z8 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>Supplier</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>Supplier</i> , or any member thereof in the case of a joint venture, or its employees, agents, or Subcontractors or the Subcontractor's employees,
Corrupt Action	means the offering, giving, taking, or soliciting, directly or indirectly, of a good or service to unlawfully or illegally influence the actions of an Affected Party,
Fraudulent Action	means any unlawfully or illegally intentional act or omission that misleads, or attempts to mislead, an Affected Party, in order to obtain a financial or other benefit or to avoid an obligation or incurring an obligation,
Obstructive Action	means a Committing Party unlawfully or illegally destroying, falsifying, altering or concealing information or making false statements to materially impede an investigation into allegations of Prohibited Action, and
Prohibited Action	means any one or more of a Coercive Action, Collusive Action Corrupt Action, Fraudulent Action or Obstructive Action.

- Z8.1 A Committing Party may not take any Prohibited Action during the course of the procurement of this contract or in execution thereof.
- Z8.2 The *Purchaser* may terminate the *Supplier's* obligation to Provide the Services if a Committing Party has taken such Prohibited Action and the *Supplier* did not take timely and appropriate action to prevent or remedy the situation, without limiting any other rights or remedies the *Purchaser* 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 *Purchaser* can terminate the *Supplier's* obligation to Provide the Services for this reason.
- Z8.3 If the *Purchaser* terminates the *Supplier's* obligation to Provide the Services for this reason, the amounts due on termination are those intended in core clauses 92.1 and 92.2.
- Z8.4 A Committing Party co-operates fully with any investigation pursuant to alleged Prohibited Action. Where the *Purchaser* does not have a contractual bond with the Committing Party, the *Supplier* ensures that the Committing Party co-operates fully with an investigation.

Z9 Insurance

Replace condition of contract 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 *Supplier* provides the insurances in this Insurance Table A from the *starting date* until Delivery and against any risks he carries under this contract between Delivery and the *defects date*.

INSURANCE TABLE A

Insurance against	Minimum amount of cover or minimum limit of indemnity
Loss of or damage to the <i>goods</i> , plant and materials	<p>The replacement cost where not covered by the <i>Purchaser's</i> insurance.</p> <p>The <i>Purchaser's</i> policy deductible as at contract date where covered by the <i>Purchaser's</i> insurance.</p>
Liability for loss of or damage to property (except the <i>goods</i> , plant and materials and equipment) and liability for bodily injury to or death of a person (not an employee of the <i>Supplier</i>) caused by activity in connection with this contract	<p><u>Loss of and / or damage to property</u></p> <p><u><i>Purchaser's</i> property</u></p> <p>The replacement cost where not covered by the <i>Purchaser's</i> insurance.</p> <p>The <i>Purchaser's</i> policy deductible as at contract date, where covered by the <i>Purchaser's</i> insurance.</p> <p><u>Other property</u></p> <p>The replacement cost</p> <p>Death of or bodily injury</p> <p>The amount required by the applicable law.</p>

Liability for death of or bodily injury to employees of the <i>Supplier</i> arising out of and in the course of their employment in connection with this contract	The amount required by the applicable law
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84.2 The Purchaser provides the insurances in this Insurance Table B

INSURANCE TABLE B

Insurance against or name of policy	Minimum amount of cover or minimum limit 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

Data provided by the *Supplier* (the *Supplier's Offer*)

The tendering Supplier is advised to read both the NEC3 Supply Short Contract (April 2013) and the relevant parts of its Guidance Notes (SSC3-GN)³ 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 page 28 of the SSC3 Guidance Notes and Flow Charts.

Completion of the data in full is essential to create a complete contract.

10.1	The <i>Supplier</i> is (Name):	_____
	Address	_____
	Tel No.	_____
	Fax No.	_____
	E-mail address	_____
11.2(7)	The Price Schedule is in	the document called 'Price Schedule' in Part 2 of this contract. (Annexure L - BOQ Secondary Relay Injection Test Sets)
11.2(7)	The offered total of the Prices	See C1.1 Form of Offer and Acceptance
63.2	The percentage for overheads and profit added to the Defined Cost is	0%

³ Available from Engineering Contract Strategies on www.ecs.co.za Tel 011 803 3008, Fax 086 539 1902.

C2 Pricing Data

C2.1 Pricing assumptions

If the *Supplier* is to be paid an amount for the item of goods which is the rate for the goods multiplied by the quantity supplied, the tenderer enters a rate for each item and multiplies it by the Quantity to produce the Price, to be entered in the final column.

The rates and Prices entered for each item includes for all work and other things necessary to supply the item.

NB! If the *Supplier* cannot fix and firm the price for a period of 180 days, Eskom's foreign exchange (FOREX) policy will be applied to all foreign transactions for this purchase.

Fixed Quantities and Descriptions: The line items, including descriptions and quantities, are fixed and may not be altered by the Supplier under any circumstances.

C2.2 Price Schedule

Item No.	Description	Qty	Foreign Currency Portion			Local Currency Portion	
			Currency	Rate	Amount	Rate	Amount
	Notes:						
	<i>The foreign portion section to be priced as per the applicable currency of the country of origin where the spares will be imported from i.e (USD, EUR and / or GBP etc.)</i>						
	<i>Bidders to indicate the applicable currency symbol thereof i.e (\$, € and / or £ etc.)</i>						
	<i>The local portion section is to be priced in South African Rands Currency (ZAR) for costs incurred in South African Rands (ZAR) for handling fees, overheads and / or profits etc.</i>						
	<i>The South African Reserve Bank exchange control regulations will be adhered to on this transaction.</i>						
	Analyzer: Professional Protection; 0- 100						
1.1	Portable Three Phase Test System for Protective Relays as specified, including test leads and software as specified in per 240-102634558 MULTI-FUNCTION SECONDARY PLANT TEST SET SPECIFICATION	8					
1.2	IEC 61850 GOOSE test module/option compatibility	8					
1.3	IEC 61850 Analysis Software/option compatibility	8					
1.4	Analogue recording facility software and analysis software (including current/voltage transducers if required)	8					
1.5	Energy Meters test module/option	8					
1.6	Hardcover carrying case for test hardware with retractable handle and wheels.	8					
1.7	Delivery costs to Emalahleni PTM Witbank	8					
	Grand-Total						

C3: Scope of Work

C3.1 Goods Information

1. Introduction

Secondary Relay Injection Set (X8) for Various PTM Departments at the following Power Stations:

Kendal PS
Koeberg PS
Kriel PS
Matla PS
Matimba PS
Arnot PS
Kusile PS
Tutuka PS

Technical Specifications			
Portable Three Phase Test System for Protective Relays, Measurement Transducers and Energy Meters			
No	Description	Requirement	Tenderer Proposal, Comments (must be completed in full for evaluation purposes)
1	General		
	Manufacture		
	Type		
2	Power Supply		
	Nominal Voltage	110 V - 240 V	
	Permissible Voltage Range	90 V - 260 V	
	Nominal Frequency	50 Hz	
	Permissible Frequency Range	45 Hz - 55 Hz	
	Connection	Standard AC sockets (IEC 60320)	
3	Dimensions and Weight		
	Weight	max. 19 kg	
4	Environment		
	Operating Temperature	0 °C ... 50 °C	
	Storage Temperature	-12 °C ... 70 °C	
	Humidity	5 % ... 95 % r.h. (non-condensing)	
5	Certificates		
	Vibration	IEC60068-2-6	

	Shock	IEC60068-2-27	
	CE	Yes	
	EMC	The product adheres to the electromagnetic compatibility (EMC) Directive 2004 / 108 / EC (CE conform)	
	EMC - Emissions	IEC 61326-1 Class A; IEC61000-6-4; IEC61000-3-2/3; FCC Subpart B of Part 15 Class A	
	EMC - Immunity	IEC 61326-1; IEC61000-6-2; IEC61000-4-2/3/4/5/6/11	
	Safety	The product adheres to the low voltage Directive 2006 / 95 / EC (CE conform)	
		IEC61010-1; Insulation of PC and SELF Interfaces complies with EN60950-1	
	Independent Test Laboratory	Copies of test certificates from independent test laboratories proving compliance with the above standards are to be supplied together with the tender	
6	Hardware		
6.1	General		
		All functions should be combined in one hardware unit	
		The unit shall be of a robust and sturdy construction	
		PC card design: Wire jumpers on a single printed circuit board are not permissible	
		Electronic components: No potentiometers are allowed	
		No moving elements or elements that are susceptible to damage, i.e. controls elements or displays on the face plate are permissible	
6.2	Output Amplifiers		
		The amplifier stages are to be fully electronic, i.e. not via transformer	
		All current amplifiers to be fully protected and proof against any open-circuit-, overload-, overburden- and over-temperature- condition. Any such condition is to be immediately displayed in all active software modules. Except for an over-temperature condition an automatic shutdown of the amplifiers is NOT permissible	
		All voltage amplifiers to be fully protected and proof against any short-circuit-, overload-, overburden- and over-temperature- condition. Any such condition is to be immediately displayed in all active software modules. Except for an over-temperature condition an automatic shutdown of the amplifiers is NOT permissible	
		All amplifiers to use linear amplification elements and to be dc-coupled	
		Ability to generate dc and ac signals	

		The amplifiers, low-level outputs, the measurement inputs and the main power supply to be galvanically isolated from each other and earth (2kV insulation voltage)	
6.3	Voltage Amplifiers		
	Setting range	4x 0..300V _{rms} (L-N), 3x 0..520V _{rms} (L-L)	
	Single phase operation	1x 0..600V _{rms} (L-L)	
	Output power	3x 100VA at 100..300V (L-N) or 1x 200VA at 100..300V (L-N) or 1x 275VA at 200..600V (L-L)	
	Maximum load current	3x 1A _{rms} ; 1x 2A _{rms}	
	Accuracy	error < 0.03% of reading (0..300V) + 0.01% of range	
	THD+N	< 0.015%	
	Connection	4mm Banana sockets amplifier combination plug (3xV and 3xI)	
6.4	Current Amplifiers		
	Setting range	6x 0.30A _{rms} 3x 0.60A _{rms}	
	Single phase operation	1x 0.120A _{rms}	
	Output power	6x 400VA at 25A 3x 800VA at 50A 1x 1000VA at 80A (LL-LN) or 1x 1740VA at 25A (L-L-L-L)	
	Maximum compliance voltage	6x 35V _{pk} 1x 140V _{pk}	
	Accuracy	error < 0.05% of reading (0.32A) + 0.02% or range	
	THD+N	< 0.05%	
	Connection	4mm Banana sockets amplifier combination plug (3xV and 3xI)	
	Independent amplifiers	The six current amplifiers are to be independent from the four voltage amplifiers	
6.5	Low-level signal Generators	Not required	
		6 additional analogue low-level signals to control external amplifiers or to test relays with low-level input, e.g. from Rogowski coils, linear voltage or linear current sensors must be provided	
		Full simulation of Rogowski coil signal (i.e. first order differential of signal) to be performed in hardware.	
		Together with 10 internally used signal generators the system should provide 16 independent signal channels in total	
	Output range	0 ... 10 V _{pk}	
	Accuracy	<0.025%	

	Overload Protection	Yes	
		The quantities displayed in the software must be scalable for primary or secondary voltages (or currents).	
6.6	Signal Generation		
		All outputs to be continuously and independently adjustable in amplitude, phase (0 to +/- 360°) and frequency.	
		Able to generate continuous sine waves with a frequency between 10 and 1kHz and to generate transient files with a bandwidth from dc up to 3 kHz.	
		Frequency error to be less than 0.5 ppm.	
		Phase error to be less than 0.02°	
6.7	Binary Inputs		
	Number of inputs	10 in at five galvanic isolated groups (2kV insulation voltage)	
	Mode/Trigger criteria	Pick-up and drop-out of potential-free contacts or dc voltages of up to 600Vdc. Trigger levels to be adjustable	
	Max. Input Voltage	600V	
	Max. error	< 100 µs	
	Counting function	inputs capable of counting number of pulses up to 3kHz.	
	Connection	4mm Banana sockets	
6.8	Analogue Inputs for Measurement		
	Number	10 in five galvanic isolated groups (2KV insulation voltage)	
	Input ranges	100mV, 1V, 10V, 100V, 600V	
	Accuracy	<0.06%	
	Bandwidth	dc..10kHz	
	Sampling frequency	3kHz, 9kHz and 28kHz	
	Overload protection	Yes	
	Recording buffer	300s for 1channel at 3kHz, 3.5s for 10 channels at 28kHz	
	Connection	4mm Banana sockets	
6.9	Analog low level measuring inputs for transducer testing		
	Direct current range	Range 1: 0 ... ±1 mA	
		Range 2: 0 ... ±20 mA	
	Direct voltage range	0 ... ±10 V	
	Max. error	< 0.003%	

	Connection	4mm Banana sockets	
6.10	Auxiliary DC supply to power test objects		
	Range	Range 1: 0 ... 264 Vdc, 0.2A	
		Range 2: 0...132 Vdc, 0.4A	
		Range 3: 0...66 Vdc, 0.8A	
	Power	max. 50W	
	Max. error	< 2%	
6.11	Binary output contacts		
	Number	4	
	Breaking capacity	300V, 8A, 2000VA or 50W	
	Type	Dry contacts that can be used to switch ac or dc	
6.12	Time Synchronization	Not required	
6.13	Interface to PC		
		Interface to the IBM compatible PC via Ethernet interface OR USB	
		10/100Mbit/s copper (autosensing, auto crossover) via RJ45 connector	
		Note: Centronics parallel port (Lpt) and/or serial RS232 ports are not permissible as modern laptops do not provide such ports.	
		Two Ethernet communications ports to support communication on a process bus (IEC61850-8-2 (GOOSE), IEC61850-9-2LE (Sampled Values) and UCA2.0) AND station bus at the same time.	
		Communications card to support IEEE 1588 / Precision Time Protocol (PTP) to synchronize the test set to a PTP enabled Grandmaster clock in the substation for End-to-end tests / Synchro phasor tests.	
7	Software		
7.1	General		
		Windows XP/7(32bit & 64bit)/8(32bit & 64bit) software. Long filenames, tool tip help, context sensitive menu function (right mouse click) and an integrated help browser must be provided.	
		All software functions, options and actions should be easily available by click of a button and/or shortcut key to avoid having to navigate through complicated menu structures and having to drill through multiple menu levels. The Microsoft ribbon-based menu structure used in Office 2010 / Office 2013 is an example of sorting all functions, options and actions and making all easily accessible in the right place.	

		No programming to be necessary to test an application - entry of setting parameters to be all that is required to set up and perform a test	
		Future expansions in functionality by means of software updates. Firmware updating to be handled by the software, i.e. exchange of any hardware components is not permissible.	
		Generation of reports on paper or file. All graphics and text to be printable.	
		Test report must be configurable to include custom information in graphical format (e.g. logos, wiring diagrams) and text format (tester, date of test, substation, reminders)	
		The test set software should be able to import relay settings records from relay setting software's (or relay settings databases) in a text file and/or XML format. An example is the XRIO file format for the transfer of relay setting parameters for all types of relays.	
		It must be possible to test multi-function relays / panels with one test routine / document.	
		Test sequence to be plausible at pre-defined points in the test sequence, by popping up a custom instruction dialogue (with or without audible warning), instructing the user to change either a setting on the relay, change of hard wiring or to record a specific measurement / status from the relay / scheme.	
		All testing to be in closed loop.	
		Online Pass/ Fail assessment for ALL tests. This is particularly important for automatic testing.	
		Full automatic testing must be possible, i.e. without launching various test modules manually.	
		Test software to be future proof to allow the complete testing of any new relay, both in form of entry of relay settings as well as testing all functions of such a relay.	
7.2	Manual Control Function		
		Direct entry of actual relay settings into test software. Test specific parameters (e.g. set I1 to 110% of I>>) must be automatically re-adjusted according to the entered relay settings.	
		Manual and independent adjustment of amplitude, phase angle and frequency for all generator outputs.	
		Graphical display of natural voltages and currents in a vector diagram.	
		Direct entry sequence components and graphical display in a vector diagram	
		Direct entry of impedances and graphical display in a R/X diagram	
		Direct entry of power and graphical display in P/Q diagram	
		Ramping and stepping of any of the above quantities: one, two or three phases at the same time	

		Pulse ramping function for any of the above quantities	
		Synchronized switching of multiple variables at the same instance in time.	
		Timing function for pick-up and drop-out measurements.	
		On-line Reporting Function	
		Synchronise generator outputs to any third-party signal, e.g. mains frequency.	
7.3	State Sequencer Function		
		Direct entry of actual relay settings into test software. Test specific parameters (e.g. set I1 to 110% of I>>) must be automatically re-adjusted according to the entered relay settings.	
		Manual testing.	
		Fully automatic testing.	
		Ability to generate test sequences from any number of states. Each state consists of any combination of voltage, current, frequency and any binary output state.	
		Graphical display of natural voltages and currents in a vector diagram.	
		Graphical display of voltages, currents and binary signals over time.	
		Direct entry sequence components and graphical display in a vector diagram	
		Direct entry of impedances and graphical display in a R/X diagram	
		Direct entry of power and graphical display in P/Q diagram	
		Define trigger conditions for each state either in fixed time or dependent upon a logical combination of the binary inputs for accurate timing measurements.	
		Synchronization to GPS / PTP and other digital timing pulses.	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.4	Linear Ramping and Pulse Ramping Functions		
		Direct entry of actual relay settings into test software. Test specific parameters (e.g. set I1 to 110% of I>>) must be automatically re-adjusted according to the entered relay settings.	
		Manual testing.	
		Fully automatic testing.	
		Ability to linearly ramp up to two independent variables (e.g. voltage and frequency) at the same time, while keeping the other quantities at a defined constant value.	

		Ability to ramp a single variable in a pulsed fashion i.e. ramped quantity shall be set back to a predefined value between every step to allow the relay to reset.	
		Graphical display of natural voltages and currents in a vector diagram.	
		Graphical display of voltages, currents and binary signals over time.	
		Define trigger conditions for pick-up / drop-out measurements upon a logical combination of the binary inputs.	
		Synchronization to GPS / PTP and other digital timing pulses.	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.5	Transient Playback Function		
		IEEE COMTRADE (C37.111-1991) compatible (ASCII and binary formats).	
		Synchronization to GPS / PTP and other digital timing pulses.	
		Timing accuracy 1µs.	
		Graphical display of voltage and current traces as well as digital signals and relay responses.	
		Editing of signals: Extending (repeating) and deleting portions of the recorded signal.	
		Ability to generate composite harmonic wave shapes.	
		Ability to edit own digital signals OR to select recorded binary signals to play back via binary outputs.	
		Unlimited length (in time) of Comtrade file to play back.	
7.6	Overcurrent Relay Testing		
		Direct entry of actual relay settings into test software. Test specific parameters (e.g. test points) must be automatically re-adjusted according to the entered relay settings.	
		Manual testing.	
		Fully automatic testing.	
		Testing of the operating characteristic (trip time vs. test) for all types of faults (earth faults, phase faults, negative sequence and zero sequence faults)	
		Display of overcurrent characteristic and test points in I/t diagram.	
		Determination of the pick-up and drop-out current for all fault types.	
		Determination the pick-up and drop-out of directional characteristic for directional overcurrent relays.	

		Breaker simulation: Simulate the 52a and 52b auxiliary contacts of a breaker with the binary outputs, switch the currents off at zero crossing of current after a trip signal has been received.	
		Characteristic formulae: IEC255-4, BS142 and IEEE PC37.112-1995, I ² t characteristics to be supported. Definition of custom characteristics must be possible.	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.7	Frequency and Voltage Relays Testing		
		Direct entry of actual relay settings into test software. Test specific parameters (e.g. test points) must be automatically re-adjusted according to the entered relay settings.	
		Manual testing.	
		Fully automatic testing.	
		Generation of ramps for amplitudes, phase angles and frequency.	
		Pick-up, timing and stability tests.	
		Graphic and tabular display of relay pick-up and drop-out vs. time.	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.8	Distance Relay Testing	Testing of line impedance relays and field failure characteristics on generator protection relays.	
		Direct entry of the actual relay settings of an ABB REL 670/RED670/511/531; SEL 321/421; Alstom Quadromho, Optimho, Micromho; Siemens 7SA511/3, 7SL27, R3Z27; GEC YTG, PYTS; BBC LZ32 distance relay into the test software. The tripping characteristic must be generated automatically for each of the above relays.	
		Impedance characteristics supported: Quadrilateral, Mho, Tomato or Lens characteristic.	
		Manual testing.	
		Fully automatic testing.	
		Test the trip time at specific fault impedances. Fault impedances must be specifiable in relation to zone reaches, e.g. 90% Z ₁ . Automatic assessment of whether the tested trip time is passed or failed.	
		Check the reach of a relay by placing a fault shot at the inner and outer tolerances border (i.e. theoretical reach minus and plus the defined reach tolerance of the relay). Automatic assessment of whether the tested reach is Passed or Failed.	
		Automatically test the characteristic in the impedance plane (R/X diagram) and/or in the time grading diagram (Z/t diagram). Automatic assessment of whether the tested reach is passed or failed.	
		Test models supported: constant test current, constant test voltage and constant source	

		impedance.	
		DC offset simulation: Control of angle of fault incidence, time constant of dc offset to be calculated on-line from system parameters (R/L).	
		The separate arc resistance algorithm is to be supported for both earth faults and phase faults (as implemented on numerical distance relays).	
		Apply Pre-fault voltage, i.e. duration settable.	
		Breaker simulation: Simulate the 52a and 52b auxiliary contacts of a breaker with the binary outputs, switch the currents off at zero crossing of current after a trip signal has been received.	
		Graphical display of analogue voltages and currents plus relay contact responses vs. time.	
		Display of injected voltages and currents on a vector diagram in natural and/or in symmetrical components.	
		Testing of auxiliary functions: Manual close, power swing, Auto-reclose function, VT fuse fail.	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.9	Differential Relay Testing	Testing of transformer differential relays, line differential relays, motor / generator differential and busbar differential relays.	
		Direct entry of the actual relay settings of ABB RET670/RED670/SPAD 346, Reyrolle Duobias, SEL 387/487/587/787, Reyrolle Duobias M and Siemens 7UT51 differential relay directly into the test software. The operating characteristic must be generated automatically for each of the above relays.	
		Manual testing.	
		Fully automatic testing.	
		Simulation of two and three winding transformers for all possible vector groups (e.g. YY0, YD1, YD11, etc.).	
		Testing the operating characteristic (I_{diff} vs. I_{bias}) for all types of fault: earth fault, phase faults and three phase faults.	
		The various types of I_{bias} formulae ($I_{bias} = (I_p + I_s)/k$; $I_{bias} = \max(I_p, I_s)$; etc; numerical zero sequence elimination and both reference side have to be supported.	
		Testing the harmonic restraint characteristic (I_{diff} vs. %I harmonic) for second harmonic (inrush restraint) and fifth harmonic (over fluxing restraint).	
		Testing of the inrush restraint characteristic for relays which utilize the gap detection technique.	
		Testing the trip time characteristic (trip time vs. I_{diff}) for all types of fault.	
		Test the stability of the relay to confirm the correctness of the vector group correction, CT mismatch correction and zero sequence elimination.	

		Apply pre-fault current, i.e. through fault current condition. Test current and duration settable.	
		Apply voltage in addition to six currents - according to HV or LV voltage	
		GPS / PTP synchronized End-to-end tests to test the operating characteristics of line differential relays, i.e. by simulating either the local or remote end of a line.	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.10	Synchronizing Devices		
		Direct entry of actual relay settings into test software. Test specific parameters (e.g. test points) must be automatically re-adjusted according to the entered relay settings.	
		Manual testing.	
		Fully automatic testing.	
		Adjustment control mode to be tested closed loop.	
		Graphical of quantities in a DV/Df diagram as well as relative phase angles in a synchroscope.	
		Feedback signals: closing pulse and adjustment pulses (V+, V-, f+, f-). Display of adjustment controls vs. time.	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.11	Testing with GOOSE Messages		
		All the above protective relay test modules must be supporting testing for IEC 61850-8-2, i.e. be able to trigger on GOOSE message as well as simulate GOOSE message (if need be).	
		Import of SCD, ICD of GOOSE sniffer files to configure the triggering / simulation of GOOSE messages.	
		Sensing of up to 360 simultaneous GOOSE message must be possible.	
7.12	Testing with Sampled Values		
		All the above protective relay test modules must be supporting testing for IEC 61850-9-2LE, i.e. be able to simulate all voltages and currents as Sampled Value signals.	
		Simulation of up to THREE sets of IEC61850-9-2LE signals must be possible.	
7.13	Testing Single and Three Phase Transducers		
		Manual testing.	
		Automatic testing.	

		Generation of sweeps for amplitudes, phase angles, frequency, power (W, VA, Var).	
		Individual setting of voltages and currents (its amplitude, phase angle and frequency) should be possible per test point.	
		For single phase transducers phase injected should be selectable.	
		L-L voltage transducers to be tested with full three phase voltage system.	
		On-line calculation of error (absolute, percentage and full-scale).	
		Display of transducer output and absolute, percentage and full-scale errors vs. sweep quantity graphically and/or as table.	
		Feedback signal: Low-level analogue voltage (0..+/-10V) or current (0..+/-20mA)	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.14	Energy meter testing according to IEC 62053		
		Manual testing.	
		Automatic testing.	
		Load test, No-load test, creep test, mechanism test, Injection test.	
		Ability to generate automatic load profiles, i.e. test the meter for different load conditions.	
		On-line display of error.	
		Feedback signal: Meter pulses of up to 100 KHz	
		Third Harmonic Test	
		DC test	
		Automatic assessment of test results (Pass / Fail) with actual results and deviation from nominal.	
7.15	On-line Multimeter Measurement Function		
		Up to 10 independent inputs	
		Software to display amplitudes and phase angles of ac voltages and currents, symmetrical components of voltages and currents, line to line voltages, frequencies, power (active, reactive and apparent) and cos(phi) independently for each input.	
		All ac measurements to be true RMS.	
		On-line vector diagram for voltages and currents as well as power.	
		On-line measurement of Vdc, Idc and dc power for each input.	
		On-line display of harmonics measured both numerically (in a table per harmonic frequency) and graphically in a bar graph.	
7.16	Transient		

	Recording Function		
		The recording function should enable recordings at the specified sampling frequency.	
		Any recordings done, should automatically be uploaded to the controller PC.	
		The recordings should be saved in COMTRADE format on the PCs hard drive.	
		Trigger conditions: amplitude, swell and sag, harmonic, frequency, frequency change, notch as well as any combination of these triggers.	
		A pre-trigger buffer should be definable.	
		Analysis software should be provided to analyse the recorded waveshapes in terms of analogue waveshapes (RMS and instantaneous values), vector diagram, impedance plots (L-N and L-L fault loops) as well as harmonics.	
		For impedance plots, the relays impedance characteristic should be displayable in relation to the impedance trajectory measured by the relay.	
8	Accessories		
	Generator combination cable	to combine 3xV and 3xI into one test lead, 8x 4mm banana plugs	
	Measurement leads	12 x 2 m; 2 mm ²	
	Other accessories:	Power cord	
		Connection lead from test set to PC	
		Various connection accessories	
		Hardcover carrying cases for test hardware (with retractable handle and wheels if available)	
		Soft Bag for test set and accessories	
		Instruction Manual	
		Software for report downloading and configuration as well as offline test sequence generation.	
9	Local Support		
	Hotline support hours	Local telephonic support to be offered in the hours of 07h00 - 20h00 South African time.	
	Email and Fax support	Email and fax support to be offered with a guaranteed turnaround time of 1 business day.	
	Number of units in operation in South Africa	10 units in SA (separate list of users with contact details to be provided)	
	No of back-up units available in South Africa	2	
	Calibration facility available in South Africa	Yes	
	Guaranteed turnaround time for repairs and calibration	< 5 working days	

	Product training offered in South Africa	standard training offered every three months in Johannesburg	
		In-house / On-site training to be offered on request	
	Warranty on Hardware	FIVE years from date of delivery	

3.3 Invoicing and payment

In terms of core clause 50 the *Supplier* assesses the amount due and applies to the *Purchaser* for payment. The *Supplier* applies for payment with a tax invoice addressed to the *Purchaser* as follows:

The *Supplier* includes the following information on each tax invoice:

- Name and address of the *Supplier*
- The contract number and title.
- *Supplier's* VAT registration number.
- The *Purchaser's* VAT registration number which is _____.
- The total of
 - The Price for each lump sum item is in the Price Schedule or Batch Order which the *Supplier* has completed.
 - Where a quantity is stated for an item in the Price Schedule or Batch Order, an amount calculated by multiplying the quantity which the *Supplier* has completed by the rate,
- Other amounts to be paid to the *Supplier*.
- Less amounts to be paid by or retained from the *Supplier*.
- The invoiced amount - excluding VAT, the VAT and including VAT.
- (add other as required)

5. Services and other things provided by the *Purchaser*

Item	Date by which it will be provided