



**Kenya Power**

**45MVA 132/33 ONLOAD TAP CHANGER REPLACEMENT/RETROFIT- SPECIFICATION**

**A Document of the Kenya Power & Lighting Co. Ltd  
June 2025**

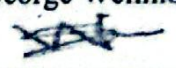
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### 0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	Senior Engineer, E/plant Coast
2	

### 0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2025-6-18	New issue		George Welimo 

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## FOREWORD

This specification has been prepared by the E/plant Coast Region of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for specifications of 45MVA 132kV Onload Tap Changer Replacement

The tap changer will be used to replace or retrofit faulty ABB/Hitachi UBBRN 350/400 tap changer in 45MVA 132/33kV power transformer.

This specification was prepared to establish uniform requirements to replace or retrofit faulty ABB/Hitachi UBBRN 350/400 tap changer used at Kenya Power and Lighting Company Ltd.

There are no other specifications in this series.

This specification stipulates the minimum requirements for specifications of replacing or retrofitting faulty ABB/Hitachi UBBRN 350/400 tap changer acceptable for use in the company and it shall be the responsibility of the supplier to ensure that the offered replacement or retrofit is of the highest quality and guarantees excellent service to KPLC, good workmanship and good engineering practice.

Users of Kenya Power specifications are responsible for their correct interpretation and application.

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## 1. SCOPE

- 1.1. This specification is for replacement or retrofitting faulty ABB/Hitachi UBBRN 350/400 tap changer in 45MVA 132/33kV power transformer

## 2. NORMATIVE REFERENCES

The following standards contain provision, which, through reference in this text, constitute provisions of this specification. For dated editions, the cited edition will apply; for undated editions, the latest edition of the referenced document shall apply.

IEC/ISO 17025, General requirements for the competence of testing and calibration laboratories

IEC 60060-1, High voltage test techniques – Part 1: General definitions and test requirements

IEC 60076-3:2013, Power transformers – Part 3: Insulation levels, dielectric tests and external clearances in air

IEC 60076-7:2005, Power transformers – Part 7: Loading guide for oil-immersed power transformers

IEC 60076-21:2011, Power transformers – Part 21: Standard requirements, terminology, and test code for step-voltage regulators

IEC 60137:2008, Insulated bushings for alternating voltages above 1 000 V

IEC 60214-2:2004, Tap-changers – Part 2: Application guide

IEC 60270, High-voltage test techniques – Partial discharge measurements

## 3. DEFINITIONS AND ABBREVIATIONS

For the purpose of this specification, the definitions and abbreviations given in the reference standards shall apply together with the following abbreviations.

### 3.1. ABBREVIATIONS

A-Amp

AC-Alternating Current

KPLC- Kenya Power and Lighting Company Limited

ISO – International Organization for Standardization.

IEC- International electrotechnical commission

Kg –Kilogram

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**KV - Kilovolt**

**LV – Low Voltage**

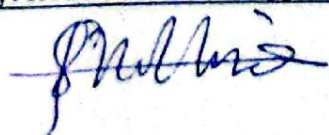
**EN – European Standard**

**mA-milliAmp**

**RMS-Root mean Square**

**V-Volt**

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#### 4. REQUIREMENTS

##### 4.1. SERVICE CONDITION

4.1.1. Onload tap changer shall be suitable for use in a 45MVA 132kV transformer in tropical areas and harsh climatic conditions including areas exposed to:

- a) Altitudes of up to 2200m above sea level;
- b) Humidity of up to 95%;
- c) Average ambient temperature of +30°C with a minimum of 10°C and a maximum of +50°C
- d) Pollution: Degree 2

##### 4.2. DESIGN AND CONSTRUCTION

###### 4.2.1. DESIGN

4.2.1.1. Onload tap changer replacement or retrofitted shall be installed on 132kV transformer with voltage range from 154 kV to 118.8kV

4.2.1.2. Onload tap changer replacement or retrofitted shall be capable of handling 45MVA of power

###### 4.2.2. CONSTRUCTION

4.2.2.1. Onload tap changer replacement or retrofitted shall be in tank type as the existing

4.2.2.2. Motor drive unit shall be matched with replaced or retrofitted onload tap changer

4.2.2.3. The following shall be matched with replaced or retrofitted onload tap changer

- a) Oil drainage pipe
- b) Protective relay
- c) Pressure relief device
- d) Driving shaft
- e) Bevel gearbox
- f) Tap changer operation controller

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### 4.3. TECHNICAL REQUIREMENTS

#### 4.3.1. Transformer Technical details

##### 4.3.1.1. Transformer MVA rating:

NOMINAL (MVA)	HV	LV	TV
ONAN	35	35	15
ONAF	45	45	15

##### 4.3.1.2. Transformer ratio:132/33kV

##### 4.3.1.3. Vector group-YNynd1

##### 4.3.1.4. Tap number 1 have the highest voltage rating

##### 4.3.1.5. Percentage tapping range:

132000	+ 10 X 1.67%
	- 6 X 1.67%

##### 4.3.1.6. Location of the tapping is 132kV winding

##### 4.3.1.7. Tapping method shall be onload tap Changer

##### 4.3.1.8. Fault level 31.5kA

##### 4.3.1.9. Impedance values

Impedance(%)	Tap 1	Tap 11	Tap 17	Base MVA
HV/LV	12.3	11.7	11.8	45
HV/TV	6.82	6.63	6.47	15
LV/TV		2.0		15

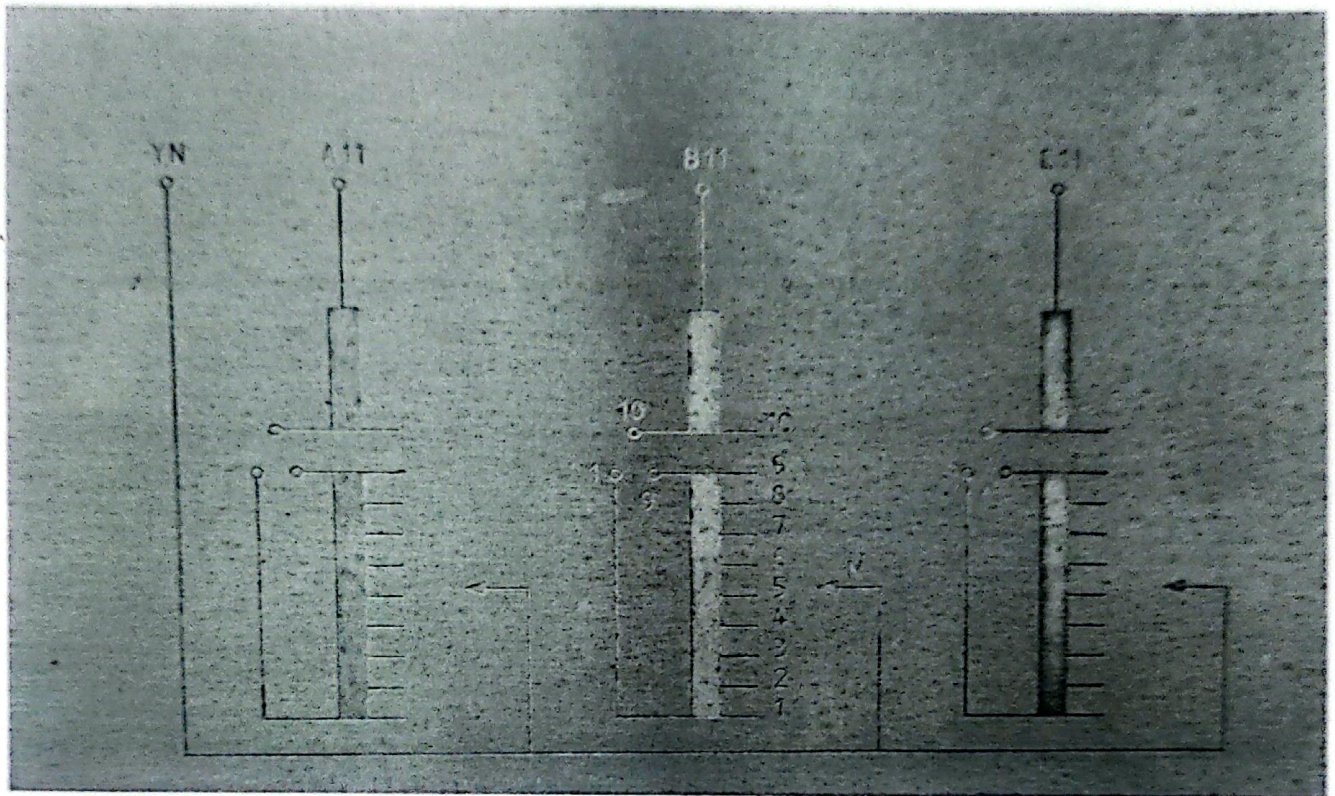
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#### 4.3.1.10. HV OLTC placement photo



#### 4.3.2. Technical Tap Changer Details

##### 4.3.2.1. Data of the On-load Tap-changer to be replaced

- 4.3.2.1.1. Manufacturer: ABB Components /Hitachi
- 4.3.2.1.2. Serial number: 8211499
- 4.3.2.1.3. Phase type: Three phase
- 4.3.2.1.4. OLTC type designation ABB UBBRN 350/400
- 4.3.2.1.5. Transition resistor range 16-17Ω
- 4.3.2.1.6. Tap changer shall be capable of handling 400A
- 4.3.2.1.7. Tap changer shall be capable of withstanding Lightning impulse 350kV
- 4.3.2.1.8. The number of tap-changer positions that gives a winding ratio change is Plus/Minus, Max 17 positions

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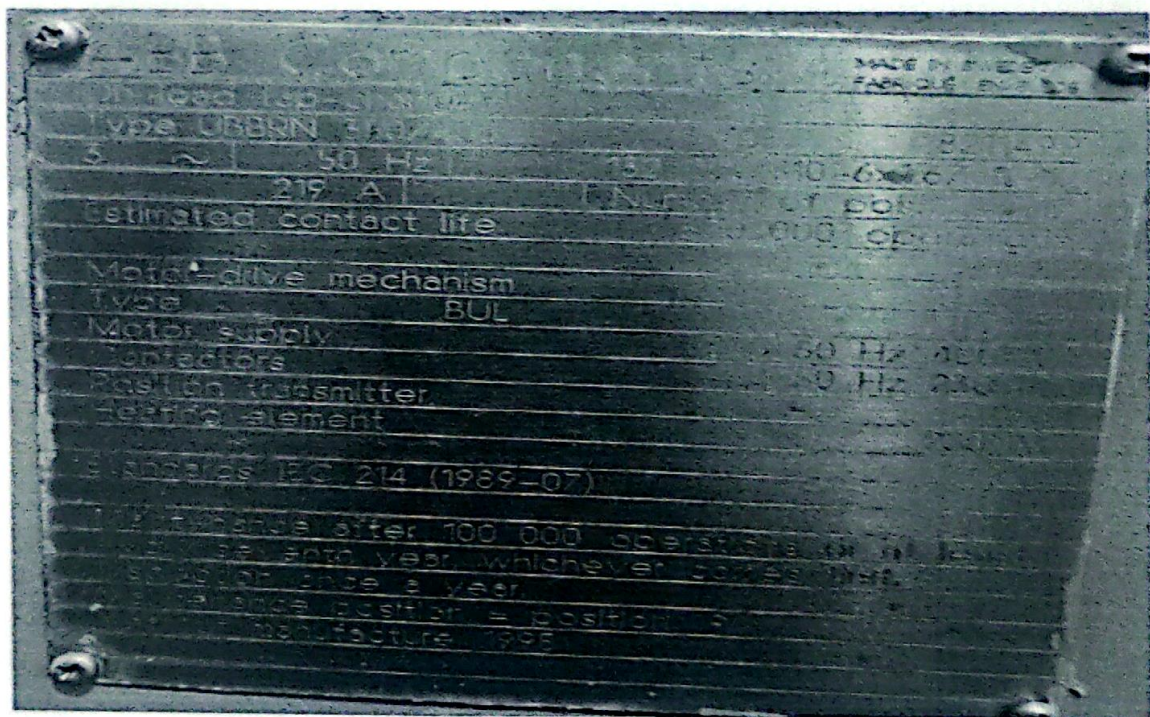
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4.3.2.1.9. The tap changer is Oiltap

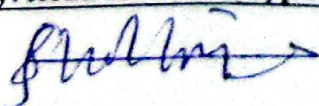
**4.3.3. Data regarding the existing Motor Drive Unit (MDU)**

- 4.3.3.1. Manufacturer: ABB COmponents
- 4.3.3.2. Serial number:8211499
- 4.3.3.3. Mechanism type: BUL
- 4.3.3.4. Year of construction: 1995
- 4.3.3.5. Counter reading:292510
- 4.3.3.6. Motor supply 3 phase ,50Hz 400V
- 4.3.3.7. Contactor supply 1-phase,50Hz 230V
- 4.3.3.8. Photo



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#### **4.4. WARRANTY, DOCUMENTATION AND DRAWINGS**

##### **4.4.1. Warranty**

4.4.1.1. Tap Changer replacement or retrofit shall be backed by a minimum of 12-months factory warranty after installation.

##### **4.4.2. Documentation**

4.4.2.1. The Bidder shall submit a clause by clause statement of compliance with the specifications together with copies of the manufacturer's catalogues, brochures, technical data and proven test reports clearly marked to support each clause, all in English for evaluation. The manufacturer's type reference/designation of the item offered shall be indicated

##### **4.4.3. Drawings**

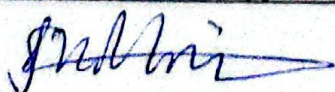
4.4.3.1. Electrical controls drawings

4.4.3.2. power schematic drawings

4.4.3.3. Detailed Spare OLTC drawings

4.4.3.4. Existing Mounting flange transformer cover

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## 5. TESTS REQUIREMENTS

5.1. The spare onload tap changer shall be inspected and tested in accordance with standards 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 previous Test Reports issued by own or a third-party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 confirming compliance of the Spare onload tap changer offered shall be submitted with the offer for evaluation (all in English Language). A copy of the accreditation certificate and the scope of accreditation of the testing laboratory shall also be submitted. Any translations of certificates or reports into English language shall be signed and stamped by the Testing Authority that carried out tests. Copies of test reports for the spare tap changer offered to be submitted for tender evaluation shall include but not limited to the following test

- Lightning and switching Impulse Voltage
- Short Circuit current
- Power Frequency voltage withstand test
- Temperature Rise
- Breaking Capacity test
- Transition impedance test

5.3. The onload tap changer shall be subject to acceptance tests at the manufacturer's works before dispatch.

## 6. INSPECTION REQUIREMENTS

6.1 On receipt of the spare onload tap changer, Kenya Power will inspect to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, spare onload tap changer, which upon examination or use fail to meet any or all of the requirements in the specification.

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## 7. MARKING AND PACKING

### 7.1 MARKING

The following information shall be marked legibly and in a permanent manner on the spare tap changer:

- a) The manufacturer's name or trade mark;
- b) The type reference number / model number;
- c) Standard of manufacture and tests;
- d) The serial number;
- e) The instructions for handling and use (in the English Language).

## 8. PACKING

- 8.1 Spare tap changer shall be packaged to protect it from damage and entry of moisture during transportation, handling and storage.

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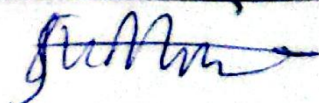
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## APPENDICIES

### A: QUALITY MANAGEMENT SYSTEM (Normative)

- A.1 The Manufacturer shall design, manufacture, supply and install on site the onload tap changer in two months. Manufacturer's monthly & annual production capacity and experience. in replacement or retrofitting ABB/Hitachi , MR and Easun MR Onload Tap changers. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for retrofitted onload tap changers on 132kV and above transformers in the last 10 years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

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**B: DOCUMENTATION AND DEMONSTRATION (Normative)**

**B.1** The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

- Fully filled clause by clause guaranteed technical particulars (GTP) signed by the manufacturer;
- Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, schematic diagram and technical data;
- Sales or onload tap changer retrofitting records for the last 10 years and at least four customer reference letters;
- Details of manufacturing capacity and the manufacturer's experience;
- Manufacturers letter of authorization, ISO 9001 certificate, and other technical documents required in the tender.
- Manufacturer's warranty and guarantee; subject to 12 months from date of commissioning to KPLC transformer
- Operational manual.
- Service manual.

**B.3.** The supplier shall submit recommendations for use, care and routine inspection/testing procedures, all in the English Language, during delivery of the spare onload tap changer to KPLC.

**B.4.** Special tools and equipment required to install or maintain the replaced/retrofitted onload tap changer shall be delivered to Electrical plant Coast

**B.5.** The successful bidder shall demonstrate to KPLC Staff (in Mombasa) the maintenance of the onload tap changer.

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**C: GUARANTEED TECHNICAL PARTICULARS (Normative)**

*To be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, and copies of complete type test certificates and test reports for tender evaluation, all in English Language)*

**Tender No.** .....

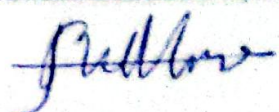
**Bidder's name and Address**.....

CLAUSE	REQUIREMENT	Bidders Offer
	Manufacturer's Name and address	Specify
	Country of origin	Specify
	Name and model Number	Specify
	Scope of work (Replace or Retrofit)	Specify
	Scope of Items to supply and install	Specify
1	<b>Main transformer parameter includes</b>	
	Rated capacity $P_N$	Specify
	Connection of transformer winding (Neutral end of star connection, Delta connection, single phase)	Specify
	Rated voltage and regulation range $U_N (1 \pm X\%)$	Specify
	Steps, tap winding connection diagram	Submit/attach
	Rated insulation level	Specify
	Voltage gradient on tap winding during impulse test and AC induction test	Specify
2	<b>switching parameter of tap changer</b>	
	Maximum through-current $I_{max}$ :	Specify
	Step voltage $U_{st}$ :	Specify
	Switching capacity:	Specify
3	<b>Tap changer model</b>	
	Tap changer type	Specify
	Specify type oiltap or vaccutap	Specify
	Number of phases	Specify
	Maximum rated through-current	Specify
4	<b>tap changer insulation level and tap selector (or selector switch) specification</b>	
	Define tap changer main insulation level	Specify

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CLAUSE	REQUIREMENT		Bidders Offer
	Define tap changer internal insulation level		Specify
	Basic connection diagram		Attach
	Switching capacity of diverter switch		Specify
	Short duration overload		Specify
	Permissible short circuit test current		Specify
	Contact life of diverter switch.		Specify
5	Motor drive unit-Model		Specify
	Motor	Rated power (W)	Specify
		Rated voltage (V)	Specify
		Rated current (A)	Specify
		Rate frequency(Hz)	Specify
		Rotate speed (r.p.m.)	Specify
	Rated torque on drive shaft (Nm)		Specify
	Revolution of the drive shaft per switching operation		Specify
	Revolution of the hand crank per switching operation		Specify
	Running time per switching operation (S)		Specify
	Max. operation positions		Specify
	Voltage for control circuit and heater circuit (V)		Specify
	Heater power (W)		Specify
	A.C. voltage test to ground (kV/50Hz, 1min)		Specify
	Approx. weight (kg)		Specify
	Protective degree		Specify
	Mechanical endurance (operations)		Specify
6	WARRANTY, DOCUMENTATION AND DRAWINGS		
	Warranty		
	Tap Changer replacement or retrofit shall be backed by a minimum of 12-months factory warranty after installation.		Submit
	Documentation		
	Submit a clause by clause statement of compliance with the specifications together with copies of the manufacturer's catalogues, brochures, technical data and proven test reports clearly marked to support each clause, all in English for evaluation. The manufacturer's type reference/designation of the item offered shall be indicated		Submit
	Drawings		
	Electrical controls drawings		Submit
	power schematic drawings		Submit
	Detailed OLTC drawings		Submit
	Existing Mounting flange transformer cover		Submit

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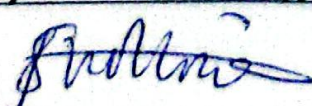
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CLAUSE	REQUIREMENT	Bidders Offer
7	<b>TESTS REQUIREMENTS</b>	
	Inspection and testing in accordance with standards and this specification. Responsibility of the manufacturer to perform all the tests specified. Confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.	Confirm
	Submit Copies of previous Test Reports issued by own or a third-party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 confirming compliance of the Spare onload tap changer offered for evaluation (all in English Language). Submit a copy of the accreditation certificate and the scope of accreditation of the testing laboratory Any translations of certificates or reports into English language shall be signed and stamped by the Testing Authority that carried out tests. Copies of test reportssubmitted for tender evaluation shall include but not limited to the following test Lightning and switching Impulse Voltage Short Circuit current Power Frequency voltage withstand test Temperature Rise Breaking Capacity test Transition impedance test	Submit
	The onload tap changer shall be subject to acceptance tests at the manufacturer's works before dispatch.	confirm
	Complete Test Reports for the spare onload tap changer shall be submitted to KPLC for approval before shipment	confirm
8	<b>INSPECTION REQUIREMENTS</b>	
	On receipt of the spare onload tap changer, Kenya Power will inspect to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, spare onload tap changer, which upon examination or use fail to meet any or all of the requirements in the specification.	Confirm
9	<b>MARKING AND PACKING</b>	
	<b>MARKING</b>	

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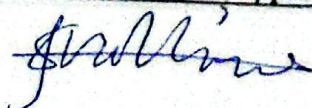
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CLAUSE	REQUIREMENT	Bidders Offer
	The following information shall be marked legibly and in a permanent manner on the spare tap changer: The manufacturer's name or trade mark; The type reference number / model number; Standard of manufacture and tests; The serial number; The instructions for handling and use (in the English Language).	State
10	PACKING	
	Spare tap changer shall be packaged to protect it from damage and entry of moisture during transportation, handling and storage.	State
	APPENDICIES	
11	A: QUALITY MANAGEMENT SYSTEM (Normative)	
	Duration of the Manufacturer shall design, manufacture, supply and install on site the onload tap changer in two months. Submit Manufacturer's monthly & annual production capacity and experience in replacement or retrofitting ABB/Hitachi , MR and Easun MR Onload Tap changers. Submit a detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for retrofitted onload tap changers on 132kV and above transformers in the last 10 years as well as reference letters from at least four of the customers with the tender for evaluation.	Specify
12	B: DOCUMENTATION AND DEMONSTRATION (Normative)	
	The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:	Submit
	Fully filled clause by clause guaranteed technical particulars (GTP) signed by the manufacturer;	Submit
	Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, schematic diagram and technical data;	Submit
	Replacement/retrofitting experience on ABB/Hitachi/MR /Easun MR Onload tap changer for the last 10 years and at least four customer reference letters;	Submit
	Details of manufacturing capacity and the manufacturer's experience;	Submit
	Manufacturers letter of authorization, ISO 9001 certificate, and other technical documents required in the tender.	Submit

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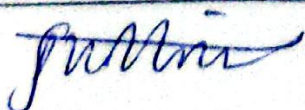
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CLAUSE	REQUIREMENT	Bidders Offer
	Manufacturer's warranty and guarantee; subject to 12 months from date of commissioning in the KPLC transformer	Submit
	Operational manual and information on maintenance cycle	Submit
	Service manual.	Submit
	The supplier shall submit recommendations for use, care and routine inspection/testing procedures, all in the English Language, during delivery of the spare onload tap changer to KPLC.	Submit
	Special tools and equipment required to install or maintain the retrofitted onload tap changer shall be delivered to Electrical plant Coast	Confirm
	The successful bidder shall demonstrate to KPLC Staff (in Mombasa) the maintenance of the onload tap changer.	Confirm

.....  
**Manufacturer's Name, Signature, Stamp and Date**

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