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0.1 Circulation List

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0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1 Rev 0	2014-03-25	New Issue	Michael Apudo	G. Owuor

IEC 60950	Information technology equipment –Safety – Part 1: General requirements
IEC 60664-1& 3:	Insulation Coordination for Equipment within Low-Voltage Systems - Part 1: Principles, Requirements and Tests; Part 3: Use of coatings to achieve insulation coordination of printed board assemblies.
IEC 60112:	Method for the determination of the proof and the comparative tracking indices of solid insulating materials
IEC 61326:	Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements
IEC 60068:	Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal) Part 2-27: Tests – Test Ea and guidance: Shock
IEC 60529:	Degrees of protection provided by enclosures (IP Code)
IEC 60320:	Appliance couplers for household and similar general purposes – Part 1: General requirements

3. TERMS AND DEFINITIONS

For the purpose of this specification, the definitions given in the reference standards shall apply.

4. REQUIREMENTS

4.1. Service Conditions

The conductors shall be suitable for:

a) Continuous outdoor operation in tropical areas at altitudes of up to 2200m above sea level,
b) Humidity of up to 90%,
c) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C;
d) heavy saline conditions along the coast and
e) Isokeraunic levels of up to 180 thunderstorm days per year.

FOREWORD

These specifications have been prepared by Research and Development Department in collaboration with Energy Transmission West Kenya section both of The Kenya Power and Lightning Company Limited (abbreviated as KPLC) and it lays down the requirements for a Portable Three-Phase Relays Test Unit [Secondary Injection Set – Numerical]. The specification is intended for use by KPLC in purchasing the equipment.

The supplier shall also submit information which confirms satisfactory service experience with products which fall within the scope of this specification.

1. SCOPE

1.1. This specification is for a high accuracy, intelligent and fully automated (Digital/Numerical) relay testing set, to be used for field testing of Medium and High Voltage Protection Relays on Lines, Transformers and Feeders and Calibration of instruments such as Ammeters, Voltmeters and transducers.

1.2. The specification also covers inspection and test of the equipment as well as the schedule of Guaranteed Technical Particulars to be filled and signed by the manufacturer and submitted for tender evaluation.

1.3. The specification stipulates the minimum requirements for the Portable Three-Phase Relays Test Unit [Secondary Injection Set – Numerical] acceptable for use in the company (KPLC) and it shall be the responsibility of the supplier to ensure adequacy of the design, good workmanship, good engineering practice and adherence to applicable standards, specifications and regulations in the manufacture of the test equipment for The Kenya Power and Lightning Company Limited.

2. REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this specification. Unless otherwise stated, the latest edition of the referenced documents (including any amendments) applies:

IEC 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements

4.2. Design and Construction

4.2.1. The injection test set shall be a portable, rugged and light weight unit (not more than 18Kgs) that can perform complete testing of Distance, Differential, Over-current & Earth fault, Voltage and Frequency Relays.

4.2.2. Its carrying case shall be shockproof, and impact resistant. It shall be able to withstand a fall of one meter without damage to the equipment.

4.2.3. The portable injection test set shall be fully automated, intelligent and of high accuracy with no additional external calibration kit/tool.

4.2.4. Test set shall be equipped with most recent software for easy operation, data analysis and test plan scheduling. The purchaser (KPLC) shall not be required to pay for any software licences nor any associated costs during the lifetime of the test set.

4.3. Operation

4.3.1. The injection test set shall be both laptop controlled and manually controlled through a manual control unit. Its Operating System shall run on windows 7, XP, Windows 2000 and be capable of being integrated with other analytical and data management software in MS office suite.

4.3.2. It shall be capable of generating its own test signals. A minimum of six (6) A.C current outputs and four (4) A.C voltage outputs are required. The accuracy of the test results shall not be dependent on the quality of the input signal.

4.3.3. It shall have a minimum of 10 binary/analog freely programmable inputs that can handle up to 300 V DC and a minimum of 4 binary freely programmable outputs that can handle up to 300 V dc, 8A.

4.3.4. It shall have a minimum of two (2) analogue DC inputs that can handle up to ±20 mA, ±10 V DC and an auxiliary DC supply of up to 260 V DC.

4.3.5. It shall have an automatic in built suppression system for Electrostatic & Electromagnetic interferences in a substation.

4.3.6. The equipment shall also have automatic test procedures which are easy and simple to follow and use.

4.3.7. The test set should have an illuminated (red colour) power supply on/off switch

4.3.8. The test set shall have a provision for combined generator A.C output test signals and a test cable with enough cores to carry all the A.C quantities from test set to device being tested. This cable shall be able to carry maximum test set rated current and voltages and shall be at least three (3) meters long.

4.4. Test results

4.4.1. Test preparations and analysis of results and parameters shall be prepared off-line and tests executed automatically.

4.4.2. The equipment shall generate the test reports automatically, and a possibility of exporting them to MS Word or Excel for detailed analysis should be available.

4.4.3. The tester shall be equipped with a standard data communication interface for connection to remote data processing such as laptop/computer, or control equipment.

4.4.4. The interfaces shall use USB 3.0, device class DCh or FEh with a signaling speed of 5 Gbit/s and a usable data rate of up to 4 Gbit/s (500 MB/s) and RS232 serial communication line, with the length of the connection not exceeding 5 meters. The tester shall be capable of being remotely controlled by such equipment.

4.4.5. The injection test shall be capable of data uploading and downloading to a laptop through RS232 and USB port and/or Ethernet.

4.5. Technical and Specific Requirements

4.5.1. The test set shall be capable of automatically carrying out the following pre-commissioning field tests;

a) Advanced distance relay and scheme testing, characteristic plotting, zone reaches and timing for various line angles and binary input/output signals monitoring, testing multiple fault loops in an automated sequence.
b) Advanced differential relay and scheme testing, bias slope characteristic plotting and timing for up to 3 winding transformers.
c) Advanced over-current and earth fault relay and scheme testing, characteristic plotting, pickup and timing for various line angles and binary input/output signals monitoring in an automated sequence.
d) Advanced trans-play for trouble shooting faults records, relay evaluation with transient files, end -to -end testing and generating test reports.

e) The automated three (3) phase secondary injection set shall be supplied with all the necessary accessories for carrying out the intended field tests on all generation of relays and equipment mentioned above.

4.5.2. The equipment rating shall be as per Table 1 with the power and physical characteristics specified in Table 2.

Table 1: Technical data for the equipment

Output Current		
1	Range	6 x 32 A AC continuous and 0 to 32 A AC
2	Resolution	1 mA AC
3	Accuracy	± 1 mA of reading
4	Connection Type	4 mm^2 banana socket
Output Voltage		
1	Range	4 x 300 VA AC / 3 x 300 V DC / 1 x 600 V AC
2	Resolution	0.010 V AC
3	Accuracy	± 1 % reading
4	Connection type	4 mm^2 banana socket
Output VA		
	Capability	6 x 430 VA / 3 x860 VA / 1 x 1000 VA
Auxiliary DC Supply Output		
1	Range	0 – 260 V DC
2	Resolution	1 V
3	Accuracy	± 0.5 % of reading
4	Connection type	4 mm^2 banana socket
Analog Input Ratings Current/Voltage:		
1	Range	±20mA ; ±10V
2	Connection type:	4mm^2 Banana socket
Binary Input Ratings Current/Voltage:		
1	Range;	At least 10 Binary Inputs; 0 to 300VDC auto ranging; 8A
2	Connection type:	4mm^2 Banana socket

Table 2: Power Supply and Mechanical Data

No	Particulars		Test Performance
1	Power Supply	Single-phase, nominal	110 V AC ... 250 V AC, 10 A
		Frequency, nominal	50 Hz
		Power consumption	<1000 VA (<2000 VA for short time < 10 sec)
		Connection socket	C22 conforming to IEC 60320
		Operating temperature	-1 ... +40 °C (+30.2 ... +104 °F)

No	Particulars		Test Performance
2	Environmental conditions	Storage temperature	-5 ... +60 °C (23 ... +140 °F)
		Humidity range - Rel. humidity	5 ... 95 %, non-condensing
		Shock (operating)	15 g / 11 ms half sine as per IEC 60068-2-27
		Vibration (operating)	frequency range from 10 Hz to 150 Hz, continuous acceleration 2 g (20 m/s^2), 10 cycles per axis as per IEC 60068-2-6
3	EMC Immunity	Performance criteria of the equipment	IEC 61326-1 Class A,
4	Safety	Rated Impulse Voltage for equipment -1.2/50µs	6000 V as per IEC 60664-1, table 1
		Overvoltage category	Class IV as per IEC 61010-1
		Pollution category	Class 2 as per IEC 61010-1
		Insulation material group	Group II - 400≤CTI<600 (PLC=1) as per IEC 60112
		Minimum clearances for equipment to withstand steady state voltages, temporary over-voltages and to avoid partial discharge	5.5 mm as per IEC 60664-1
		Creepage distance for equipment subject to long term stresses, min	1.8 mm as per IEC 60664-1
		Minimum acceptable creepage distances on printed circuit boards	1.0 mm as per IEC 60664-1
		Maximum recurring peak voltage related to creepage distance on printed wiring boards	913 V as per IEC 60664-1
		Width of grooves by pollution degree on printed circuit boards	1.0 mm as per IEC 60664-1
		Partial discharge requirements	As per IEC 60664-1 Annex C
		Solid insulation design	Shall withstand short term and long term stresses as per IEC 60664-1 clause 3.3

4.6. Accessories *(To be supplied with the equipment)*

4.6.1. Laptop (optional unless specified in the tender)

The laptop shall be designed and manufactured as per the requirements of IEC 60950 with minimum requirements as per Table 3.

Table 3: Technical data for a Laptop

Item	Minimum Specification
Brand	Specify
Model	Specify
Year of manufacture	Specify
Processor	Intel® Core™ i5-920 Processor
Clock speed	2.2 GHz or higher
Chipset	Compatible – (specify)
Motherboard	Compatible – (specify)
Memory (maximum)	2GB DDR3, 1333MHz (Upgradable upto 6 GB)
Cache memory	3MB L2 or higher
Graphics	256MB Dedicated DDR3 Memory
Hard disk controller	Serial ATA
Hard disk	250 GB or higher 5400RPM SATA Hard Drive
Shock resistant	Anti-shock mounting design to protect screen and hard disk drive from damage and data loss
Keyboard	Spill resistant keyboard
Mouse	2 or 3 button with scroll wheel optical PC Mouse with pad – USB 3.0
Touch pad	Intelligent Touch with configurable vertical and horizontal scroll functions
Power supply	Input – 220V – 250V Auto-sensing, 50 Hz
Battery life	4 hours or higher
Optical drive	Dual Layer DVD +/-RW
Card slots	Secured Digital Card Reader
Display	14" or smaller WXGA with 1280 x 800 or higher resolution
Integrated Web Camera	2 Mega Pixels or higher
Network/Wireless Interfaces	Integrated 10/100/1000Mbps Ethernet LAN, Integrated 802.11 a/b/g/n WLAN, Bluetooth
Security	Booting/HDD User password Protection and Fingerprint Recognition
I/O Inputs	Minimum 4 x USB 3.0 Hi-Speed, 1 x RJ45, 1 VGA
Operating system	MS Windows 7 Professional OEM Version with original Media kit, & manuals (firewall enabled and all security updates and patches and fixes up-to-date) or equivalent higher version.
Productivity software	Latest versions of, Open Office AND Genuine Microsoft Office 2007 Standard or better, OEM, Full or Suitable licensing scheme
	Adobe Acrobat reader - the latest version
Carrying bag	Include with the same brand of the notebook.
Manufacturer Authorization & warranty	Attach Authorization letter and 2 years comprehensive on-site manufacturer authorized warranty (parts).

4.6.2. The other accessories to be supplied with the equipment are:

a) Generator combination cable to carry all AC test quantities;
b) Flexible test leads ($2.5mm^2$, 3m long) - at least 8 banana ended leads;
c) Insulated crocodile clips ($4mm^2$) - at least 12 banana ended leads;
d) Flexible jumpers ($2.5mm^2$, 50mm long) - at least 8 pieces ;
e) PC to Test Set communication cable - Parallel port or Ethernet or USB, or Optical;
f) Network communication cable - Ethernet, Optical , IEC61850;
g) Carrying bag for accessories which should be able to carry all the accessories and should be water proof
h) Other standard accessories

4.7. Quality Management System

4.7.1. The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the portable three-phase relays test unit physical properties, tests and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008.

4.7.2. The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001: 2008 certificate shall be submitted with the tender for evaluation.

4.7.3. The bidder shall indicate the delivery time of the items, manufacturer's monthly & annual production capacity and experience in the production of the type and size of items being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the portable three-phase relays test unit sold in the last five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

5.0. TESTS AND INSPECTION

5.1. The portable three (3)-phase relay test unit shall be inspected and tested in accordance with the requirements of IEC 61010-1, IEC 60950, IEC 60664- 1 & 3, IEC

61326, IEC 60112 and IEC 60529 standards. It shall be the responsibility of the supplier to perform or to have performed the tests specified and whatever other tests he normally performs at works.

5.2. Copies of previous Type Tests Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. The accreditation certificate to ISO/IEC 17025 for the same third party testing laboratory used shall also be submitted with the tender document (all in English Language)

5.3. Copies of type test reports to be submitted with the tender (by bidder) for evaluation shall be as stated below:

a) Type Tests for Equipment Performance

- Electromagnetic compatibility (EMC)
- Switching tests on the equipment.
- Impulse overvoltage tests on the equipment -Clearances
- Dielectric voltage withstand tests on the equipment - Controlled overvoltage
- Functional tests on the equipment.

b) Type Tests for Printed Circuit Board Coating Performance

- Environmental, humidity and thermal conditioning tests
- Dielectric voltage withstand tests
- Comparative tracking index (CTI)
- Resistance to soldering heat test
- Flammability test
- Coating adhesion test
- Insulation resistance between conducting parts

5.4. Routine and sample test reports for the portable three-phase relays test unit to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods. KPLC Engineers will witness tests at the factory before shipment.

5.5. On receipt of the goods KPLC will perform any of the tests specified in order to verify compliance with this specification. The supplier shall replace without charge to KPLC the test unit which upon examination, test or use; fail to meet any of the requirements in the specification.

5.6. Tests to be witnessed at the factory before shipment shall be in accordance with IEC 61010-1, IEC 60664- 1 & 3, IEC 61326, IEC 60112 and IEC 60529 standards and this specification and shall include the following:

- Insulation Resistance of the equipment
- Leakage Current of the equipment
- Ground Continuity of the equipment
- Ground Bond of the equipment
- Polarization Test of the equipment
- Recurring Peak Voltage Determination
- Dielectric Voltage Withstand Tests - Measuring clearances
- Functional tests of the equipment
- Dimensional and overall checks.

6.0. MARKING AND PACKING

6.1. PACKING

6.1.1 The test unit shall be carried in a sturdy transport case with hard-foam interior, water tight, air-tight, dust proof, chemical resistant and corrosion proof. The weight of the case should not exceed 12kg. The total case dimensions shall not exceed 700mm x 550mm x 400mm in size.

6.1.2 The housing shall be complete with a gasket to seals the lid when closed so as to protect the equipment against water and dirt while the instrument is carried through rainstorms or other hazardous conditions. The lid shall be secured by two latches and a handle for portability. A compartment shall also be provided for storage of test cables and line cord.

6.1.3 The accessories shall be packed in suitable matching bag with a shoulder carrying strap and a hand grip.

6.2 MARKING

The portable three-phase relay test unit and its accessories shall be marked in a permanent manner with the following information (in English Language):

a) Standard to which the test unit complies
b) Name of manufacturer
c) Type of portable three-phase relay test unit (description of type, number and overall size of sections)

d) Year and month of manufacture and serial number
e) Maximum permissible measurement limits
f) The words "**Property of Kenya Power & Lighting Co**" shall be engraved permanently on each portable three-phase relay test unit while the other parameters shall be marked on a permanent label.
g) The overvoltage protection category and duty rating e.g. category IV-field
h) The portable three-phase relay test unit shall be provided with a separate permanent label displaying advice to the user.
i) In addition, the portable three-phase relay test unit shall be marked with the necessary labels that conform to IEC 61010-1 clauses 5.1.2 to 5 and its accessories (Laptop) as per IEC 60950 clauses 1.7.

7 WARRANTY AND TRAINING

7.1 The Portable 3 Phase Relays Test Unit [Secondary Injection Set - Numerical] shall be complete with a minimum 12-months warranty after installation.

7.2 If the test set is new to KPLC, then a two day Training on the equipment shall be carried out by the Supplier's engineer on a KPLC site. The supplier shall meet the cost of this training.

7.3 After tender award, factory inspection and certification by two KPLC's engineers or third party shall be carried out before shipment of the Equipment.

7.4 Technical support and software, where applicable upgrades shall be provided free of charge to KPLC for a period of not less than 36 months.

7.5 In the case of tender award, technical detailed design drawings for the portable three (3) phase relays test unit shall be submitted to KPLC for approval before manufacture commences.

8 DOCUMENTATION

8.1 The bidder shall submit its tender complete with technical documents required by Annex A (Guaranteed Technical Particulars) for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:
a) Guaranteed Technical Particulars signed by the manufacturer;
b) Copies of the Manufacturer's catalogues, brochures, detailed design drawings and technical data;
c) Sales records for the last five years and at least four customer reference letters;
d) Details of manufacturing capacity and the manufacturer's experience;

e) Copies of relevant type test reports by a third party testing laboratory accredited to ISO/IEC 17025;
f) Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;
g) Manufacturers letter of authorization, ISO 9001:2008 certificate and other technical documents required in the tender.

8.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

a) Guaranteed Technical Particulars signed by the manufacturer;
b) Design Drawings with details of the test set to be manufactured for KPLC.
c) Quality assurance plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008
d) Detailed test program to be used during factory testing;
e) All documentation necessary for safety of the equipment as specified in IEC 61010-1 clause 5.4 shall be provided with the equipment.
f) Manufacturer's undertaking to ensure adequacy of the design, good engineering practice, adherence to the specification and applicable standards and regulations as well as ensuring good workmanship in the manufacture of the test set for The Kenya Power & Lighting Company;
g) Packaging details (including packaging materials).

8.3 The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the portable relay test set [secondary injection] to KPLC stores

ANNEX A: *Guaranteed Technical Particulars (to be filled and signed by the supplier and submitted together with copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records and copies of test certificates for tender evaluation)*

Tender No ..... Bidder's Name & Address .....

	Description		Bidder's Offer
1	Name of the manufacturer and country of origin		
	Type Reference Number or Model Number		
2	**Applicable Standards**		
3	**Terms and Definitions**		
4	Requirements		
4.1	Service conditions		
4.2	**Design and Construction**		
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4.3	**Operation**		
	4.3.1 – 4.3.5		
4.4	**Test Results**		
	4.4.1 – 4.4.5		
4.5.	**Ratings – Generator Outputs – as per Table 1**		
	Output Current		
	Range	6 x 32 A AC continuous and 0 to 32 A AC	
	Resolution	1 mA AC	
	Accuracy	± 1 mA of reading	
	Connection Type	4 mm^2 banana socket	
	Output Voltage		
	Range	4 x 300 VA AC / 3 x 300 V DC / 1 x 600 V AC	
	Resolution	0.010 V AC	
	Accuracy	± 1 % reading	
	Connection type	4 mm^2 banana socket	
	Output VA		
	Capability	6 x 430 VA / 3 x860 VA / 1 x 1000 VA	
	Power Supply		
	Voltage	110 – 250 V AC; at 50 Hz	
	Current	10 A max at 250 V AC	
	Auxiliary DC Supply Output		
	Range	0 – 260 V DC	
	Resolution	1 V	
	Accuracy	± 0.5 % of reading	

	Description		Bidder's Offer
	Connection type	4 mm^2 banana socket	
	Analog Input Ratings Current/Voltage:		
	Range	±20mA ; ±10V	
	Connection type:	4mm^2 Banana socket	
	Binary Input Ratings Current/Voltage:		
	Range;	At least 10 Binary Inputs; 0 to 300VDC auto ranging; 8A	
	Connection type:	4mm^2 Banana socket	
Power Supply and Mechanical Data as per Table 2			
	Single-phase, nominal	110 V AC ... 250 V AC, 10 A	
	Frequency, nominal	50 Hz	
	Power consumption	<1000 VA (<2000 VA for short time < 10 sec)	
	Connection socket	C22 conforming to IEC 60320	
	Operating temperature	-10 ... +55 °C (+14 ... +131 °F)	
	Storage temperature	-20 ... +70 °C (-4 ... +158 °F)	
	Humidity range - Rel. humidity	5 ... 95 %, non-condensing	
	Shock (operating)	15 g / 11 ms half sine as per IEC 60068-2-27	
	Vibration (operating)	frequency range from 10 Hz to 150 Hz, continuous acceleration 2 g (20 m/s^2), 10 cycles per axis as per IEC 60068-2-6	
	Performance criteria of the equipment	IEC 61326-1 Class A,	
	Rated Impulse Voltage for equipment -1.2/50µs	6000 V as per IEC 60664-1, table 1	
	Overvoltage category	Class IV as per IEC 61010-1	
	Pollution category	Class 2 as per IEC 61010-1	
	Insulation material group	Group II - 400≤CTI<600 (PLC=1) as per IEC 60112	
	Minimum clearances for equipment to withstand steady state voltages, temporary over-voltages and to avoid partial discharge	5.5 mm as per IEC 60664-1	
	Creepage distance for equipment subject to long term stresses, min	1.8 mm as per IEC 60664-1	
	Minimum acceptable creepage distances on printed circuit boards	1.0 mm as per IEC 60664-1	

	Description		Bidder's Offer
	Maximum recurring peak voltage related to creepage distance on printed wiring boards	913 V as per IEC 60664-1	
	Width of grooves by pollution degree on printed circuit boards	1.0 mm as per IEC 60664-1	
	Partial discharge requirements	As per IEC 60664-1 Annex C	
	Solid insulation design	Shall withstand short term and long term stresses as per IEC 60664-1 clause 3.3	
4.6	**Accessories**		
	4.6.1 **Laptop**		
	Brand	Specify	
	Model	Specify	
	Year of manufacture	Specify	
	Processor	Intel® Core™ i7-920 Processor	
	Clock speed	2.2 GHz or higher	
	Chipset	Compatible – (specify)	
	Motherboard	Compatible – (specify)	
	Memory (maximum)	2GB DDR3, 1333MHz (Upgradable upto 4 GB)	
	Cache memory	3MB L2 or higher	
	Graphics	256MB Dedicated DDR3 Memory	
	Hard disk controller	Serial ATA	
	Hard disk	250 GB or higher 5400RPM SATA Hard Drive	
	Shock resistant	Anti-shock mounting design to protect screen and hard disk drive from damage and data loss	
	Keyboard	Spill resistant keyboard	
	Mouse	2 or 3 button with scroll wheel optical PC Mouse with pad – USB 3.0	
	Touch pad	Intelligent Touch with configurable vertical and horizontal scroll functions	
	Power supply	Input – 220V – 250V Auto-sensing, 50 Hz	
	Battery life	4 hours or higher	
	Optical drive	Dual Layer DVD +/-RW	
	Card slots	Secured Digital Card Reader	
	Display	14" or smaller WXGA with 1280 x 800 or higher resolution	
	Integrated Web Camera	2 Mega Pixels or higher	
	Network/Wireless Interfaces	Integrated 10/100/1000Mbps Ethernet LAN, Integrated 802.11 a/b/g/n WLAN, Bluetooth	
	Security	Booting/HDD User password Protection and Fingerprint Recognition	

	Description		Bidder's Offer
	I/O Inputs	Minimum 3 x USB 3.0 Hi-Speed, 1 x RJ45, 1 VGA	
	Operating system	MS Windows 7 Professional OEM Version with original Media kit, & manuals (firewall enabled and all security updates and patches and fixes up-to-date). Sinhala/Tamil Unicode support is required.	
	Productivity software	Latest versions of, Open Office AND Genuine Microsoft Office 2007 Standard or better, OEM, Full or Suitable licensing scheme * Please quote the price for one unit of computer with and without Microsoft Office 2007	
		Adobe Acrobat reader - the latest version	
	Anti-virus	Anti-Virus software should be installed with licenses (Specify) * Please quote the price for one unit of computer with and without Anti-Virus software	
	Carrying bag	Include with the same brand of the notebook.	
	Manufacturer Authorization and warranty	Attach Authorization letter and 3 years comprehensive on-site manufacturer authorized warranty (labour & parts)	
	4.6.2 Other Accessories		
	Generator combination cable	To carry all ac test quantities (at least 8 banana ended leads)	
	Flexible Test Leads ($2.5mm^2$, 3m long)	At least 12 banana ended leads	
	Insulated Crocodile clips ($4mm^2$)	At least 8 pieces	
	Flexible jumpers ($2.5mm^2$, 50mm long)	At least 4 banana ended leads	
	PC to Test Set Communication cable	Parallel port or Ethernet or USB, or Optical Ethernet, Optical , IEC61850	
	(g)Carrying Bag for accessories	Should be able to carry all the accessories, should be water proof2X 6 m high current cable	
	(h)Others if any specify		
	Calibration certificate	Certificate from accredited Laboratory.	
4.7	**Quality Management Systems**		
	4.7.1 – 4.7.3		

	Description	Bidder's Offer
5.0	Tests and Inspection	
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6.0	Marking and packing	
	6.1 Packing	
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7.0	Warranty and Training	
8.0	Documentation	
9.0	Manufacturer's Guarantee and Warranty	
10.0	List catalogues, brochures, technical data and drawings submitted to support the offer.	
11.0	List customer sales records submitted to support the offer.	
12.0	List Test Certificates submitted with tender	
13.0	List test & calibration reports to be submitted to KPLC for approval before shipment	
14.0	Statement of compliance to specification (indicate deviations if any & supporting documents)	

.....

Manufacturer's Name, Signature, Stamp and Date