DOCUMENT NO.: KP1/13D/4/1/TSP/10/006

Kenya Power

36KV CURRENT TRANSFORMERS – SPECIFICATION

A Document of the Kenya Power & Lighting Co. Plc

November 2022

TABLE OF CONTENTS

0.1 CIRCULATION LIST 2
0.2 AMENDMENT RECORD 3
0.3 FOREWORD 5
1. SCOPE 6
2. NORMATIVE REFERENCES 6
3. DEFINITIONS AND ABBREVIATIONS 6
3.1. ABBREVIATIONS 6
4. REQUIREMENTS 7
4.1. SERVICE CONDITIONS 7
4.2. MATERIAL, DESIGN AND CONSTRUCTION 7
5. TESTS REQUIREMENTS 9
6. MARKING AND PACKAGING 11
APPENDICES 12
APPENDIX A: TESTS AND INSPECTION (NORMATIVE) 12
APPENDIX B: QUALITY MANAGEMENT SYSTEM (Normative) 13
APPENDIX C: DOCUMENTATION (Normative) 13
APPENDIX D: WARRANTY 14
APPENDIX E: MANUFACTURER'S QUALIFICATION AND CAPACITY 15
APPENDIX F: GUARANTEED TECHNICAL PARTICULARS (Normative) 15

0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	Manager, Standards
2	Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?fFolderId=23)

REVISION OF KPLC STANDARDS

To keep abreast of progress in the industry, KPLC Standards shall be regularly reviewed. Suggestions for improvements to approved Standards, addressed to the Manager, Standards Department, are welcome.

© Kenya Power & Lighting Co. Ltd.

Users are reminded that by Section 25 of the Copyright Act, 2001 (Revised 2014) Cap 130 of the Laws of Kenya, copyright subsists in all KPLC Standards and except as provided under Section 26 of this Act, no KPLC Standard produced by KPLC may be reproduced, stored in a retrieval system by any means without prior permission from the Managing Director & CEO, KPLC.

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2022-11-18	Date: 2022-11-18

0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1, Rev 0	2019-05-10	Cancels and replaces KPLC1/3CB/TSP/10-005 Issue 1 rev 0 dated 2006-02-23 and all previous issues	S. Kimitei	G. Owuor
Issue 1, Rev 1	2021-05-25	i) Adopted the new format of the specifications ii) Added clause 4.2.13.4. on degree of protection of enclosure. iii) Added clause 4.2.14 on terminal markings iv) Added clause 4.2.15 on earthing requirements. v) Added clause 4.2.16 on temperature rise requirements vi) Added clause 4.2.17 on partial Discharge requirements vii) Added clause 4.2.18 on internal Arc withstand requirement. viii) Added clause 4.2.19 on mechanical strength requirement. ix) Added the following parameters on table 1: • Minimum power frequency withstand for secondary terminals • Rated dynamic current x) Changed the following parameters on table 1:overload factor, rated short circuit withstand current , CT ratio, CTaccuracy class and burden	Nancy Wairimu	Dr. Eng. Peter Kimemia
Issue 1, Rev 2	2022-11-01	i) Modified **Clause 4.2.12.2** to include 2No. U-bolt as a	Benson Dianga Peter Wanyonyi Emanuel Baraza	Dr. Eng. Peter Kimemia

		component in the primary clamp terminals ii) Modified Scope clause to recommend areas of application for various Types. iii) Modified Clause 4.2.12.3 to give option of clamp termination for conductor. iv) Inserted Clause 4.2.12.4 to give option of clamp termination for tube. v) Removed (formely)Clause 4.2.18 requiring the CT to withstand internal Arc of 31.5kA for 0.3s in accordance with the requirements of IEC 61869-1.This test is not applicable for Um>72.5kV according to IEC 61869-1:2007 and IEC 61869-2:2012 vi) Added clause 4.2.21 requirements and ratings for metering core. vii) Modified clause 4.3 - Table 1 on Ratings to describe what types of CTs, and their ratings, for various applications viii) Removed part of Appendix A section A2 requiring Mechanical test & Electromagnetic compatibility test. These tests are not applicable for 33kV CT according to IEC 61869-1:2007 and IEC 61869-2:2012	Vincent Achongo Abdalla Chanzu	

0..3 FOREWORD

This Specification has been prepared by the Standards Department and Technical Services Department both of The Kenya Power and Lighting Company Plc. (KPLC) and it lays down requirements for 36 kV Current Transformers.

The 36kV Current Transformers are intended for use with electrical measuring instruments and electrical protective devices at Kenya Power and Lighting Company Plc.

There are no specifications in this series.

The Specification has been revised by a team comprising personnel from Customer Services, Infrastructure and Standards to update some of the features required for 36 kV Current Transformers

This Specification stipulates the minimum requirements for 36kV Current Transformers acceptable for use in KPLC power system. It shall be the responsibility of the supplier and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, ensure good workmanship and good engineering practice in the manufacture of the 36 kV Current Transformers.

Users of this Kenya Power Specification are responsible for its correct interpretation and application.

The following are members of the technical team that developed this specification:

Name	Department
Eng.Peter Wanyonyi	Commersial Services
Eng. Benson Dianga	Standards
Eng. Vincent Achongo	Technical Services
Eng.Emannuel Buluma	Infrastructure
Eng. Abdalla Chanzu	Infrastructure

1. SCOPE

1.1. This Specification is for newly manufactured 36kV Current Transformers for use with electrical measuring instruments and electrical protective devices for system highest voltage of 36 kV at frequency of 50Hz: Type I(33kV-45MVA incomers & 33kV Bus Bars), Type II(33kV-23/7.5MVA Incomers & 33kV Feeders), Type III(33kV tariff Metering & 33kV Feeder Protection & metering) & Type IV(33kV tariff Metering).

1.2. The Specification covers general requirements, design, construction, technical parameters, inspection and tests, and schedule of Guaranteed Technical Particulars of 36kV Current Transformers.

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 61869-1:	Instrument Transformers – Part 1: General Requirements
IEC 61869-2:	Instrument Transformers- Part 2: Additional Requirements for Current Transformers.
IEC 60417:	Graphical Symbols for use on equipment.
IEC 60296:	Fluids for Electrotechnical applications – Mineral Insulating Oil for Electrical Equipment
IEC 60529:	Degrees of protection provided by enclosures (IP code).
IEC/TS 60815:	Selection and dimensioning of high voltage insulators intended for use in polluted conditions.
ISO 9001:2015	Quality Management System – Requirements
KP1/6C.1/13/TSP/08/001:	Specification for Mineral Insulating oil (Transformer & Switchgear oil)

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:

3.1. ABBREVIATIONS

KPLC: Kenya Power and Lighting Company Plc.

IEC: International Electrotechnical Commission

ISO: International Organization for Standardization.

CTs: Current Transformers

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 The 36kV Current Transformers shall be suitable for continuous use outdoors 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 -1°C and a maximum of +45°C
d) Pollution: Design pollution level to be taken as "Very Heavy" (Pollution level IV) for inland in accordance with IEC 60815.
e) Isokeraunic level: 180 thunderstorm days per year

4.1.2 36kV Current Transformers shall be connected to overhead system that is generally of earthed construction i.e. with continuous aerial earth wire and with the neutral point Solidly grounded.

4.2. MATERIAL, DESIGN AND CONSTRUCTION

4.2.1. The current transformer (CT) shall be designed and manufactured to IEC 61869-1 & 2 and the requirements of this specification.

4.2.2. All materials used shall be new and of the best quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperatures and atmospheric conditions arising under working conditions without undue distortion or deterioration or the setting up of undue stresses in any part, and also without affecting the strength and suitability of the various parts for the work which they have to perform.

4.2.3. The design shall ensure satisfactory operation under such sudden variations of load and voltage as may be met with under working conditions on the system, including those due to short circuits conditions.

4.2.4. All parts of the transformer, including insulators with their mountings, shall be designed so as to avoid pockets in which water can collect.

4.2.5. The current transformer shall be outdoor; oil insulated and hermetically sealed type. The insulator portion of the current transformer shall be made of high-grade brown-glazed porcelain.

4.2.6. The insulating oil shall be new, unused and shall comply with all the requirements of IEC 60296 and as per current KPLC specification – KPLC/3CB/008/001. *(This shall be attached during tender).*

4.2.7. A device shall be provided for checking the oil level and shall indicate whether the oil level is within the operating range during operation.

4.2.8. The current transformer shall be effectively sealed to prevent liquid loss, as this would lead to contamination of the insulation.

4.2.9. The current transformer shall be suitable for vertical installation on a steel structure.

4.2.10. All parts and components of the current transformer shall be resistant to atmospheric corrosion, during the service life. The visual appearance shall remain acceptable. The current transformer paint work shall be protected from weathering due to atmospheric conditions and ultra-violet radiation.

4.2.11. The current transformer shall have primary, secondary and earth terminals.

4.2.12. **Primary Terminal**

4.2.12.1. The primary terminal shall be of high conductivity copper, tin-plated, suitable for connection of both copper and aluminium conductors.

4.2.12.2. It shall have palm clamp connectors with 2No. U-bolt suitable for either stranded conductor and tube connection.

4.2.12.3. Palm clamp connectors shall be for Conductor overall diameter of between 18.3mm to 25mm.

4.2.12.4. Palm clamp connectors shall be for busbar tubes of overall diameter of maximum 76.2mm

4.2.13. **Secondary Terminals**

4.2.13.1. The secondary terminals of the current transformer shall be wired to a terminal box and earthed at one point.

4.2.13.2. The terminal box shall be weatherproof with a cable plate at the bottom and shall be covered with removable plate.

4.2.13.3. The terminal box shall be capable of accommodating all the secondary terminals each suitable for a conductor size of up to 3.2mm diameter.

4.2.13.4. The degree of protection of enclosure of the secondary terminal box shall be at least IP54 according to IEC 60529.

4.2.14. The Primary and Secondary terminals shall be marked in accordance with IEC 61869-2.

4.2.15. The Frame of the Current Transformer shall be provided with a reliable earthing terminal for connection to an earthing conductor suitable for specified fault condition. The connection point shall be marked with the "earth symbol" as indicated by the symbol No. 5019 of IEC 60417.

4.2.16. The current transformer top oil temperature rise shall not exceed 55°C, while the winding average temperature rise shall not exceed 65°C.

4.2.17. The Maximum Partial Discharge shall be 10pC.

4.2.18. The Current transformer shall be of sufficient mechanical strength.In particular the Current Transformer top cover shall be strong so as to withstand any flying debris resulting from failure of porcelain housing of other nearby equipment in the susbstation.

4.2.19. The current transformer shall have cores as per clause 4.3. The ratio selection shall be done on the secondary side.

4.2.20. The protection cores shall be suitable for conventional overcurrent and for true transformation of the fully asymmetrical fault currents.

4.2.21. The metering cores shall have high accuracy(low loss) and low saturation level suitable for conventional tarrif metering.

4.3. RATINGS

The ratings of the 36kV Current Transformers shall be as indicated in the tables below:

Table 1: Ratings

Description		**Requirements**
Rated highest Voltage and Frequency		36kV, 50Hz
Minimum nominal specific creepage distance of insulator		31mm/kV
Minimum creepage distance		1116mm
Minimum arcing Distance		380mm
Minimum lightning impulse withstand voltage		200 kV (peak)
Minimum power frequency withstand voltage for primary terminals		95 kV(rms)
Minimum power frequency withstand voltage for secondary terminals		3 kV(rms)
Overload factor		1.2
Type of CT		**Type I**
Rated Primary Current		1000A
Rated Secondary Current		1A
Rated short circuit withstand current and duration.		31.5 kA, 3 seconds
Rated Dynamic Current		79kA
CT Ratio		1000-800/1-1-1-1
Accuracy class and rated burden	Core 1	Class 0.5, 15VA, ISF≤ 10, Rct @75°C ≤7.5 Ω at highest ratio
	Core 2	Class 5PR20, 15VA, Vk ≥ 450V at highest ratio
	Core 3	Class 5PR20, 15VA, Vk ≥ 450V at highest ratio
	Core 4	Class PX, Vk ≥ 450V, Ik< 30mA

Burden at all Ratios		Manufacturer to state
Turns ratio and upper limit of secondary winding resistance (Rct), for Class PX core		Manufacturer to state
Rated Temperature of Equipment		-5°C to +50°C
Type of CT		**Type II**
Rated Primary Current		400A
Rated Secondary Current		1A
Rated short circuit withstand current and duration.		31.5 kA, 3 seconds
Rated Dynamic Current		79kA
CT Ratio		400-200/1-1-1-1
Accuracy class and rated burden	Core 1	Class 0.5, 15VA, ISF≤ 10, Rct@75°C ≤7.5Ω at highest ratio
	Core 2	Class 5PR20, 15VA, Vk ≥ 450V at highest ratio
	Core 3	Class PX, V_k >450V, Ik< 30mA, Rct< 3 Ω@200/1A
	Core 4	Class PX, V_k > 450V, Ik< 30mA,Rct<3 Ω @200/1A
Burden at all Ratios		Manufacturer to state
Turns ratio and upper limit of secondary winding resistance (Rct), for Class PX core		Manufacturer to state
Rated Temperature of Equipment		-5°C to +50°C
Type of CT		**Type III**
Rated Primary Current		400A
Rated Secondary Current		1A
Rated short circuit withstand current and duration.		31.5 kA, 3 seconds
Rated Dynamic Current		79kA
CT Ratio		400-200/1-1-1
Accuracy class and rated burden	Core 1	Class 0.2,15VA, ISF≤ 10, Rct@75°C ≤7.5Ω at highest ratio
	Core 2	Class 5PR20,15VA, Vk ≥ 450V Ω at highest ratio
	Core 3	Class PX, V_k > 450V, Ik<30mA, Rct<3 Ω
Burden at all Ratios		Manufacturer to state
Turns ratio and upper limit of secondary winding resistance (Rct), for Class PX core		Manufacturer to state
Rated Temperature of Equipment		-5°C to +50°C

Type of CT		Type IV
Rated Primary Current		100A
Rated Secondary Current		1A
Rated short circuit withstand current and duration.		31.5 kA, 3 seconds
Rated Dynamic Current		79kA
CT Ratio		100-50/1-1-1
Accuracy class and rated burden	Core 1	Class 0.2, 15VA, ISF< 10, Rct@75^{0}C ≤7.5 Ω at highest ratio
	Core 2	Class 0.5, 15VA, ISF< 10, Rct@75^{0}C ≤7.5 Ω at highest ratio
	Core 3	Class 5PR20, 15VA, Vk ≥ 450V
Burden at all Ratios		Manufacturer to state
Turns ratio and upper limit of secondary winding resistance (Rct), for Class PX core		Manufacturer to state
Rated Temperature of Equipment		-5°C to +50°C

5. TESTS REQUIREMENTS

The 36kV Current Transformers shall be inspected and tested in accordance with the requirements of IEC 61869-1 & 2 and provision of this specification.

6. MARKING AND PACKAGING

6.1 The 36kV current transformer shall be fitted with a permanent rating plate indicating the following:

a) The manufacturer's name and identification mark;
b) The type reference number and serial number;
c) The year of manufacture;
d) The rated primary and secondary current;
e) The rated frequency;
f) The rated output and the corresponding accuracy class of the cores;
g) The highest voltage of equipment ;
h) The rated insulation level;
i) The class of insulation;
j) The short-time current ratings and time;
k) The rated continuous thermal current;

l) Requirements for Class PX rated turns ratio, the rated knee point e.m.f., the upper limit of exciting current (I_e)at rated knee point e.m.f. and the upper limit of secondary winding resistance (R_{ct}).

All the marking shall be by engraving (or superior method) and shall be permanent and legible.

6.2 The terminals shall be marked clearly and indelibly and in accordance with IEC 61869-1 & 2 . The terminal marking shall consist of letters followed by numbers. The letters shall be in block capitals.

6.3 The 36kV Current Transformers shall be delivered packed in wooden crates firmly bound together to avoid damage during transportation and storage.

6.4 A set of three (3) original installation and technical manuals for the Current Transformers shall be supplied with the equipment.

APPENDICES

APPENDIX A: TESTS AND INSPECTION (NORMATIVE)

A.1 It shall be the responsibility of the supplier to test or to have all the relevant tests performed.

A.2 Copies of Type Test Certificates and Type Test Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate for the testing laboratory clearly stating the scope of accreditation shall also be submitted with the tender (all in English Language).

Copies of type test reports to be submitted with the tender for evaluation shall be as stated below:

a) Short-time current tests;
b) Temperature rise test;
c) Lightning impulse test on primary terminals (with both positive and negative polarity – fifteen consecutive impulses of each polarity);
d) Wet test for outdoor type transformers;
e) Enclosure tightness test at ambient temperature
f) Verification of the degree of protection by enclosures
g) Capacitance and dielectric dissipation factor;
h) Chopped lightning impulse withstand test;
i) Partial discharge test;
j) Transmitted overvoltage test;
k) Test of Accuracy.

NOTE: Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Authority.

A.3 At the company's (Kenya Power) discretion, our Engineers shall witness tests at the factory before shipment. Tests to be witnessed by KPLC Engineers at the factory before

shipment/delivery shall be in accordance with IEC 61869-2 and this specification and shall include the following:

a) Verification of markings;
b) Visual inspection;
c) Power-frequency withstand test on primary winding;
d) Partial discharge measurement;
e) Power-frequency withstand tests on secondary winding;
f) Power-frequency withstand tests between sections;
g) Inter-turn overvoltage test;
h) Measurement of Capacitance and dielectric dissipation factor;
i) Partial discharge test;
j) Test for accuracy;
k) Test for rated knee point e.m.f., maximum exciting current, secondary winding resistance and turns ratio of class PX Current Transformers.
l) Enclosure Tightness Test at ambient temperature.

A.4 Routine and sample test reports for the 36 kV Current Transformers to be supplied shall be submitted to KPLC for approval before supply/delivery.

A.5 On receipt of the 36 kV Current Transformers, KPLC will inspect them and may perform any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to KPLC, any current transformer which upon examination, test or use fail to meet any or all of the requirements in the specification.

APPENDIX B: QUALITY MANAGEMENT SYSTEM (Normative)

B.1 The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the 36kV Current Transformers physical properties, tests and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2015.

B.2 The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001:2015 certificate shall be submitted with the tender for evaluation.

APPENDIX C: DOCUMENTATION (Normative)

C.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:

a) Fully filled clause by clause guaranteed technical particulars (GTP) signed and stamped by the manufacturer;
b) Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions and technical data;
c) Sales records for the last five years and at least four customer reference letters;
d) Details of manufacturing capacity and the manufacturer's experience;

e) Copies of required type test reports by a third party testing laboratory accredited to ISO/IEC 17025. The test reports shall not be more than five years old;
f) Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;
g) Contacts and address of third party testing laboratory;
h) Manufacturers letter of authorization, ISO 9001:2015 certificate and other technical documents required in the tender.
i) Supplier/manufacturer's warranty and guarantee

C.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

a) Fully filled clause by clause guaranteed technical particulars (GTP) stamped and signed by the manufacturer;
b) Design Drawings with details of the current transformer to be manufactured for KPLC;
c) Quality assurance plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2015;
d) Marking details and method to be used in marking the 36 kV Current Transformers;
e) Packaging details (including packaging materials).

NOTE: *The drawings to be submitted by the supplier to KPLC for approval before manufacture shall be in standard format clearly indicating the drawing number, parts list with material details and quantities, standard of manufacture, ratings, approval details and identity of the manufacturer (as per manufacturer's authorization submitted during tendering).*

C.3. Instruction should be provided for Inspection and tests which should be carried out after the current transformer has been installed and after all connections are completed. These instructions should include: -

a) A Schedule of Recommended site tests to establish correct operation
b) Procedures for carrying out any adjustment that may be necessary to obtain correct operation
c) Recommendations for any relevant measurements that should be made and recorded to help with future maintenance decisions.
d) Instructions for final inspection and putting the current transformer into service.

APPENDIX D: WARRANTY

D.1. The supplier/manufacturer warrants the purchaser that all goods supplied shall have no defect arising from design, materials or workmanship.

D.2. Supplier/manufacturer's warranty and guarantee: subject to 60 months from date of delivery to KPLC stores.

APPENDIX E: MANUFACTURER'S QUALIFICATION AND CAPACITY

E.1. The current transformers manufacturer shall have a minimum of 25 years' experience in the manufacture of 36 kV Current Transformer.

E.2. The current transformers on offer shall have been in service and given reliable service for a minimum period of 8 years in at least two (2) power utilities in at least three (3) of the following continents/regions:

a) Europe
b) North America
c) Africa
d) Asia or South America

E.3. The current transformers manufacturer shall provide references to support these requirements including export records with copy of contractual letters, current transformer details and date of sale/export, letter of satisfaction from power utilities shall also be provided with the bid.

E.4. Current transformers that have failed in service or mal-operated while in service on the Kenyan power system shall not be accepted.

APPENDIX F: 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, sales records for previous five years, four customer reference letters, details of suppliers' capacity and experience; 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 number	Item Description	KPLC Requirements	Bidder's offer
	Manufacturer's Name and address		State
	Country of Manufacture		State
	Name and model Number		State
	Manufacturer's Letter of Authorization		Provide
1.	Scope		State
2.	Normative References		State
3.	Definitions and Abbreviations		
3.1.	Abbreviations		State
4.	Requirements		
4.1.1	Site conditions	Altitudes of up to 2200m above sea level	State
		Humidity of up to 95%	
		Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +45°C	

Clause number	Item Description	KPLC Requirements	Bidder's offer
		Design pollution level to be taken as "Very Heavy" (Pollution level IV) for inland in accordance with IEC 60815	
		Isokeraunic level: 180 thunderstorm days per year	
4.1.2	System Requirements	overhead system that is generally of earthed construction and with the neutral point Solidly grounded	State
4.2	**Material, design and construction**		
4.2.1	Design Standard	IEC 61869-1 & 2	State
4.2.2	Materials used shall be new and of best quality		State
4.2.3	Design withstand capability with variations of load & voltage under working conditions and due to short circuits		State
4.2.4	Design to avoid pockets which water can collect		State
4.2.5	Current transformer type	Outdoor, oil insulated and hermetically sealed type	State
	Material of insulator portion	High-grade brown-glazed porcelain	State
4.2.6	Insulating oil requirements	Fill GTP as per KPLC specification – KPLC/3CB/008/001	Provide GTP
4.2.7	Provide a device for checking oil level		State
4.2.8	The current transformer is effectively sealed		State
4.2.9	Suitability for vertical installation on a steel structure		State
4.2.10	All parts & components to be resistance to atmospheric corrosion		State
4.2.11	Terminals present	Primary, secondary and earth terminals	State
4.2.12	Primary Terminal		
4.2.12.1	Primary terminal material		State
4.2.12.2	Primary terminal to have palm clamp connectors with U-Bolt suitable for stranded or tube terminations.		State
4.2.12.3	Clamp suitable for conductor overall diameter of 18.3mm to 25mm		Attach drawing
4.2.12.4	Clamp suitable for tube of overall diameter of 76.2mm		Attach drawing
4.2.13	Secondary Terminal		
4.2.13.1	Secondary terminals wired to terminal box & earthed		Attached drawing
4.2.13.2	Terminal box shall be weather-proof with cable plate at bottom		State compliance

Clause number	Item Description	KPLC Requirements	Bidder's offer
4.2.13.3	Terminal box shall be capable of accommodating all the secondary terminals & conductor size of 3.2mm diameter		State
4.2.13.4	Degree of protection	IP54	State
4.2.14	Marking	Primary and Secondary terminals shall be marked in accordance with IEC 61869-2	State
4.2.15	Earthing terminal		Provide
	Connection point symbol	the "earth symbol" as indicated by the symbol No. 5019 of IEC 60417	State
4.2.16	Top oil temperature rise	< 55°C	State
	Winding average temperature rise	< 65°C	State
4.2.17	Partial discharge	< 10pC	State
4.2.18	Current transformer id of sufficient mechanical strength		State
4.2.19	Ratio selection on the secondary side		State
4.2.20	Protection cores suitable for conventional overcurrent and for true transformation of the fully asymmetrical fault currents		State
4.2.21	The metering cores shall have high accuracy(low loss) and low saturation level suitable for conventional tarrif metering.		State
4.3	**Ratings**		
Table 1	Rated highest Voltage	36kV	State
	Minimum nominal specific creepage distance of insulator	31mm/kV	State
	Minimum creepage distance	1120mm	State
	Minimum arcing Distance	380mm	State
	Minimum lightning impulse withstand voltage	200 kV (peak)	State
	Minimum power frequency withstand voltage for primary terminals	95 kV(rms)	State
	Minimum power frequency withstand voltage for secondary terminals	3 kV(rms)	State
	Overload factor	1.2	State
	Type I		
	Rated Primary Current	1000A	State

Clause number	Item Description		KPLC Requirements	Bidder's offer
	Rated Secondary Current		1A	State
	Rated short circuit withstand		31.5 kA, 3 seconds	State
	Rated Dynamic Current		79kA	State
	CT Ratio		1000-800/1/1/1/1	State
	Accuracy Class and VA Burden	Core 1	Class 0.5, 15VA, ISF≤ 10, Rct @75°C ≤7.5 Ω at highest ratio	State
		Core 2	Class 5PR20, 15VA, Vk ≥ 450V at highest ratio	State
		Core 3	Class 5PR20, 15VA, Vk ≥ 450V at highest ratio	State
		Core 4	Class PX, Vk > 450V, Ik< 30mA	State
	Burden at all Ratios for stated CT characteristics			State
	Turns ratio and upper limit of secondary winding resistance (Rct), for Class PX core		Manufacturer to state	State
	Rated Temperature of Equipment		-5°C to +50°C	State
	Type II			
	Rated Primary Current		400A	State
	Rated Secondary Current		1A	State
	Rated short circuit withstand current and duration.		31.5 kA, 3 seconds	State
	Rated Dynamic Current		79kA	State
	CT Ratio		400-200/1/1/1/1	State
	Accuracy class and rated burden	Core 1	Class 0.5, 15VA, ISF≤ 10, Rct@75°C ≤7.5Ω at highest ratio	State
		Core 2	Class 5PR20, 15VA, Vk ≥ 450V at highest ratio	State
		Core 3	Class PX, V_k >450V, Ik< 30mA, Rct< 3 Ω@200/1A	State
		Core 4	Class PX, V_k > 450V, Ik< 30mA,Rct<3 Ω @200/1A	State
	Burden at all Ratios for stated CT characteristics			State
	Turns ratio and upper limit of secondary winding resistance (Rct), for Class PX core		Manufacturer to state	State
	Rated Temperature of Equipment		-5°C to +50°C	State
	Type III			
	Rated Primary Current		400A	State

Clause number	Item Description		KPLC Requirements	Bidder's offer
	Rated Secondary Current		1A	State
	Rated short circuit withstand current and duration.		31.5 kA, 3 seconds	State
	Rated Dynamic Current		79kA	State
	CT Ratio		400-200/1-1-1	State
	Accuracy class and rated burden	Core 1	Class 0.2,15VA, ISF≤ 10, Rct@75°C ≤7.5 Ω at highest ratio	
		Core 2	Class 5PR20,15VA, Vk ≥ 450V at highest ratio	State
		Core 3	Class PX, V_k > 450V, Ik<30mA, Rct<3 Ω	State
	Burden at all Ratios for stated CT characteristics			state
	Turns ratio and upper limit of secondary winding resistance (Rct), for Class PX core		Manufacturer to state	State
	Rated Temperature of Equipment		-5°C to +50°C	State
	Type IV			
	Rated Primary Current		100A	State
	Rated Secondary Current		1A	State
	Rated short circuit withstand current and duration.		31.5 kA, 3 seconds	State
	Rated Dynamic Current		79kA	State
	CT Ratio		100-50/1-1-1	State
	Accuracy class and rated burden	Core 1	Class 0.2, 15VA, ISF< 10, Rct@75°C ≤7.5 Ω at highest ratio	State
		Core 2	Class 0.5, 15VA, ISF< 10, Rct@75°C ≤7.5 Ω at highest ratio	State
		Core 3	Class 5PR20, 15VA, Vk ≥ 450V at highest ratio	State
	Burden at all Ratios for stated CT characteristics			State
	Rated Temperature of Equipment		-5°C to +50°C	State
5	**Test requirements**		As per IEC 61869-1 & 2	State
6	**Marking and Packing**			
6.1	Permanent rating plate			Attach drawing

Clause number	Item Description	KPLC Requirements	Bidder's offer
6.2	Terminal markings		Attach drawing
6.3	Packing		State
6.4	A set of 3 Installation and technical manuals		Provide
A	**Test and inspection**		
A.1	Responsibility of carrying out tests		State
A.2	Copies of Type Test Reports submitted with tender		Provide
A.3	Tests to be witnessed by KPLC Engineers at the factory		List
A.3	Test certificates to be submitted by supplier to KPLC for approval before supply/delivery		Provide
A.5	Inspection at the stores and replacement of rejected items		State
B	**Quality Management System**		
B.1	Quality Assurance Plan		Provide
B.2	Copy of ISO 9001:2015 Certificate		Provide
C	**Documentation**		
C.1	Documents submitted with tender		Provide
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture		Provide
C.3	Instruction for Inspection and tests after installation		Provide
D	**WARRANTY**		
D.1	The supplier/manufacturer warrants all goods supplied shall have no defect arising from design, materials or workmanship		State compliance
D.2	Supplier/manufacturer's warranty and guarantee: subject to 60 months from the date of commissioning		State compliance
E	**Manufacturer's Qualification and Capacity**		
E.1	Minimum manufacturing experience	25 years	Specify
E.2	Minimum number of years in at least 2 power utilities in at least three of the following regions: Europe, North America, Africa, Asia or South America	8 years	Specify

Clause number	Item Description	KPLC Requirements	Bidder's offer
E.3	References	Export records with copy of contractual letters, 36kV Current Transformer details and date of sale/export, letter of satisfaction from power utilities	Specify
E.4	Has the 36kV Current Transformer failed in service or mal-operated while in service on the Kenyan power system?		State
	Statement of compliance to specification (indicate deviations if any & supporting documents)		State compliance

.....

Manufacturer's Name, Signature, Stamp and Date

NOTES:

The Bidders should note that the above Technical schedules must be fully completed and submitted with the bid. Failure to Complete the schedules shall lead to rejection of the bid. Words like 'agreed', 'confirmed', compliant, 'As per KPLC specifications', etc. shall not be accepted and shall be considered non-responsive.