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Kenya Power

145KV CURRENT TRANSFORMERS - SPECIFICATION

A Document of the Kenya Power & Lighting Co. Plc
May 2021

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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.

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 0	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 requiremnts on table 3: • Minimum power frequency withstand for secondary terminals • Rated dynamic current x) Changed the overload factor requirement to 1.2 on table 1 xi) Changed the rated short circuit withstand current to 31.5kA on table 1. xii) Changed core 1 accuracy class to 0.2s	Nancy Wairimu	Dr. Eng. Peter Kimemia

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 145 kV Current Transformers.

The 145kV Current Transformers are intended for use with electrical measuring instruments and electrical protective devices.

The following specifications are in this series:

i. TSP/10/034-1: Specifiction for Transmission spares: Part 1: 145kV Current Transformers
ii. TSP/10/034-3: Transmission spares- Part 3: 145kV Current Transformers for Kamburu Substation- Specification

This Specification stipulates the minimum requirements for 145 kV 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 145 kV Current Transformers.

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

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

Name	Department
Eng. Paul Mwangi	Technical Services
Eng. Wachira Kahoro	Technical Services
Nancy Wairimu	Standards

1. SCOPE

1.1. This Specification is for newly manufactured 145kV Current Transformers for use with electrical measuring instruments and electrical protective devices for system highest voltage of 145 kV at power frequency of 50Hz.

1.2. The Specification covers general requirements, design, construction, technical parameters, inspection and tests, and schedule of Guaranteed Technical Particulars of 145kV 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 145kV 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 145kV 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 inbuilt in the current transformer 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 suitable for both stranded conductor and tube connection.

4.2.12.3. Conductor overall diameter shall be of between 18.3mm to 25mm and busbar tubes of 76.2mm diameter.

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 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 able to withstand Internal Arc of 31.5 kA for 0.3s in accordance with the requirements of IEC 61869-1

4.2.19. 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.

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

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

4.3. **RATINGS**

The ratings of the 145kV Current Transformers shall be as indicated in the tables below:

Table 1: Ratings

Description		Requirements	
Rated highest voltage and frequency		145kV, 50Hz	
Minimum nominal specific creepage distance of insulator		31mm/kV	
Minimum creepage distance		4495mm	
Minimum arcing Distance		1125mm	
Minimum lightning impulse withstand voltage		650 kV (peak)	
Minimum power frequency withstand voltage for primary terminals		275 kV(rms)	
Minimum power frequency withstand voltage for secondary terminals		3 kV(rms)	
Overload factor		1.2	
Rated short circuit withstand current and duration.		40kA, 3 seconds	
Rated Dynamic Current		100kA	
Type of CT		Type I	Type II
Rated Primary Current		1000A	1200A
Maximum continuous thermal current		1200A	1500A
Rated Secondary Current		1A	1A
CT Ratio	Core 1, 2 & 3	800-400/1-1-1-1	1200-800/1-1-1
	Core 4	1000/1	1000/1
Accuracy class and rated burden	Core 1	Class 5P30, 30VA Rct≤ 7.5Ω @75°C	Class 5P30, 30VA Rct @75°C ≤ 7.5Ω
	Core 2	Class 5P20, 30VA	Class PX, Vk=1800V, Rct≤ 7.5Ω @75°C
	Core 3	Class 0.5, 30VA	Class 0.5, 30VA Rct @75°C ≤ 7.5Ω

Description		Requirements	
	Core 4	Class PX, Vk=1800V, Rct≤ 7.5Ω @75°C	Class PX, Vk=1800V, Rct≤ 7.5Ω @75°C
Burden at all Ratios		Manufacturer to state	
Turns ratio, for Class PX core		Manufacturer to state	
Rated Temperature of Equipment		-5°C to +50°C	

5. TESTS REQUIREMENTS

The 145kV 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 145kV 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 145kV 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) Mechanical test;
l) Electromagnetic compatibility test;
m) 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 145 kV Current Transformers to be supplied shall be submitted to KPLC for approval before supply/delivery.

A.5 On receipt of the 145 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 145kV 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 145 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 145kV 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%	State
		Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +45°C	State
		Design pollution level to be taken as "Very Heavy" (Pollution level IV) for inland in accordance with IEC 60815	State
		Isokeraunic level: 180 thunderstorm days per year	State
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

Clause number	Item Description	KPLC Requirements	Bidder's offer
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		State
4.2.12.3	Clamp suitable for conductor overall diameter of 18.3mm to 25mm and tubes of 76.2mm diameter		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
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	Internal Arc withstand	31.5 kA, 0.5 s	State
4.2.19	Current transformer id of sufficient mechanical strength		State
4.2.20	Ratio selection on the secondary side		State
4.2.21	Protection cores suitable for conventional overcurrent and for true transformation of the fully asymmetrical fault currents		State

Clause number	Item Description		KPLC Requirements	Bidder's offer
4.3	**Ratings**			
Table 1	Rated highest voltage and frequency		145kV, 50Hz	State
	Minimum nominal specific creepage distance of insulator		31mm/kV	State
	Minimum creepage distance		4495 mm	State
	Minimum arcing Distance		1125 mm	State
	Minimum lightning impulse withstand voltage		650 kV (peak)	State
	Minimum power frequency withstand voltage for primary terminals		275 kV(rms)	State
	Minimum power frequency withstand voltage for secondary terminals		3 kV(rms)	State
	Overload factor		1.2	State
	Rated short circuit withstand		40kA, 3 seconds	State
	Rated Dynamic Current		100kA	State
	Type I			
	Rated Primary Current		1000A	State
	Rated Secondary Current		1A	State
	Maximum continuous thermal current		1200A	
	CT Ratio	Core 1, 2 & 3	800-400/1-1-1	State
		Core 4	1000/1	
	Accuracy Class and VA Burden	Core 1	Class 5P20, 30VA	State
		Core 2	Class 5P20, 30VA	State
		Core 3	Class 0.5, 30VA	State
		Core 4	Class PX, Vk=1800V, Rct≤ 7.5Ω @75°C	
	Type II			
	Rated Primary Current		1200A	State
	Maximum continuous thermal current		1500A	
	Rated Secondary Current		1A	State
	CT Ratio	Core 1, 2 & 3	1200-800/1-1-1	State
		Core 4	1000/1	
	Accuracy class and rated burden	Core 1	Class 5P30, 30VA Rct @75°C ≤ 6Ω	State
		Core 2	Class PX, Vk=1800V, Rct≤ 7.5Ω @75°C	State

Clause number	Item Description		KPLC Requirements	Bidder's offer
		Core 3	Class 0.5, 30VA Rct @75°C ≤ 6Ω	State
		Core 4	Class PX, Vk=1800V, Rct≤ 7.5Ω @75°C	
	Burden at all Ratios			Manufacturer to state
	Turns ratio, for Class PX core			Manufacturer to state
	Rated Temperature of Equipment			-5°C to +50°C
5	**Test requirements**		As per IEC 61869-1 & 2	State
6	**Marking and Packing**			
6.1	Permanent rating plate			Attach drawing
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 compliance
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		8 years	Specify

Clause number	Item Description	KPLC Requirements	Bidder's offer
	three of the following regions: Europe, North America, Africa, Asia or South America		
E.3	References	Export records with copy of contractual letters, 145kV Current Transformer details and date of sale/export, letter of satisfaction from power utilities	Specify
E.4	Has the 145kV 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

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Manufacturer's Name, Signature, Stamp and Date