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*The Kenya Power & Lighting Co. Ltd.  
Central Office – P.O. Box 30099, Nairobi, Kenya  
Telephone – 254-02-3201000  
Fax No. 254-02-3201889  
Stima Plaza, Kolobot Road*

*Our Ref: KP1/9A.3/OT/22/24-25*

*10<sup>th</sup> April, 2025*

TO ALL PROSPECTIVE TENDERERS

**RE: ADDENDUM NO. 3 TO THE TENDER NO. KP1/9A.3/OT/22/24-25 SUPPLY OF POWER TRANSFORMERS, SPARE TAP CHANGERS AND SWITCHBOARD PANELS.**

The following amendments are made to the specified provisions of the Tender document for Supply of Power Transformers, Spare Tap Changers and Switchboard Panels.

**1. RELATIONSHIP WITH THE PRINCIPAL TENDER DOCUMENT**

Save where expressly amended by the terms of this Addendum, the Principal Tender Document shall continue to be in full force and effect.

The provisions of this Addendum shall be deemed to have been incorporated in and shall be read as part of the Principal Tender Document.

**2. CLARIFICATION**

The attached **Annexure 1-3** are responses made to clarifications sought on various issues on the Technical Specifications.

**3. AMENDMENTS**

The following amendments are made on the tender document.

- I. **Section III: TABLE 3: CAPACITY DECLARATION FORM** is amended and replaced with **Appendix III** Attached.
- II. **ITT 15.2** is amended to include the following exemptions in documentary requirements for items in **LOT 2** as summarized below;

**LOT 2: TAP CHANGER SPARES AND OTHER EQUIPMENT**

<b>ITEM DESCRIPTION</b>	<b>Manufacturer Authorization</b>	<b>Warranty</b>	<b>Type test Report</b>	<b>ISO 9001:2015</b>	<b>GTP</b>
MR-EASUN-3 XMI 501-123/C-10.19.3W tap changes INSEART Only -Juja Road	Yes	Yes	Not Required	Not Required	Yes
Huaming Motor Drive CMA7 units	Yes	Yes	Not Required	Not Required	Not Required
EASUN MR Motor Drive MA7 Unit 23MVA 66/11 Kv for Kimathi and Kitisuru S/s	Yes	Yes	Not Required	Not Required	Not Required
MR Motor Drive MA9 Unit for Nyali S/s	Yes	Yes	Not Required	Not Required	Not Required
Shanghai Huaming Tap changes- 7.5MVA 33/11kV	Yes	Yes	Not Required	Not Required	Not Required
Shanghai Huaming CV2III-350 D/126 -10193 W Limuru 23MVA 66/11kV	Yes	Yes	Not Required	Not Required	Not Required
ABB VUBBRT 200/400 Kisumu 33/11kV S/s	Yes	Yes	Not Required	Not Required	Not Required
Automatic Voltage Control relay-Tapcon	Not Required	Bidder Warranty	Not Required	Not Required	Not Required
Automatic Voltage Control relay-REGDA	Not Required	Bidder Warranty	Not Required	Not Required	Not Required
Switchboard panel 11kV	Yes	Yes	Yes	Yes	Yes
Switchboard panel 11kV	Yes	Yes	Yes	Yes	Yes
<b>BUSHING</b>					
ABB Powertech 52kV Bushing for New Bamburi	Yes	Yes	Not Required	Not Required	Yes

**4. TENDER CLOSING DATE**

The tender closing been extended to **23th April 2025** at 10:00am, opening of the Tender will take place thereafter at the Auditorium, Stima Plaza on the same day at 10.30am.

All the other terms and conditions remain as per the tender document.

Yours faithfully,

**For: KENYA POWER & LIGHTING COMPANY LIMITED.**

  
**DR. JOHN NGENO, OGW**  
**GENERAL MANAGER, SUPPLY CHAIN & LOGISTICS**

ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER																																													
No.	Stipulation as per Technical Specificaiton					Clarifications / Confirmation	Customer Reply																																						
1	As per the given technical specification clause no 1 mentioned: The Vector Group shall be stated on the schedule of requirements in the tender and shall either be YNyn0d11 or Dyn1/Dyn11. Power transformer intended for Dy connection shall have facility to change over from Dyn1 to Dyn11 and vice versa.					As per the Price Schedule, the vector groups of 23 MVA is mentioned as Dyn1(1 No). Where as in specification clause no.1 it is mentioned as "Power transformer intended for Dy connection shall have facility to change over from Dyn1 to Dyn11 and vice versa." Please confirm whether change over facility is required or not.	As per schedule of requirements.Vector groups are as per the schedule of requirements																																						
2	Where as in Price Schedule mentioned as below; <table><tr><td>4</td><td>23MVA 66/33 KV</td><td>Dyn1</td><td>1</td><td>PCS</td></tr><tr><td>5</td><td>7.5MVA 33/11 KV</td><td>Dyn1</td><td>1</td><td>PCS</td></tr><tr><td>6</td><td>2.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr><tr><td>7</td><td>Earthing Transformer and Resistor</td><td>Zyn11</td><td>4</td><td>PCS</td></tr><tr><td>8</td><td>7.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr><tr><td>9</td><td>7.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr><tr><td>10</td><td>2.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr><tr><td>11</td><td>2.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr></table>							4	23MVA 66/33 KV	Dyn1	1	PCS	5	7.5MVA 33/11 KV	Dyn1	1	PCS	6	2.5MVA 33/11 KV	Dyn11	1	PCS	7	Earthing Transformer and Resistor	Zyn11	4	PCS	8	7.5MVA 33/11 KV	Dyn11	1	PCS	9	7.5MVA 33/11 KV	Dyn11	1	PCS	10	2.5MVA 33/11 KV	Dyn11	1	PCS	11	2.5MVA 33/11 KV	Dyn11
4	23MVA 66/33 KV	Dyn1	1	PCS																																									
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10	2.5MVA 33/11 KV	Dyn11	1	PCS																																									
11	2.5MVA 33/11 KV	Dyn11	1	PCS																																									
3	As per the given technical specification clause no 4.1.1-d mentioned: Pollution: Design pollution level to be taken as "Very Heavy"					Against this clause, we are considering the 31mm/kV creepage distance including correction factor at 2200 altitude. Please confirm.	Creepage distance to be done considering 31mm/kV																																						
4	As per the given technical specification clause no 4.1.2 mentioned: the transformer shall be operated at a high loading factor					Against this clause, please specify what are the high loading factors to be considered .	The transformers serve residential, industrial and commercial loads and are likely to be operated at high loads through out the service life.Transformer design to avoid overheating, reduced lifespan and potential damage when operated close to full load.High load factor means the transformer is being used more efficiently,as its closer to its peak capacity for alarger portion of time.Take a peak load of full load capacity and average load/safe load of 80% of full load.																																						

**ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
5	As per the given technical specification clause no 4.2.5 mentioned: The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the equipment keeping in view the regulatory requirements in Kenya.	Against this clause, please provide the regulatory requirements document if any to consider in design.	The specification entails all the necessary provisions for safety ranging from insulation requirements in clause 4.11, minimum external air clearances in clauses 4.10.3 and 4.8.5, short circuit requirements in clauses 4.3.3 and 4.3.4. Adhering to these clauses shall ensure a safe design.
6	As per the given technical specification clause no 4.2.12 mentioned: Galvanizing shall be applied by the hot-dipped process to ISO 1461 and for all parts other than steel wires shall consist of a thickness of zinc coating equivalent to not less than 610g of zinc per square meter of surface. The zinc coating shall be smooth, clean and of uniform thickness and free from defects. The preparation of galvanizing and the galvanizing itself shall not adversely affect the mechanical properties of the coated material. The quality will be established by tests as per ISO 1461.	Against this clause, galvanizing shall be applied as mentioned wherever applicable further, paint shall be applied to the transformer tank and radiators as per the clause no.4.14 and 4.15 . Please confirm.	Confirmed
7	As per the given technical specification clause no 4.2.13 mentioned: All bolts, nuts, and washers exposed to atmosphere and in contact with non-ferrous parts which carry current shall be of phosphor bronze.	Against this clause, all external hardware exposed to atmosphere shall be of hot dip galvanized (HDG)/ stain less steel(SS) as per our regular practice of power transformers. Please confirm the same to be ok.	Phosphor bronze is preferred due to its good electrical conductivity, corrosion resistance and ability to maintain reliable connections. While stainless steel is also corrosion resistant, its electrical conductivity may not be as good as phosphor bronze.
8	As per the given technical specification clause no 4.3.2 mentioned: The temperature rise in the hottest region exceeding 55°C and 60°C in oil and winding respectively	Against this clause, we are considering the mentioned Temperature Rise values Over Ambient temperature of 40°C at 2200 mtrs. Altitude level (including altitude correction factor). Please confirm.	Confirmed



**ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
9	As per the given technical specification clause no 4.6.4 mentioned: Adequate oil ducts shall be provided in the core for cooling.	Cooling ducts for core for this capacity of transformer is not required as hotspot in core is very less than required and hence same will not be provided. Please confirm.	To guarantee efficient surface cooling of the core and mitigate against insulation failures and transformer damage due to overheating, please provide oil ducts made of chemically and thermally stable material.
10	As per the given technical specification clause no 4.7.3 mentioned: Typical values for existing 23MVA transformers in Kenya Power at principal (nominal) tap are 9.8% 10.1%.the minimum as per IEC 60076-5 for this size of transformer is 8%	Against this clause, please confirm the exact requirement of %impedance to be considered at rated tap. Further applicable tolerance shall be as per IEC standard. Please confirm.	This is true but considering that there are existing installed transformers which are likely to be paralleled with this transformer and the need for equal sharing of station loads, please maintain short circuit impedance at nominal tap between 9.8% and 10.1% as per requirement of this clause.
11	As per the given technical specification clause no 4.8.6 mentioned: Bushing terminals shall be clamp type suitable for both copper and aluminium busbars of sizes up to 76mm diameter.	Against this clause, running bus bar of this much diameter (76mm) is not preferred since the loading on bushing will lead to bushing leakage hence we would like proceed flag type connectors of suitable size as per DIN standard. Please confirm.	These connectors are frequently connected/disconnected during transformer maintenance and the most suitable application for this is clamp type connectors. They are simple to remove and install. The system vibrations are also not as much
12	As per the given technical specification clause no 4.9.1 mentioned: HV-SIDE(33kV) A. Core-2 : 15VA,200/1A,cl.PX B. Core-2 : 15VA,200/1A,cl.PX C. Core-2 : 15VA,200/1A,cl.PX	Against this clause please specify the below details for PX class CT's i.e magnetizing current at $V_k$ or $V_k/2$ , secondary resistance, knee point voltage and instrument safety factor etc. further burden is not applicable for PX class CT's	The design must ensure that the knee point voltage ( $V_k$ ) is high enough to prevent core saturation during fault currents considering worst fault level of 31kA. The resistance of the secondary winding must be minimized to ensure that the CT delivers the required voltage and current to the protection relays even under fault condition.

ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER																								
No.	Stipulation as per Technical Specificaiton	Clarifications / Confirmation	Customer Reply																					
13	As per the given technical specification clause no 4.9.1 mentioned: LV-SIDE(11 kV) a.Core-3 : 15VA,400/1A,cl.PX b. Core-3 : 15VA,400/1A,cl.PX c. Core-3 : 15VA,400/1A,cl.PX n. Core-1 : 15VA,400/1A,cl.PX	Against this clause please specify the below details for PX class CT's i.e magnetizing current at V <sub>k</sub> or V <sub>k</sub> /2, secondary resistance, knee point voltage and instrument safety factor etc. further burden is not applicable for PX class CT's	The design must ensure that the knee point voltage (V <sub>k</sub> ) is high enough to prevent core saturation during fault currents considering worst fault level of 31kA.The resistance of the secondary winding must be minimized to ensure that the CT delivers the required voltage and current to the protection relays even under fault condition.For reliable and accurate CT operation, the core material to have low loss, low reluctance values and low flux density.																					
14	As per the given technical specification clause no 4.9.3 mentioned: Current transformers of suitable rating and class for winding temperature indicators shall be installed to adequately cover the transformer (HV & LV) as indicated above (as 200/? and 400/?) for guidance	Against this clause, Generally generally HV WTI CT will be provided by considering negative tap current also i.e 231.6A and hence CT ratio will be provided accordingly(i.e232/2A).	The current transformers and scheme for HV and LV winding transformer indication is manufacturer specific. Implement a working and reliable scheme.																					
15	As per the given technical specification clause no 4.10.3 mentioned: <table><tr><td>Nominal System Voltage between Phases</td><td></td><td>66kV</td><td>33kV</td></tr><tr><td>Minimum clearance phase-to-earth and phase-to-neutral</td><td>mm</td><td>830</td><td>485</td></tr><tr><td>Minimum clearance phase-to-phase between phases of the same winding</td><td>mm</td><td>830</td><td>485</td></tr><tr><td>Minimum clearance between a line terminal of the high voltage winding and a line terminal of a lower voltage winding</td><td>mm</td><td>830</td><td>485</td></tr><tr><td>Minimum clearance from live metal to oil pipe-work including conservator and pressure relief device</td><td>mm</td><td>830</td><td>485</td></tr></table>	Nominal System Voltage between Phases		66kV	33kV	Minimum clearance phase-to-earth and phase-to-neutral	mm	830	485	Minimum clearance phase-to-phase between phases of the same winding	mm	830	485	Minimum clearance between a line terminal of the high voltage winding and a line terminal of a lower voltage winding	mm	830	485	Minimum clearance from live metal to oil pipe-work including conservator and pressure relief device	mm	830	485	Against this clause, we are considering the mentioned external clearances including correction factor at 2200 altitude. Please confirm.	External clearances to remain as per the requirements of this clause.	
Nominal System Voltage between Phases		66kV	33kV																					
Minimum clearance phase-to-earth and phase-to-neutral	mm	830	485																					
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**ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply												
16	<p>As per the given technical specification clause no 4.11 mentioned:</p> <table border="1"> <thead> <tr> <th>Nominal system voltage (kV, rms)</th><th>Highest system voltage (kV, rms)</th><th>Lightning impulse withstand voltage, 1.2/50µs, dry, +ve (kV, peak)</th><th>Power frequency withstand voltage, 50Hz, 60s, wet, (kV, rms)</th></tr> </thead> <tbody> <tr> <td>66</td><td>72.5</td><td>325</td><td>140</td></tr> <tr> <td>33</td><td>36</td><td>200</td><td>95</td></tr> </tbody> </table>	Nominal system voltage (kV, rms)	Highest system voltage (kV, rms)	Lightning impulse withstand voltage, 1.2/50µs, dry, +ve (kV, peak)	Power frequency withstand voltage, 50Hz, 60s, wet, (kV, rms)	66	72.5	325	140	33	36	200	95	<p>Against this clause, please confirm at what altitude we have to consider these insulation level values( i.e at 1000 mtrs or 2200 mtrs)</p>	<p>2200m</p>
Nominal system voltage (kV, rms)	Highest system voltage (kV, rms)	Lightning impulse withstand voltage, 1.2/50µs, dry, +ve (kV, peak)	Power frequency withstand voltage, 50Hz, 60s, wet, (kV, rms)												
66	72.5	325	140												
33	36	200	95												
17	<p>As per the given technical specification clause no 4.12.8 mentioned: The tap changer shall be housed in a separate compartment and shall be vacuum type.</p>	<p>Clause no 4.12.8 calls for separate compartment means flange mounted type is OLTC required, at the same time against clause no 4.2.11 calls for in-tank type OLTC hence please confirm the requirement of OLTC type i.e external flange mounted type or in-tank type OLTC.</p>	<p>OLTC shall be in tank but with its own compartment within the tank.</p>												
18	<p>As per the given technical specification clause no 4.2.11 mentioned: In tank on-load type changer shall be located such that space above the diverter switch chamber will be free of interconnecting pipes etc</p>		<p>OLTC shall be in tank but with its own compartment within the tank.</p>												
19	<p>As per the given technical specification clause no 4.12.10 mentioned: The tap changer shall be of a design &amp; make approved by KPLC</p>	<p>Against this clause, please confirm any specific make/model of OLTC, AVR if required</p>	<p>OLTC manufacturer must be experienced. Must be from a leading known and reputable manufacturer with remarkable experience. Must be a leading pioneer in the vacuum OLTC technology with 40 years experience in OLTC Vacuum technology development and 30 years experience in production. The OLTC switching and control units must have shown reliable and stable operation without problems in KPLC network for atleast 16 years, and proof to that effect.</p>												
20	<p>As per the given technical specification clause no 4.12.11 mentioned: KV meter (technical details to be submitted with tender)</p>	<p>Against this clause, please confirm for what purpose this KV meter is required.</p>	<p>For remote indication of actual transformer secondary voltage (33kV)</p>												

**ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
21	As per the given technical specification clause no 4.13.1 mentioned: A scheme for operating this transformer in parallel with other similar units of different rating shall be provided and wired in the marshalling kiosk (box) by the manufacturer ready for interphasing.:	Against this clause, existing transformer details and scheme are required at ordering stage to consider the parallel operation. Please provide the same.	No need of existing transformer details, implement a master follower tap changer operation scheme with both master and follower units scheme drawing. The tap changer AVR used should be capable of CANbus communication protocol allowing all the AVRs in parallel operation to communicate and exchange paralleling commands and signals.
22	As per the given technical specification clause no 4.14-a mentioned: Winding temperature indicator for both 66KV and 33KV with a maximum pointer drag hand type with a resetting knob and three separately adjustable <b>mercury contacts</b> for alarm, trip and operation of cooler control circuits as required.	Against these two clauses, mercury is banned for industrial use. Hence, We will provide micro switches/contacts instead of mercury contacts. Please confirm the same to be ok.	Micro switches are acceptable
23	As per the given technical specification clause no 4.14-b mentioned: Oil temperature indicator with a maximum pointer drag hand type with a resetting knob and three separately adjustable <b>mercury contacts</b> for alarm, trip		
24	As per the given technical specification clause no 4.16.1 mentioned: The tank shall be of top cover design and shall be constructed of mild steel plates of sufficient thickness and strength and shall be complete with all accessories. It shall be designed so as to allow the complete transformer when filled with oil to be lifted by crane or jacks, transported by road, rail or on water without overstraining any joints and without causing subsequent leakage of oil. The minimum thickness for sides, bottom and top cover shall be 8mm, 20mm and 20mm respectively.	Against this clause, thickness of tank sides, bottom cover and top cover are mentioned as 8mm, 12mm, 12mm respectively where as in 7.5 MVA spec it is mentioned as 8mm, 20mm, 20mm. Hence please review the same and confirm the thickness to be considered.	Tank side thickness 8mm Top cover thickness 20mm, Bottom Cover Thickness 20mm



**ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER**

No.	Stipulation as per Technical Specificaiton	Clarifications / Confirmation	Customer Reply
25	As per the given technical specification clause no 4.17.1 mentioned: The interior of all transformer tanks and other oil-filled chambers shall be cleaned of all scale and rust by shot blasting or other approved method. Hot oil resistant varnish on white synthetic enamel paint is to be used for painting the inside of all oil filled chambers, including transformer tanks and CT chambers & covers. The final coat shall be of a light-coloured anti-condensation finish.	The statements in given clause are not clear hence we would like to proceed with epoxy based Hot oil resistant varnish for oil-filled chambers further anti-condensation finish is not applicable since oil-filled chambers. Please review and confirm.	Hot oil resistant varnish on white synthetic enamel paint is to be used for painting the inside of all oil filled chambers, including transformer tanks and CT chambers & covers. The final coat shall be of a light-coloured anti-condensation finish.
26	As per the given technical specification clause no 4.18.1 mentioned: Radiator shall be supplied in banks as suitable. Each bank shall be fitted with gate valves	Against this clause, radiators shall be of tank mounted detachable type radiators(Not seperatley mounted) which are connected through top and bottom isolating butterfly valve hence gate valves are not applicable for radiators. Please confirm.	Confirmed,use butterfly valves as per clause 4.18.1 requirements
27	As per the given technical specification clause no 4.19 mentioned : All fittings& Accessories including Gas& Oil actuated relay shall be of a design make approved by KPCL	Against this clause, please provide if any approved vendor list is there, or else please confirm whether we can proceed with reputed indian makes which are approved by us.	Procced with reputed indian makes but requirements of clause 4.19 must be met. Detailed list and brochures of all the required fittings and accessories indicating type/model number, manufacturer should be submitted with the bid

ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER			
No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
28	<p>As per the given technical specification clause no 4.19.4 mentioned:</p> <p>The transformer shall be provided with winding temperature indicator, maximum indicator and associated current transformers. The temperature indicator shall have a scale ranging from 20°C to 150°C, preferably uniformly divided and its type to be stated in the bid. The indicator shall have two sets of independently adjustable contacts as follows:</p> <p>(i) Alarm (ii) Trip</p> <p>Adjustable setting: 70°C to 150°C Fixed differential: Not more than 10°C Adjustable setting: Fixed differential: 70° to 150°C Not more than 10°C</p>	<p>Against this clause, the temperature indicator shall have a scale ranging from 0°C to 150°C and Adjustable setting will be 15% to 85% of full scale deviation. Please confirm.</p>	<p>As per IEC 60076-22-1, a scale of 0°C to 150°C is acceptable.</p>
29	<p>As per the given technical specification clause no 5.2-b mentioned :</p> <p>b) Short circuit withstand test to IEC 60076. thermal ability of the transformer to withstand short circuit, ability of the transformer to withstand the dynamic effects of short circuit</p>	<p>Against this clause, Short circuit withstand, Thermal ability will be demonstrated by the calculation as per IEC-60076. Please confirm the same to be ok.</p>	<p>Type test certificates from accredited third party laboratory as the per requirements of clause 5.2b together with calculations as per clause 4.3.4</p>
30	<p>As per the given technical specification clause no 5.3.1 mentioned :</p> <p>Efficiency at 50%, 75%, 100% loading at unity p.f and rated terminal voltage (Corrected to 75°C),</p>	<p>Against this clause, Efficiency at 50%, 75%, 100% loading at unity p.f and rated terminal voltage will be demonstrated by the calculation. Please confirm the same to be ok.</p>	<p>This should be part of routine test during FAT as per the specification requirements.</p>

ANNEXURE 1: CLARIFICATIONS FOR 23MVA, 66/33KV TRANSFORMER			
No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
31	As per the given technical specification clause no 5.3.1 mentioned : Magnetic balance test	Magnetic Balance Test will be performed during Final Inspection on Transformer from STAR winding side. The limitation criteria shall be as follows  The voltage induced in the center phase shall be 50% to 90% of the applied voltage on the outer phases and when the Center phase is excited then the voltage induced in the outer phases shall be 30 to 70% of the applied voltage. Please review and confirm.	Confirmed
32	As per the given technical specification clause no 5.3.3 mentioned : insulation dissipation factor	Against this clause, 5. We would like to guarantee value of $\tan \delta$ is $\leq 1\%$ @ 20 Deg.C at following combinations Measurement Between HV-LV LV-HV (HV Earthed) HV-LV (LV Earthed) Please confirm the same to be ok.	Adhere to dissipation factor of less than 0.5% @ 20 Deg.C
<b>General</b>			
33		Please confirm Specific paint requirement/Corrosive environment like C3/C4/C5, if any.	As per ISO 12944, Corrosive classification of C5 for coastal areas with high salinity, humidity and off shore areas with a large amount of salt in air
34		Please confirm Any specific make of components are required if any Else we will proceed with any reputed indian make as per our approved vendor list	Detailed list and brochures of all the required fittings and accessories indicating type/model number, manufacturer should be submitted with the bid

**ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply																																						
1	As per the given technical specification clause no 1 mentioned: The Vector Group shall be stated on the schedule of requirements in the tender and shall either be YNyn0d11 or Dyn1/Dyn11. Power transformer intended for Dy connection shall have facility to change over from Dyn1 to Dyn11 and vice versa.	As per the Price Schedule, the vector groups of 7.5MVA are mentioned as Dyn11(2 No's) and Dyn1 (1 No). Where as in specification clause no.1 it is mentioned as "Power transformer intended for Dy connection shall have facility to change over from Dyn1 to Dyn11 and vice versa." Please confirm whether change over facility is required or not.cility is required or not?	<b>As per schedule of requirements.</b> Vector groups are as per the schedule of requirements																																						
2	Where as in Price Schedule mentioned as below <table><tr><td>4</td><td>23MVA 66/33 KV</td><td>Dyn1</td><td>1</td><td>PCS</td></tr><tr><td>5</td><td>7.5MVA 33/11 KV</td><td>Dyn1</td><td>1</td><td>PCS</td></tr><tr><td>6</td><td>2.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr><tr><td>7</td><td>Earthing Transformer and Resistor</td><td>Zyn11</td><td>4</td><td>PCS</td></tr><tr><td>8</td><td>7.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr><tr><td>9</td><td>7.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr><tr><td>10</td><td>2.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr><tr><td>11</td><td>2.5MVA 33/11 KV</td><td>Dyn11</td><td>1</td><td>PCS</td></tr></table>			4	23MVA 66/33 KV	Dyn1	1	PCS	5	7.5MVA 33/11 KV	Dyn1	1	PCS	6	2.5MVA 33/11 KV	Dyn11	1	PCS	7	Earthing Transformer and Resistor	Zyn11	4	PCS	8	7.5MVA 33/11 KV	Dyn11	1	PCS	9	7.5MVA 33/11 KV	Dyn11	1	PCS	10	2.5MVA 33/11 KV	Dyn11	1	PCS	11	2.5MVA 33/11 KV	Dyn11
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3	As per the given technical specification clause no 4.1.1-d mentioned: Pollution: Design pollution level to be taken as "Very Heavy" (Pollution level IV: 31mm/kV) according to IEC 815.	Against this clause, we are considering the mentioned creepage distance including correction factor at 2200 altitude. Please confirm.	Creepage distance to be done considering 31mm/kV																																						
4	As per the given technical specification clause no 4.1.2 mentioned: the transformer shall be operated at a high loading factor	Against this clause, please specify what are the high loading factors to be considered .	The transformers serve residential, industrial and commercial loads and are likely to be operated at high loads through out the service life.Transformer design to avoid overheating, reduced lifespan and potential damage when operated close to full load.High load factor means the transformer is being used more efficiently,as its closer to its peak capacity for alarger portion of time.Take a peak load of full load capacity and average load/safe load of 80% of full load.																																						

**ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
5	As per the given technical specification clause no 4.2.5 mentioned: The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the equipment keeping in view the regulatory requirements in Kenya.	Against this clause, please provide the regulatory requirements document if any to consider in design.	The specification entails all the necessary provisions for safety ranging from insulation requirements in clause 4.11, minimum external air clearances in clauses 4.10.3 and 4.8.5, short circuit requirements in clauses 4.3.3 and 4.3.4. Adhering to these clauses shall ensure a safe design.
6	As per the given technical specification clause no 4.2.12 mentioned: Galvanizing shall be applied by the hot-dipped process to ISO 1461 and for all parts other than steel wires shall consist of a thickness of zinc coating equivalent to not less than 610g of zinc per square meter of surface. The zinc coating shall be smooth, clean and of uniform thickness and free from defects. The preparation of galvanizing and the galvanizing itself shall not adversely affect the mechanical properties of the coated material. The quality will be established by tests as per ISO 1461.	Against this clause, galvanizing shall be applied as mentioned wherever applicable further, paint shall be applied to the transformer tank and radiators as per the clause no.4.14 and 4.15 . Please confirm.	Confirmed
7	As per the given technical specification clause no 4.2.13 mentioned: All bolts, nuts, and washers exposed to atmosphere and in contact with non-ferrous parts which carry current shall be of phosphor bronze.	Against this clause, all external hardware exposed to atmosphere shall be of hot dip galvanized (HDG)/ stain less steel(SS) as per our regular practice of power transformers. Please confirm the same to be ok.	Phosphor bronze is preferred due to its good electrical conductivity, corrosion resistance and ability to maintain reliable connections. While stainless steel is also corrosion resistant, its electrical conductivity may not be as good as phosphor bronze.
8	As per the given technical specification clause no 4.3.2 mentioned: The temperature rise in the hottest region exceeding 55°C and 60°C in oil and winding respectively	Against this clause, we are considering the mentioned Temperature Rise values Over Ambient temperature of 40°C at 2200 mtrs. Altitude level (including altitude correction factor). Please confirm.	Confirmed



ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER			
No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
9	As per the given technical specification clause no 4.6.4 mentioned: Adequate oil ducts shall be provided in the core for cooling.	Cooling ducts for core for this capacity of transformer is not required as hotspot in core is very less than required and hence same will not be provided. Please confirm.	To guarantee efficient surface cooling of the core and mitigate against insulation failures and transformer damage due to overheating, please provide oil ducts made of chemically and thermally stable material.
10	As per the given technical specification clause no 4.7.3 mentioned: Typical values for existing transformers in Kenya Power at principal (nominal) tap are 9.8% - 10.1%.the minimum as per IEC 60076-5 for this size of transformer is 8%	Against this clause, please confirm the exact requirement of %impedance to be considered at rated tap. Further applicable tolerance shall be as per IEC standard. Please confirm.	This is true but considering that there are existing installed transformers which are likely to be paralleled with this transformer and the need for equal sharing of station loads, please maintain short circuit impedance at nominal tap between 9.8% and 10.1% as per requirement of this clause.
11	As per the given technical specification clause no 4.8.6 mentioned: Bushing terminals shall be clamp type suitable for both copper and aluminium busbars of sizes up to 76mm diameter.	Against this clause, running bus bar of this much dia(76mm) is not preferred since the loading on bushing will lead to bushing leakage hence we would like proceed flag type connectors of suitable size as per DIN standard. Please confirm.	These connectors are frequently connected/disconnected during transformer maintenance and the most suitable application for this is clamp type connectors. They are simple to remove and install. The system vibrations are also not as much
12	As per the given technical specification clause no 4.9.1 mentioned: HV-SIDE(33kV) A. Core-2 : 15VA, 150/1A, cl.X B. Core-2 : 15VA, 150/1A, cl.X C. Core-2 : 15VA, 150/1A, cl.X	Against this clause please specify the below details for PX class CT's i.e magnetizing current at $V_k$ or $V_k/2$ , secondary resistance, knee point voltage and instrument safety factor etc. further burden is not applicable for PX class CT's	The design must ensure that the knee point voltage ( $V_k$ ) is high enough to prevent core saturation during fault currents considering worst fault level of 31kA. The resistance of the secondary winding must be minimized to ensure that the CT delivers the required voltage and current to the protection relays even under fault condition.

**ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply															
13	As per the given technical specification clause no 4.9.1 mentioned: LV-SIDE(11 kV) a.Core-3 : 15VA,400/1A,cl.X b. Core-3 : 15VA,400/1A,cl.X c. Core-3 : 15VA,400/1A,cl.X n. Core-1 : 15VA,400/1A,cl.X	Against this clause please, specify the below details for PX class CT's i.e magnetizing current at V <sub>k</sub> or V <sub>k</sub> /2, secondary resistance, knee point voltage and instrument safety factor etc. further burden is not applicable for PX class CT's	The design must ensure that the knee point voltage (V <sub>k</sub> ) is high enough to prevent core saturation during fault currents considering worst fault level of 31kA.The resistance of the secondary winding must be minimized to ensure that the CT delivers the required voltage and current to the protection relays even under fault condition.For reliable and accurate CT operation, the core material to have low loss, low reluctance values and low flux density.															
14	As per the given technical specification clause no 4.10.3 mentioned:  4.10.3 Minimum external air clearances shall be as shown under: <table border="1"><thead><tr><th>Nominal System Voltage between Phases</th><th>11kV</th><th>33kV</th></tr></thead><tbody><tr><td>Minimum clearance phase-to-earth and phase-to-neutral</td><td>mm 300</td><td>485</td></tr><tr><td>Minimum clearance phase-to-phase between phases of the same winding</td><td>mm 300</td><td>485</td></tr><tr><td>Minimum clearance between a line terminal of the high voltage winding and a line terminal of a lower voltage winding</td><td>mm 300</td><td>485</td></tr><tr><td>Minimum clearance from live metal to oil pipe-work including conservator and pressure relief device</td><td>mm 300</td><td>485</td></tr></tbody></table>	Nominal System Voltage between Phases	11kV	33kV	Minimum clearance phase-to-earth and phase-to-neutral	mm 300	485	Minimum clearance phase-to-phase between phases of the same winding	mm 300	485	Minimum clearance between a line terminal of the high voltage winding and a line terminal of a lower voltage winding	mm 300	485	Minimum clearance from live metal to oil pipe-work including conservator and pressure relief device	mm 300	485	Against this clause,as mentioned air clearances are higher than the IEC standard hence we are considering the mentioned external clearances including correction factor at 2200M altitude. Please confirm.	External clearances to remain as per the requirements of this clause.
Nominal System Voltage between Phases	11kV	33kV																
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15	As per the given technical specification clause no 4.11 mentioned: <table border="1"><thead><tr><th>Nominal system voltage  (kV, rms)</th><th>Highest system voltage  (kV, rms)</th><th>Lightning Impulse withstand voltage, dry  (kV, peak)</th><th>Power frequency withstand voltage, wet  (kV, rms)</th></tr></thead><tbody><tr><td>33</td><td>36</td><td>200</td><td>95</td></tr><tr><td>11</td><td>12</td><td>95</td><td>38</td></tr></tbody></table>	Nominal system voltage  (kV, rms)	Highest system voltage  (kV, rms)	Lightning Impulse withstand voltage, dry  (kV, peak)	Power frequency withstand voltage, wet  (kV, rms)	33	36	200	95	11	12	95	38	Against this clause, please confirm at what altitude we have to consider these insulation level values( i.e at 1000 mtrs or 2200 mtrs)	2200m			
Nominal system voltage  (kV, rms)	Highest system voltage  (kV, rms)	Lightning Impulse withstand voltage, dry  (kV, peak)	Power frequency withstand voltage, wet  (kV, rms)															
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**ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
16	As per the given technical specification clause no 4.12.8 mentioned: The tap changer shall be housed in a separate compartment and shall be vacuum type.	Clause no 4.12.8 calls for separate compartment means flange mounted type is OLTC required, at the same time against clause no 4.2.11 calls for in-tank type OLTC hence please confirm the requirement of OLTC type i.e external flange mounted type or in-tank type OLTC.	OLTC shall be in tank but with its own compartment within the tank.
17	As per the given technical specification clause no 4.2.11 mentioned: In tank on-load type changer shall be located such that space above the diverter switch chamber will be free of interconnecting pipes etc		OLTC shall be in tank but with its own compartment within the tank.
18	As per the given technical specification clause no 4.12.10 mentioned: The tap changer shall be of internationally reputable manufacture and proven reliability in service	Against this clause, please confirm any specific make/model of OLTC, AVR if required	OLTC manufacturer must be experienced. Must be from a leading known and reputable manufacturer with remarkable experience. Must be a leading pioneer in the vacuum OLTC technology with 40 years experience in OLTC Vacuum technology development and 30 years experience in production. The OLTC switching and control units must have shown reliable and stable operation without problems in KPLC network for at least 16 years, and proof to that effect.
19	As per the given technical specification clause no 4.12.11 mentioned: KV meter (technical details to be submitted with tender)	Against this clause, please confirm for what purpose this KV meter is required.	For remote indication of actual transformer secondary voltage (11kV)
20	As per the given technical specification clause no 4.13.1 mentioned: A scheme for operating this transformer in parallel with other similar units of different rating shall be provided and wired in the marshalling kiosk (box) by the manufacturer ready for interphasing.:	Against this clause, existing transformer details and scheme are required at ordering stage to consider the parallel operation. Please provide the same.	No need of existing transformer details, implement a master follower tap changer operation scheme with both master and follower units scheme drawing. The tap changer AVR used should be capable of CANbus communication protocol allowing all the AVRs in parallel operation to communicate and exchange parallel commands and signals.

ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER			
No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
21	As per the given technical specification clause no 4.14-a mentioned: Winding temperature indicator for both HV and MV with a maximum pointer drag hand type with a resetting knob and three separately adjustable <b>mercury contacts</b> for alarm, trip and operation of cooler control circuits as required.	Against these two clauses, mercury is banned for industrial use. Hence We will provide micro switches/contacts instead of mercury contacts. Please confirm the same to be ok.	Micro switches are acceptable
22	As per the given technical specification clause no 4.12.10-b mentioned: Oil temperature indicator with a maximum pointer drag hand type with a resetting knob and three separately adjustable <b>mercury contacts</b> for alarm, trip		
23	As per the given technical specification clause no 4.14-c mentioned: e) Suitable starters for the cooling fan motors complete with thermal overload/single phase protection relay and normally-closed electrical auxiliary contacts for motor failure alarm/trip circuits. f) A selector switch with 'OFF', 'HAND' and AUTO positions for cooling fan motors	Against this clause, being a ONAN type cooling the cooling fans and clauses which are related to cooling fans are not applicable. Please confirm.	Confirmed, cooling fans and clauses which are related to cooling fans are not applicable
24	As per the given technical specification clause no 4.16.1 mentioned: The tank shall be of top cover design and shall be constructed of mild steel plates of sufficient thickness and strength and shall be complete with all accessories. It shall be designed so as to allow the complete transformer when filled with oil to be lifted by crane or jacks, transported by road, rail or on water without overstraining any joints and without causing subsequent leakage of oil. The minimum thickness for sides, bottom and top cover shall be 8mm, 20mm and 20mm respectively	Against this clause, thickness of tank sides, bottom cover and top cover are mentioned as 8mm, 20mm, 20mm respectively where as in 23MVA spec it is mentioned as 8mm, 12mm, 12mm hence please recheck and confirm the thickness to be considered.	Tank side thickness 8mm Top cover thickness 20mm, Bottom Cover Thickness 20mm

**ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER**

No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
25	As per the given technical specification clause no 4.17.1 mentioned: The interior of all transformer tanks and other oil-filled chambers shall be cleaned of all scale and rust by shot blasting or other approved method. Hot oil resistant varnish on white synthetic enamel paint is to be used for painting the inside of all oil filled chambers, including transformer tanks and CT chambers & covers. The final coat shall be of a light-coloured anti-condensation finish.	The statements in given clause are not clear hence we would like to proceed with epoxy based Hot oil resistant varnish for oil-filled chambers further anti-condensation finish is not applicable since oil-filled chambers . Please review and confirm.	Hot oil resistant varnish on white synthetic enamel paint is to be used for painting the inside of all oil filled chambers, including transformer tanks and CT chambers & covers. The final coat shall be of a light-coloured anti-condensation finish.
26	As per the given technical specification clause no 4.18.1 mentioned: Radiator shall be supplied in banks as suitable. Each bank shall be fitted with gate valves	Against this clause, radiators shall be of tank mounted detachable type radiators(Not separately mounted) which are connected through top and bottom isolating butterfly valve hence gate valves are not applicable for radiators. Please confirm.	Confirmed,use butterfly valves as per clause 4.18.1 requirements
27	As per the given technical specification clause no 4.19 mentioned : All fittings & Accessories including Gas & Oil actuated relay shall be of a design make approved by KPLC	Against this clause, please provide if any approved vendor list is there, or else please confirm whether we can proceed with reputed indian makes which are approved by us.	Proceed with reputed indian makes but requirements of clause 4.19 must be met. Detailed list and brochures of all the required fittings and accessories indicating type/model number, manufacturer should be submitted with the bid



ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER			
No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
28	As per the given technical specification clause no 4.19.4 mentioned: The transformer shall be provided with winding temperature indicator, maximum indicator and associated current transformers. The temperature indicator shall have a scale ranging from 20°C to 150°C, preferably uniformly divided and its type to be stated in the bid. The indicator shall have two sets of independently adjustable contacts as follows: (i) Alarm (ii) Trip Adjustable setting: 70°C to 150°C Fixed differential: Not more than 10°C Adjustable setting: Fixed differential: 70° to 150°C Not more than 10°C	Against this clause, the temperature indicator shall have a scale ranging from 0°C to 150°C and Adjustable settin will be 15% to 85% of full scale deviation. Please confirm.	As per IEC 60076-22-1, a scale of 0°C to 150°C is acceptable.
29	As per the given technical specification clause no 5.2-b mentioned : b) Short circuit withstand test to IEC 60076. thermal ability of the transformer to withstand short circuit, ability of the transformer to withstand the dynamic effects of short circuit	Against this clause, Short circuit withstand, Thermal ability will be demonstrated by the calculation as per IEC-60076. Please confirm the same to be ok.	Type test certificates and reports from accredited third party laboratory as the per requirements of clause 5.2b together with calculations as per clause 4.3.4
30	As per the given technical specification clause no 5.3.1 mentioned : Efficiency at 50%, 75%, 100% loading at unity p.f and rated terminal voltage (Corrected to 75°C),	Against this clause, Efficiency at 50%, 75%, 100% loading at unity p.f and rated terminal voltage will be demonstrated by the calculation. Please confirm the same to be ok.	This should be part of routine test during FAT as per the specification requirements.
31	As per the given technical specification clause no 5.3.1 mentioned : Magnetic balance test	Magnetic Balance Test will be performed during Final Inspection on Transformer from STAR winding side. The limitation creteria shall be as follows The voltage induced in the center phase shall be 50% to 90% of the applied voltage on the outer phases and when the Center phase is excited then the voltage induced in the outer phases shall be 30 to 70% of the applied voltage. Please review and confirm.	Confirmed

ANNEXURE 2: CLARIFICATIONS FOR 7.5MVA, 33/11KV TRANSFORMER			
No.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
32	As per the given technical specification clause no 5.3.3 mentioned : insulation dissipation factor	Against this clause, 5. We would like to guarantee value of $\tan \delta$ is $\leq 1\%$ @ 20 Deg.C at following combinations Measurement Between HV-LV LV-HV (HV Earthed) HV-LV (LV Earthed) Please confirm the same to be ok.	Adhere to dissipation factor of less than 0.5% @ 20 Deg.C
	<b>General</b>		
33		Please confirm Specific paint requirement/Corrosive environment like C3/C4/C5, if any.	As per ISO 12944, Corrosive classification of C5 for coastal areas with high salinity, humidity and off shore areas with a large amount of salt in air
34		Please confirm Any specific make of components are required if any Else we will proceed with any reputed indian make as per our approved vendor list	Detailed list and brochures of all the required fittings and accessories indicating type/model number, manufacturer should be submitted with the bid

**ANNEXURE 3: CLARIFICATIONS FOR 2.5MVA, 33/11KV TRANSFORMER**

NO.	Stipulation as per Technical Specificaiton	Clarifications / Confirmation	Customer Reply
1	As per the given technical specification clause no 4.1.1-d mentioned: Pollution: Design pollution level to be taken as "Very Heavy" (Pollution level IV: 31mm/kV) according to IEC 815.	Against this clause, we are considering the mentioned creepage distance including correction factor at 2200 altitude. Please confirm.	Creepage distance to be done considering 31mm/kV
2	As per the given technical specification clause no 4.1.2 mentioned: the transformer shall be operated at a high loading factor	Against this clause, please specify what are the high loading factors to be considered .	The transformers serve residential, industrial and commercial loads and are likely to be operated at high loads through out the service life.Transformers design to avoid overheating, reduced lifespan and potential damage when operated close to full load.High load factor means the transformer is being used more efficiently,as its closer to its peak capacity for alarger portion of time.Take a peak load of full load capacity and average load/safe load of 80% of full load.
3	As per the given technical specification clause no 4.2.5 mentioned: The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the equipment keeping in view the regulatory requirements in Kenya.	Against this clause, please provide the regulatory requirements document if any to consider in design.	The specification entails all the necessary provisions for safety ranging from insulation requirements in clause 4.11, minimum external air clearances in clauses 4.10.3 and 4.8.5, short circuit requirements in clauses 4.3.3 and 4.3.4.Adhering to these clauses shall ensure a safe design.
4	As per the given technical specification clause no 4.2.11 mentioned: Galvanizing shall be applied by the hot-dipped process to ISO 1461 and for all parts other than steel wires shall consist of a thickness of zinc coating equivalent to not less than 610g of zinc per square meter of surface. The zinc coating shall be smooth, clean and of uniform thickness and free from defects. The preparation of galvanizing and the galvanizing itself shall not adversely affect the mechanical properties of the coated material. The quality will be established by tests as per ISO 1461.	Against this clause, galvanizing shall be applied as mentioned wherever applicable further, paint shall be applied to the transformer tank and radiators as per the clause no.4.14 and 4.15 . Please confirm.	Confirmed

### ANNEXURE 3: CLARIFICATIONS FOR 2.5MVA, 33/11KV TRANSFORMER

NO.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply																				
5	As per the given technical specification clause no 4.2.12 mentioned: All bolts, nuts, and washers exposed to atmosphere and in contact with non-ferrous parts which carry current shall be of phosphor bronze	Against this clause, all external hardware exposed to atmosphere shall be of hot dip galvanized (HDG)/ stain less steel(SS) as per our regular practice of power transformers. Please confirm the same to be ok.	Phosphor bronze is preferred due to its good electrical conductivity, corrosion resistance and ability to maintain reliable connections. While stainless steel is also corrosion resistant, its electrical conductivity may not be as good as phosphor bronze.																				
6	As per the given technical specification clause no 4.6.4 mentioned: Adequate oil ducts shall be provided in the core for cooling.	Cooling ducts for core for this capacity of transformer is not required as hotspot in core is very less than required and hence same will not be provided. Please confirm.	Ensure there is adequate core cooling																				
7	As per the given technical specification clause no 4.7.3 mentioned: the impedance voltage at extreme tapping and principal tapping shall be stated and shall be subjected to tolerance in accordance with IEC60076. the minimum as per IEC 60076-5 for this size of the transformer is 6.0%	Against this clause, please confirm the exact requirement of %impedance to be considered at rated tap. Further applicable tolerance shall be as per IEC standard. Please confirm.	At principal tap impedance is 6%. Tolerance is as per IEC 60076																				
8	As per the given technical specification clause no 4.8.6 mentioned: Bushing terminals shall be clamp type suitable for both copper and aluminium busbars of sizes up to 76mm diameter.	Against this clause, running bus bar of this much dia(76mm) is not preferred since the loading on bushing will lead to bushing leakage hence we would like proceed flag type connectors of suitable size as per DIN standard. Please confirm.	These connectors are frequently connected/disconnected during transformer maintenance and the most suitable application for this is clamp type connectors. They are simple to remove and install. The system vibrations are also not as much																				
9	As per the given technical specification clause no 4.10.3 mentioned: 4.10.3 Minimum external air clearances shall be as shown under: <table border="1"> <thead> <tr> <th>Nominal System Voltage between Phases</th><th></th><th>11kV</th><th>33kV</th></tr> </thead> <tbody> <tr> <td>Minimum clearance phase-to-earth and phase-to-neutral</td><td>mm</td><td>300</td><td>485</td></tr> <tr> <td>Minimum clearance phase-to-phase between phases of the same winding</td><td>mm</td><td>300</td><td>485</td></tr> <tr> <td>Minimum clearance between a line terminal of the high voltage winding and a line terminal of a lower voltage winding</td><td>mm</td><td>300</td><td>485</td></tr> <tr> <td>Minimum clearance from live metal to oil pipe-work including conservator and pressure relief device</td><td>mm</td><td>300</td><td>485</td></tr> </tbody> </table>	Nominal System Voltage between Phases		11kV	33kV	Minimum clearance phase-to-earth and phase-to-neutral	mm	300	485	Minimum clearance phase-to-phase between phases of the same winding	mm	300	485	Minimum clearance between a line terminal of the high voltage winding and a line terminal of a lower voltage winding	mm	300	485	Minimum clearance from live metal to oil pipe-work including conservator and pressure relief device	mm	300	485	Against this clause, as mentioned air clearances are higher than the IEC standard hence we are considering the mentioned external clearances including correction factor at 2200M altitude. Please confirm.	External clearances to remain as per the requirements of this clause.
Nominal System Voltage between Phases		11kV	33kV																				
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### ANNEXURE 3: CLARIFICATIONS FOR 2.5MVA, 33/11KV TRANSFORMER

NO.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply												
10	<p>As per the given technical specification clause no 4.11 mentioned:</p> <table border="1"> <thead> <tr> <th>Nominal system voltage (kV, rms)</th><th>Highest system voltage (kV, rms)</th><th>Lightning impulse withstand voltage, dry (kV, peak)</th><th>Power frequency withstand voltage, wet (kV, rms)</th></tr> </thead> <tbody> <tr> <td>33</td><td>36</td><td>200</td><td>95</td></tr> <tr> <td>11</td><td>12</td><td>95</td><td>38</td></tr> </tbody> </table>	Nominal system voltage (kV, rms)	Highest system voltage (kV, rms)	Lightning impulse withstand voltage, dry (kV, peak)	Power frequency withstand voltage, wet (kV, rms)	33	36	200	95	11	12	95	38	<p>Against this clause, please confirm at what altitude we have to consider these insulation level values( i.e at 1000 mtrs or 2200 mtrs)</p>	<p>2200m</p>
Nominal system voltage (kV, rms)	Highest system voltage (kV, rms)	Lightning impulse withstand voltage, dry (kV, peak)	Power frequency withstand voltage, wet (kV, rms)												
33	36	200	95												
11	12	95	38												
11	<p>As per the given technical specification clause no 4.12.10-a mentioned: Winding temperature indicator for both HV and MV with a maximum pointer drag hand type with a resetting knob and three separately adjustable <b>mercury contacts</b> for alarm, trip and operation of cooler control circuits as required</p>	<p>Against these two clauses, mercury is banned for industrial use. Hence We will provide micro switches/contacts instead of mercury contacts. Please confirm the same to be ok.</p>	<p>Micro switches are acceptable</p>												
12	<p>As per the given technical specification clause no 4.12.10-b mentioned: Oil temperature indicator with a maximum pointer drag hand type with a resetting knob and three separately adjustable <b>mercury contacts</b> for alarm, trip</p>														
13	<p>As per the given technical specification clause no 4.13.1 mentioned: The tank shall be of top cover design and shall be constructed of mild steel plates of sufficient thickness and strength and shall be complete with all accessories. It shall be designed so as to allow the complete transformer when filled with oil to be lifted by crane or jacks, transported by road, rail or on water without overstraining any joints and without causing subsequent leakage of oil. The minimum thickness for sides, bottom and top cover shall be 8mm, 20mm and 20mm respectively</p>	<p>Against this clause, thickness of tank sides, bottom cover and top cover are mentioned as 8mm, 20mm, 20mm respectively where as in 23MVA spec it is mentioned as 8mm, 12mm, 12mm hence please recheck and confirm the thickness to be considered.</p>	<p>Tank side thickness 8mm Top cover thickness 20mm, Bottom Cover Thickness 20mm</p>												




### ANNEXURE 3: CLARIFICATIONS FOR 2.5MVA, 33/11KV TRANSFORMER

NO.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
14	As per the given technical specification clause no 4.14.1 mentioned: The interior of all transformer tanks and other oil-filled chambers shall be cleaned of all scale and rust by shot blasting or other approved method. Hot oil resistant varnish on white synthetic enamel paint is to be used for painting the inside of all oil filled chambers, including transformer tanks and CT chambers & covers. The final coat shall be of a light-coloured anti-condensation finish.	The statements in given clause are not clear hence we would like to proceed with epoxy based Hot oil resistant varnish for oil-filled chambers further anti-condensation finish is not applicable since oil-filled chambers	Hot oil resistant varnish on white synthetic enamel paint is to be used for painting the inside of all oil filled chambers, including transformer tanks and CT chambers & covers. The final coat shall be of a light-coloured anti-condensation finish.
15	As per the given technical specification clause no 4.18.1 mentioned: Radiator shall be supplied in banks as suitable. Each bank shall be fitted with gate valves	Against this clause, radiators shall be of tank mounted detachable type radiators (Not separately mounted) which are connected through top and bottom isolating butterfly valve hence gate valves are not applicable for radiators,	Confirmed, use butterfly valves as per clause 4.18.1 requirements
16	As per the given technical specification clause no 4.19.4 mentioned: The transformer shall be provided with winding temperature indicator, maximum indicator and associated current transformers. The temperature indicator shall have a scale ranging from 20°C to 150°C, preferably uniformly divided and its type to be stated in the bid. The indicator shall have two sets of independently adjustable contacts as follows: (i) Alarm (ii) Trip Adjustable setting: 70°C to 150°C Fixed differential: Not more than 10°C Adjustable setting: Fixed differential: 70° to 150°C Not more than 10°C	Against this clause, the temperature indicator shall have a scale ranging from 0°C to 150°C and Adjustable setting will be 15% to 85% of full scale deviation	As per IEC 60076-22-1, a scale of 0°C to 150°C is acceptable.
17	As per the given technical specification clause no 5.2-b mentioned : b) Short circuit withstand test to IEC 60076. thermal ability of the transformer to withstand short circuit, ability of the transformer to withstand the dynamic effects of short circuit	Against this clause, Short circuit withstand, Thermal ability will be demonstrated by the calculation as per IEC-60076. Please confirm the same to be ok.	Type test certificates and reports from accredited third party laboratory as the per requirements of clause 5.2b together with calculations as per clause 4.3.4

### ANNEXURE 3: CLARIFICATIONS FOR 2.5MVA, 33/11KV TRANSFORMER

NO.	Stipulation as per Technical Specification	Clarifications / Confirmation	Customer Reply
18	As per the given technical specification clause no 5.3.1 mentioned : Efficiency at 50%, 75%, 100% loading at unity p.f and rated terminal voltage (Corrected to 75°C),	Against this clause, Efficiency at 50%, 75%, 100% loading at unity p.f and rated terminal voltage will be demonstrated by the calculation. Please confirm the same to be ok.	This should be part of routine test during FAT as per the specification requirements.
19	As per the given technical specification clause no 5.3.1 mentioned : Magnetic balance test	Magnetic Balance Test will be performed during Final Inspection on Transformer from STAR winding side. The limitation criteria shall be as follows The voltage induced in the center phase shall be 50% to 90% of the applied voltage on the outer phases and when the Center phase is excited then the voltage induced in the outer phases shall be 30 to 70% of the applied voltage. Please review and confirm.	Confirmed
20	As per the given technical specification clause no 5.3.3 mentioned : insulation dissipation factor	Against this clause, 5. We would like to guarantee value of $\tan \delta$ is $\leq 1\%$ @ 20 Deg.C at following combinations Measurement Between HV-LV LV-HV (HV Earthed) HV-LV (LV Earthed) Please confirm the same to be ok.	Adhere to dissipation factor of less than 0.5% @ 20 Deg.C
<b>General</b>			
1		As page number 7 is missed We are considering Temperature Rise values as (55 and 60 Deg.C) Over Ambient temperature of 40°C at 2200 mtrs. Altitude level (including altitude correction factor) which is similar to other rating please confirm.	Confirmed
2		Please confirm Specific paint requirement/Corrosive environment like C3/C4/C5, if any.	As per ISO 12944, Corrosive classification of C5 for coastal areas with high salinity, humidity and off shore areas with a large amount of salt in air
3		Please confirm Any specific make of components are required if any Else we will proceed with any reputed indian make as per our approved vendor list	Detailed list and brochures of all the required fittings and accessories indicating type/model number, manufacturer should be submitted with the bid
4		Please provide missed pages: page no: 7, 20	Attached as <b>Appendix I &amp; II</b>

 The Kenya Power & Lighting Co. Ltd.	<b>TITLE:</b>  <b>SPECIFICATION FOR 2.5MVA 33/11KV POWER TRANSFORMER</b>	<b>Doc. No.</b>	KPLC1/3CB/TSP/10/046
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levels following good modern manufacturing practices. The maximum noise levels shall be stated in the bid.

**4.3 Ratings**

4.3.1 (a) The windings of the transformer shall be rated at 2.5MVA ONAN. These ratings shall be for the operating conditions stated in clause 4.1.

(b) The rating specified in this clause shall be the continuous rating at the maximum ambient temperature and altitude given in clause 4.1.

4.3.2 (a) The transformer shall be capable of carrying its full normal rating continuously at any tap under the conditions stated in clause 4.3.1 without undue stress, overheating, or the temperature rise in the hottest region exceeding 55°C and 60°C in oil and windings respectively.

(b) The loading capabilities shall be demonstrated by a temperature – rise test. This test shall be done in the presence of KPLC Representatives during factory visit.


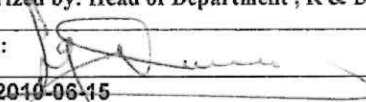
4.3.3 The transformer shall be capable of withstanding the fault level at its rated voltage and impedance for 2 seconds. The design should cater for the expected lifetime of the transformer.

4.3.4 The thermal ability to withstand short circuit shall be demonstrated by calculation as per IEC 60076-5 and the calculation shall be submitted with tender. The duration of the current to be used for the calculation of the thermal ability to withstand short circuit shall be 2 seconds while the maximum permissible value of the average temperature of each winding shall be as per IEC 60076-5. As a minimum, the short-circuit apparent power of 11kV and 33kV systems shall be taken as 500MVA and 1000MVA respectively (as per IEC 60076-5) in order to obtain the value of the symmetrical short circuit current to be used for the design and tests.

4.3.5 The ability of the transformer to withstand the dynamic effects of short circuit shall be demonstrated by tests and complete test reports (including oscillograms and records of the condition of the transformer before and after the short-circuit test) shall be submitted for tender evaluation.

**4.4 Winding and Connections**

4.4.1 The **VECTOR GROUP** shall be stated on the schedule of requirements in the tender. Typical vector groups used in KPLC include **YNyn0d11**.

<b>Issued by:</b> Head of Section, Tech Stds & Specs	<b>Authorized by:</b> Head of Department , R & D
<b>Signed:</b> 	<b>Signed:</b> 
<b>Date:</b> 2010-06-15	<b>Date:</b> 2010-06-15





The Kenya Power & Lighting  
Co. Ltd.

TITLE:

**SPECIFICATION FOR 2.5MVA  
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size of transformer being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for exact or similar rating of transformers sold in the last five years shall be submitted with the tender for evaluation.

## 5. TESTS AND INSPECTION

5.1 The transformer shall be inspected and tested in accordance with the requirements of IEC 60076 and this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.

5.2 Copies of Type Test Certificates and Type Test Reports issued by the relevant Independent International or National Testing/ Standards Authority of country of manufacture or ISO/IEC 17025 accredited and independent testing laboratory shall be submitted with the offer for evaluation (all in English Language). A copy of the accreditation certificate for the independent laboratory shall also be submitted. Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Authority.

Copies of type test certificates and type test reports for the transformer to be submitted for tender evaluation shall include:

- a) Dielectric tests to IEC 60076 (Lightning Impulse and Power Frequency Withstand Tests).
- b) Short circuit withstand test to IEC 60076.
  - thermal ability of the transformer to withstand short circuit,
  - ability of the transformer to withstand the dynamic effects of short circuit
- c) Temperature rise test to IEC 60076.

Note: Temperature rise test to IEC 60076 if conducted at the manufacturer's premises (factory) MUST be in the presence of representatives of ISO/IEC 17025 accredited and independent testing laboratory; who shall sign the certificates and test reports.

5.3 The transformer shall be subject to acceptance tests at the manufactures' works before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Limited (KPLC) and shall include the following:

### 5.3.1 Routine tests to IEC 60076 (to be done during acceptance testing at factory)

- Measurement of winding resistance
- Ratio test

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Signed:

Date: 2010-06-15

Authorized by: Head of Department, R & D

Signed:

Date: 2010-06-15

**TABLE 3: CAPACITY DECLARATION FORM**  
**Form 3.1 Manufacturer's Capacity Declaration Form**

No.	Capacity Detail / Requirement	KPLC Requirement	Manufacturer to indicate	Meets capacity (Yes / No)
1.	<b>Annual Production capacity</b>	<b>POWER TRANSFORMERS</b>		
	23MVA 132/33 KV	Minimum 2 pcs		
	23 MVA 132/33 KV	Minimum 2 pcs		
	23MVA 132/33 KV	Minimum 2 pcs		
	23MVA 66/33 KV	Minimum 2 pcs		
	7.5MVA 33/11 KV	Minimum 2 pcs		
	2.5MVA 33/11 KV	Minimum 2 pcs		
	Earthing transformer with Resistor	Minimum 6 pc		
	7.5MVA kVA 33/11kV	Minimum 2 pcs		
	7.5MVA kVA 33/11kV	Minimum 2 pcs		
	2.5MVA kVA 33/11kV	Minimum 2 pcs		
	2.5MVA kVA 33/11kV	Minimum 2 pcs		
	<b>TAP CHANGER SPARES AND OTHER EQUIPMENT</b>			
	MR-EASUN-3 XMI 501-123/C-10.19.3W tap changes INSEART Only -Juja Road	No Requirement	Not Required	N/A
	Huaming Motor Drive CMA7 units	No Requirement	Not Required	N/A
	EASUN MR Motor Drive MA7 Unit 23MVA 66/11 Kv for Kimathi and Kitisuru S/s	No Requirement	Not Required	N/A
	MR Motor Drive MA9 Unit for Nyali S/s	No Requirement	Not Required	N/A
	Shanghai Huaming Tap changes-7.5MVA 33/11kV	No Requirement	Not Required	N/A
	Shanghai Huaming CV2III-350 D/126 -10193 W Limuru 23MVA 66/11kV	No Requirement	Not Required	N/A
	ABB VUBBRT 200/400 Kisumu 33/11kV S/s	No Requirement	Not Required	N/A
	Automatic Voltage Control relay-Tapcon	No Requirement	Not Required	N/A
	Automatic Voltage Control relay-REGDA	No Requirement	Not Required	N/A
	Switchboard panel 11kV	Minimum 12 pc		
	Switchboard panel 11kV	Minimum 12 pc		
	<b>BUSHING</b>			
	ABB Powertech 52kV Bushing for New Bamburi	No Requirement	Not Required	N/A
*2.	<b>Delivery</b>	<b>POWER TRANSFORMERS</b>		



	<b>Period after issuance of Purchase Order</b>	23MVA 132/33 KV	Maximum 10 months		
		23 MVA 132/33 KV	Maximum 10 months		
		23MVA 132/33 KV	Maximum 10 months		
		23MVA 66/33 KV	Maximum 10 months		
		7.5MVA 33/11 KV	Maximum 10 months		
		2.5MVA 33/11 KV	Maximum 10 months		
		Earthing transformer with Resistor	Maximum 10 months		
		7.5MVA kVA 33/11kV	Maximum 10 months		
		7.5MVA kVA 33/11kV	Maximum 10 months		
		2.5MVA kVA 33/11kV	Maximum 10 months		
		2.5MVA kVA 33/11kV	Maximum 10 months		
		<b>TAP CHANGER SPARES AND OTHER EQUIPMENT</b>	Maximum 10 months		
		MR-EASUN-3 XMI 501-123/C-10.19.3W tap changes INSEART Only -Juja Road	Maximum 10 months		
		Huaming Motor Drive CMA7 units	Maximum 10 months		
		EASUN MR Motor Drive MA7 Unit 23MVA 66/11 Kv for Kimathi and Kitisuru S/s	Maximum 10 months		
		MR Motor Drive MA9 Unit for Nyali S/s	Maximum 10 months		
		Shanghai Huaming Tap changes-7.5MVA 33/11kV	Maximum 10 months		
		Shanghai Huaming CV2III-350 D/126 -10193 W Limuru 23MVA 66/11kV	Maximum 10 months		
		ABB VUBBRT 200/400 Kisumu 33/11kV S/s	Maximum 10 months		
		Automatic Voltage Control relay-Tapcon	Maximum 10 months		
		Automatic Voltage Control relay-REGDA	Maximum 10 months		
		Switchboard panel 11kV	Maximum 10 months		
		Switchboard panel 11kV	Maximum 10 months		
		<b>BUSHING</b>	Maximum 10 months		
		ABB Powertech 52kV Bushing for New Bamburi	Maximum 10 months		
3	<b>No. of Ready Stocks</b>	<b>POWER TRANSFORMERS</b>	N/A		
		<b>TAP CHANGER SPARES AND OTHER EQUIPMENT</b>	N/A		
4	<b>Valid Quality Certifications</b>		Valid ISO 9001:2015, KEBS SM/DM, or Type Test Reports		
5	<b>Manufacturing Experience (From date plant was established)</b>		Minimum 10 years		

6	Quality Assurance Plan (QAP)				Attach QAP				
7	Four (4) reference letters from previous customers in the last five years				Attach Evidence				
	No.	Contract Name	Date	Value (Kshs)	Order Quantity	Quantity Delivered	% Delivered	Country	
	Country(ies) of Export				Minimum no. of continent(s) is/are .....[Specify]				
Overall Criteria Score									Pass / Fail

**NOTES TO TABLE 1:**

1. Where the Tenderer's offer fails to satisfy any one or more of the requirements as per the Criteria in Table 1 above, that Tenderer will be declared to have failed "*Failed on Mandatory Technical Requirements.*"
2. The Tenderer shall not qualify for further evaluation.
3. Where the Tenderer's offer complies with all the requirements in Table 1 above, that offer shall proceed for further evaluation as per criteria set out in Table 2.

Tenders will proceed to the Detailed Technical Stage only if they qualify in compliance with Part II clause 2.2.1 above, and Preliminary Evaluation under Clause 29.2 of the ITT.