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Kenya Power

36kV VACUUM CIRCUIT BREAKERS WITH GANGED THREE POLE OPERATING MECHANISM - SPECIFICATION

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

March 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

In order 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.

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0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 2, Rev 0	2021-03-16	Cancels and replaces all previous editions	Eng. J. Ndirangu	Dr. Eng. P. Kimemia

FOREWORD

This Specification has been prepared by the Standards Department and Technical Services Department of The Kenya Power and Lighting Company Plc (KPLC) and it lays down requirements for 36kV Vacuum Circuit Breakers with ganged three pole operating mechanism.

The 36kV Vacuum Circuit Breakers with Ganged three pole operating mechanism are intended for use in the network for switching power transformers, short and long distribution lines, underground cables and for fault current interruption.

Specification in this series are:

(i) KP1/6C/4/1/TSP/11/004-1: 145kV SF6 Circuit Breakers with single pole operating mechanism.

(ii) KP1/6C/4/1/TSP/11/012-1: 245kV SF6 Circuit Breakers with single pole operating mechanism.

(iii) KP1/6C/4/1/TSP/11/003: 72.5kV SF6 Circuit Breakers with ganged three pole operating mechanism.

This specification stipulates the minimum requirements for 36kV Vacuum Circuit Breakers with ganged three pole operating mechanism acceptable for use in the Company and it shall be the responsibility of the suppliers and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, good workmanship and good engineering practice in the manufacture of the 36kV Vacuum Circuit Breakers with Ganged three pole operating mechanism for KPLC.

Users of this KPLC specification are responsible for its correct interpretation and application.

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

Name	Department
Eng. Paul Mwangi	Technical Services
Eng. Kahoro Wachira	Technical Services
Eng. Julius Ndirangu	Standards

1. SCOPE

This specification covers the requirements, design, test methods, marking and packing of 36kV Vacuum Circuit Breakers with Ganged three pole operating mechanism complete with controls, support structures and ancillary equipment.

2. NORMATIVE REFERENCES

The following standards contain provisions 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 62271-100:	High Voltage Switchgear and Control gear - Part 100: High Voltage Alternating Current Circuit Breakers.
IEC 60376:	Specification of technical grade sulfur hexafluoride (SF6) for use in electrical equipment.
IEC/ISO 17025:	General requirements for the competence of testing and calibration laboratories.
ISO 1461:	Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods.
IEC 60529:	Degrees of protection provided by enclosures (IP Code).
IEC 62155:	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V.
BS1363:	13A plugs socket-outlets adaptors and connections units.
ISO 9001:2015	Quality management systems — Requirements

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 Electro Technical Commission

ISO – International Organization for Standardization.

ISO 9001: 2015 - Quality Management Systems - Requirements

4. REQUIREMENTS

4.1 SERVICE CONDITIONS

4.1.1 The 36kV Vacuum Circuit Breakers with Ganged three pole operating mechanism shall be suitable for continuous use outdoors in tropical areas with the following conditions:

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 +40°C

d. Pollution: Design pollution level to be taken as "Heavy" (Pollution level III) for inland and "Very Heavy" (Pollution level IV) for coastal applications.

e. Isokeraunic levels of up to 180 thunderstorm days per year.

4.1.2 The circuit breaker shall be installed in an effectively (solidly) earthed system.

4.2 DESIGN AND CONSTRUCTION

4.2.1 GENERAL

4.2.1.1 The 36kV Vacuum Circuit Breakers (VCB) with ganged three pole operating mechanism shall be of three pole mechanism type, ganged, out-door type, vacuum insulated and shall comply with the requirements of IEC 62271-100 and the requirements of this specification.

4.2.1.2 The circuit breaker shall be of live tank type.

4.2.1.3 The construction shall include a fixed contact, moving contact and arc shield mounted inside a vacuum chamber (vacuum interrupters). The movable member shall be connected to the control mechanism by stainless steel bellows (a stored energy operating mechanism), necessary electrical controls and interlock devices, disconnect devices to connect the circuit breaker to both primary and control power and an operator housing. This shall enable a permanent sealing of the vacuum chamber.

4.2.1.4 All the three poles shall be interconnected by a suitable shaft, linked to the operating mechanism so that the poles are operated simultaneously.

4.2.1.5 The circuit breaker shall be operated by local electrical and remote electrical controls from the circuit breaker mechanism box and the remote control panel respectively.

4.2.1.6 The circuit breaker shall use vacuum for electrical interrupting medium and insulation.

4.2.1.7 The circuit breaker shall have separate interrupters for each phase with a common drive mechanism actuating the interrupters.

4.2.1.8 Insulation creepage distance shall not be less than 31mm per kV of rated voltage between phases.

4.2.1.9 The circuit breaker shall be equipped with a trip counter operated by the circuit breaker mechanism.

4.2.1.10 The circuit breaker shall be provided with a trip coil and a closing coil.

4.2.1.11 The resistance of the circuit breaker primary circuit (contact resistance) shall not exceed the values specified in IEC 62271-100.

4.2.1.12 A galvanized steel support structure shall be supplied with the circuit breaker. All the bolts, nuts & fasteners for connecting the circuit breaker onto the support structure shall be provided. All ferrous parts shall be galvanized as per ISO 1461.

4.2.1.13 The circuit breaker shall be capable of 10000 mechanical operations.

4.2.1.14 One trip coil and one closing coil shall be supplied as mandatory spares for each circuit breaker, free of cost.

4.2.1.15 The frame of the circuit breaker shall be provided with a reliable earthing terminal having a clamping screw or bolt for connection to an earthing conductor suitable for specified fault conditions. The diameter of the clamping screw or bolt shall be at least 12 mm. The connecting point shall be marked with the "protective earth" symbol, as indicated by symbol No. 5019 of IEC 60417-1:2000. Parts of metallic enclosures connected to the earthing system may be considered as an earthing conductor.

4.2.1.16 One manual spring charging handle shall be supplied as an accessory for each circuit breaker free of cost.

4.2.1.17 VACUUM INTERRUPTER UNIT

4.2.1.17.1 The envelope vacuum shall be made of alumina or glass ceramic and must be capable of maintaining the vacuum over a long life of the interrupter at a pressure range from 10^{-7} to 10^{-5} torr. It shall offer mechanical support for the other components as well as electrical insulation when the contacts are in the open position.

4.2.1.17.2 End cups or plates and centre shell shall be made of stainless steel or monel. They shall provide support to other components and must match the thermal expansion of the envelope if a direct seal is made.

4.2.1.17.3 Stationary and movable rods shall be made of oxygen-free, high conductivity (OFHC) copper and shall form the main electrical contacts. One shall be fixed while the other moves to separate the contacts.

4.2.1.17.4 Metal vapour condensing shields shall be made from OFHC copper, nickel or stainless steel. They shall serve as a condensing surface for the metal vaporized arc. They shall be capable of preventing the metal from condensing on the insulating portion of the envelope.

4.2.1.17.5 Flexible metallic bellows shall be made of stainless steel or monel. Their design shall permit the motion to be transferred into the interrupter without a loss of vacuum.

4.2.2 OPERATING MECHANISM

4.2.2.1 The operating mechanism shall be suitable for mounting at the circuit breaker supporting structure, and below the circuit breaker in a weather-proof, dust-proof, vermin-proof and well ventilated housing. The degree of protection shall be at least IP 54 as per IEC 60529.

4.2.2.2 The operating mechanism shall open and close the circuit breaker within the specified opening and closing time of the circuit breaker and in any case, the opening times will be $\leq$ 50ms and the closing time will be $\leq$ 100ms, on average.

4.2.2.3 The operating mechanism shall after charging, carry out an Open-Close-Open (O-0.3s-CO) sequence with no external power supply to the operating mechanism.

4.2.2.4 The circuit breaker shall after a closing operation always be able to trip immediately without intentional time delay.

4.2.2.5 Operating mechanism shall be trip free during the entire closing sequence.

4.2.2.6 Operating mechanism shall be provided with motor wound spring actuated mechanism with provision for hand charge.

4.2.2.7 Motor operating voltage shall be 110 Volts d.c.

4.2.2.8 The operating mechanism shall be at ground potential, and shall house the secondary wiring for interface of the circuit breaker with the networks control and protection system.

4.2.2.9 A set of at least ten normally closed and ten normally open spare potential free contacts shall be provided for remote electrical indication as well as electrical interlocking and shall be wired to a terminal block in the housing.

4.2.2.10 A minimum of twenty (20) spare terminals shall be provided.

4.2.2.11 The circuit breaker shall be provided with local/remote selector switch. The selection of local operation shall inhibit the operation of the circuit breaker from any remote source. A spare contact for local selection and remote selection shall be provided on the switch for remote indications.

4.2.2.12 The circuit breaker shall be provided with a local switch for Open/Neutral/Close Operation. The Position for Open, Neutral and close positions shall be clearly indicated on the switch.

4.2.2.13 Mechanically operated indication to show the status of the circuit breaker position (open/close and springs charged/discharged) shall be provided. "ON" or "I", shall be used for CB closed status and "OFF" or "O" for CB open status.

4.2.2.14 The circuit breaker shall be provided with suitable terminals for connecting clamps for up to 3" outside diameter copper or aluminium tubes.

4.2.2.15 The circuit breaker shall be provided with means to prevent contact pumping while the closing circuit remains energized, should the circuit breaker either fail to latch or be tripped during closing due to operation of the protective relays.

4.2.2.16 An anti-condensation heater of adequate design and with suitable hygrostat and temperature controls shall be provided in the circuit breaker mechanism operating box, to prevent condensation. The anti-condensation heater shall be adequately rated and located in a position that ensure safety of personnel and effectiveness in keeping the whole cubicle dry to prevent condensation. It shall not cause deterioration in the wiring or in operation of the components.

4.2.2.17 A cable plate shall be provided at the bottom of the circuit breaker mechanism box. The cable plates shall be factory drilled, but blocked with removable stoppers to ensure integrity of IP degree of enclosure for the mechanism box and central control cabinet. The stoppers shall be easily knocked off at site. These shall be shown in the drawings for approval.

4.2.2.18 The circuit breaker mechanism box shall be fitted with suitable lifting lugs for ease of lifting and assembly of the circuit breaker.

4.2.2.19 The circuit breaker mechanism box shall be fitted with a 230±10%V AC socket outlet with three square terminals (Live, Neutral and Ground) as per BS 1363 standard. The 230±10%V AC Outlet will be controlled by an embedded ON/OFF switch.

4.2.2.20 All terminal blocks used inside the operating mechanism box shall as a minimum comply with IP20 degree on enclosure to ensure adequate personnel safety.

4.2.2.21 Wiring of the Mechanism Box shall be done in 2.5 mm^2 stranded and flexible copper conductors. All wiring connections to the terminal Block will be lugged and labelled using ferrules. The terminal Blocks with be indelibly marked with numbers.

4.2.2.22 All doors or shutters which give access to live parts shall be interlocked in such a way that these cannot be opened unless the circuit breaker is in the open position. Other interlocks shall be provided as deemed necessary for safety.

4.2.2.23 Painting of the circuit breaker mechanism box shall be such that the paint work shall not wear due to weather conditions and ultra violet radiation during the duration of service.

4.2.3 RATINGS

4.2.3.1 The guaranteed operating characteristics of the 36kV Vacuum Circuit Breakers with Ganged three pole operating mechanism shall be complied with during tests, with all the features stated in Table 1.

Table 1: Ratings for 36kV Vacuum Circuit Breakers.

Item	Parameters, Units	Value
1.	Rated Voltage, kV	36
2.	Frequency, Hz	50
3.	Normal Current, A	1250

4.	Rated short circuit current, kA	31.5
5.	Duration of short circuit, sec	3
6.	Rated short circuit making current, kA	63
7.	First pole to clear factor	1.5
8.	Operating sequence	0-0.3 sec – CO – 3 min - CO
9.	Auxiliary D.C Voltage for closing & tripping coils, Vdc (Specific pieces required for 110V DC and for 30V DC will be indicated in the Price Schedule in tender documents)	110 and 30
10	Auxiliary A.C Voltage and frequency V, Hz	400/230±10%, 50
11	Lightning Impulse withstand voltage, kV peak	170
12	One minute power frequency withstand voltage, kV r.m.s.	70
13	Creepage distance, mm	1116
14	Minimum clearance between phases, mm	460
15	Minimum clearance to earth, mm	400
16	Temperature Class of Circuit Breaker	-5°C to +50°C

5 TESTS REQUIREMENTS

The 36kV VCB with ganged three pole operating mechanism shall be inspected and tested in accordance with the requirements of IEC 62271-100 and this specification.

6 MARKING AND PACKING

6.1 MARKING

The nameplates of the circuit breaker and its operating devices shall be marked in accordance with clause 5.10 of IEC 62271-100 in English language. All markings shall be indelible and legible. Nameplate and their fixings shall be weatherproof and corrosion proof.

6.2 PACKING

6.2.1 36kV Vacuum circuit breakers with ganged three pole operating mechanism shall be packaged for outdoor storage in tropical conditions defined in clause 4.1

6.2.2 A set of five (5) original hard cover installation, operation and maintenance manuals for the circuit breakers shall be supplied with each complete breaker.

6.2.3 Recommendations for use, care, storage and routine inspection/testing procedures, all in English language shall be submitted.

6.3 MANUFACTURER'S EXPERIENCE AND CAPACITY

6.3.1 The circuit breaker manufacturer shall have a minimum of 25 years' experience in the manufacture of 36kV Vacuum Circuit Breakers with ganged three pole operating mechanism.

6.3.2 The circuit breaker 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:

i) Europe
ii) North America
iii) Africa
iv) Asia or South America

The manufacturer shall provide references to support requirements of this including export records with copy of contractual letters, circuit breaker details and date of sale/export, letter of satisfaction from power utilities.

6.3.3 Circuit breakers brands that have failed in service or mal-operated while in service on the Kenyan power system shall not be accepted.

6.3.4 The warranty for the offered circuit breaker shall be 5 years from the date of circuit breaker delivery to KPLC store

APPENDICES

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 for 36kV Vacuum Circuit Breakers with Ganged three pole operating mechanism issued by a third party testing laboratory that is accredited to ISO/IEC 17025 and shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate for the testing laboratory 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 include the following tests in accordance with IEC 62271-100:

a. Dielectric tests
b. Radio interference voltage tests
c. Measurement of the resistance of the main circuit
d. Temperature-rise tests
e. Short-time withstand current and peak withstand current tests
f. Tightness tests
g. EMC tests
h. Mechanical operation test at ambient temperature
i. Short-circuit current making and breaking tests
j. Capacitive current switching tests: line-charging current breaking tests
k. Verification of degree of protection
l. Humidity test

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

A.3 Routine and sample test reports for the 36kV vacuum circuit breakers with ganged three pole operating mechanism to be supplied shall be submitted to KPLC before delivery. KPLC Engineers will witness tests at the factory before delivery. Tests to be witnessed by KPLC Engineers at the factory before delivery shall be in accordance with IEC 62271-100 and this specification and shall include the following:

a) Dielectric test on main circuit
b) Dielectric test on auxiliary and control circuits
c) Measurement of the resistance of the main circuit
d) Tightness test
e) Design and visual checks
f) Mechanical operating tests

A.4 Training on installation and maintenance: The manufacturer shall conduct virtual training on installation, testing and maintenance of the circuit breaker to Ten (10) Kenya Power Engineers and Technicians. Maintenance shall cover both the operating mechanism and the interruption chamber.

A.5 On receipt of the 36kV Vacuum Circuit Breakers with ganged three pole operating mechanism, 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 36kV Vacuum Circuit Breakers with Ganged three pole operating mechanism which upon examination, test or use fail to meet any or all of the requirements in the specification.

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 Vacuum Circuit Breakers with Ganged three pole operating mechanism 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.

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) References letters to support requirements of clause 6.3.2 including export records with copy of contractual letters, circuit breaker details and date of sale/export, letter of satisfaction from power utilities

d) Details of manufacturing capacity;

e) Copies of required type test reports by a third party testing laboratory accredited to ISO/IEC 17025.

f) Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;

g) Contacts and address of third party testing laboratory;

h) Manufacturers letter of authorization, ISO 9001 certificate and other technical documents required in the tender.

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

a) Fully filled clause by clause guaranteed technical particulars (GTP) stamped and signed by the manufacturer (these are not the ones submitted with the tender) ;
b) Detailed design drawings to be used for manufacture of the 36kV Vacuum Circuit Breakers with Ganged three pole operating mechanism 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;
d) Marking details and method to be used in marking the 36kV Vacuum Circuit Breakers with ganged three pole operating mechanism.
e) Packaging details including packaging materials.

C.3 Statement of compliance to specification (indicate deviations if any provide supporting documents)

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).*

D: 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	KPLC Requirements	Bidder's offer
Manufacturer's Name and address		Specify
Country of Manufacture		Specify
Name and model Number		Specify
1.	Scope	State
2.	Normative References	State
3.	Definitions and Abbreviations	
3.1.	Abbreviations	State
4.	**Requirements**	
4.1.1	Service conditions	State
4.1.2	Circuit Breaker shall be installed in an effectively(Solidly) earthed system	State
4.2	**Design and Construction**	
4.2.1	General	
4.2.1.1	With three pole mechanism type, ganged, out-door type, Vacuum gas insulated	State
	Comply with IEC 62271-100 and KPLC specification	State
4.2.1.2	Circuit breakers shall be of live tank type	State
4.2.1.3	The construction shall include a fixed contact, moving contact and arc shield mounted inside a vacuum chamber - vacuum interrupters	State
	The movable member shall be connected to the control mechanism by stainless steel bellows - a stored energy operating mechanism, necessary electrical controls and interlock devices, disconnect devices to connect the circuit breaker to both primary and control power and an operator housing	State

Clause number	KPLC Requirements	Bidder's offer
4.2.1.4	All the three poles shall be interconnected by a suitable shaft, linked to the operating mechanism so that the poles are operated simultaneously	State
4.2.1.5	The circuit breaker shall be operated by local electrical and remote electrical controls from the circuit breaker mechanism box and the remote control panel respectively.	State
4.2.1.6	The circuit breaker shall use vacuum for electrical interrupting medium and insulation.	State
4.2.1.7	Circuit breaker shall have separate interrupters for each phase with a common drive mechanism actuating the interrupters.	State
4.2.1.8	Insulation creepage distance	State
4.2.1.9	Circuit breaker shall be equipped with a trip counter operated by the circuit breaker mechanism.	State
4.2.1.10	The circuit breaker shall be provided with a trip coil and a closing coil.	State
4.2.1.11	The resistance of the Circuit Breaker Primary Circuit (contact resistance) shall not exceed the values specified in IEC 62271-100.	State
4.2.1.12	A galvanized steel support structure shall be supplied with the circuit breaker. All the bolts, nuts & fasteners for connecting the circuit breaker onto the support structure shall be provided	State
	All ferrous parts shall be galvanized as per ISO 1461.	State
4.2.1.13	Circuit breaker shall be capable of 10000 mechanical operations	State
4.2.1.14	One trip coil and one closing coil shall be supplied as mandatory spares for each circuit breaker free of cost.	State
4.2.1.15	The frame of the circuit breaker shall be provided with a reliable earthing terminal having a clamping screw or bolt for connection to an earthing conductor suitable for specified fault conditions. The diameter of the clamping screw or bolt shall be at least 12 mm	State
	The connecting point shall be marked with the "protective earth" symbol, as indicated by symbol No. 5019 of IEC 60417-1:2000	State
4.2.1.16	One manual spring charging handle shall be supplied as an accessory for each circuit breaker free of cost.	provide
4.2.1.17	VACUUM INTERRUPTER UNIT	
4.2.1.17.1	Envelope vacuum shall be made of alumina or glass ceramic and must be capable of maintaining the vacuum over a long life of the interrupter at a pressure range from 10^{-7} to 10^{-5} torr.	State
	It shall offer mechanical support for the other components as well as electrical insulation when the contacts are in the open position	State

Clause number	KPLC Requirements	Bidder's offer
4.2.1.17.2	End cups or plates and centre shell shall be made of stainless steel or monel	State
	They shall provide support to other components and must match the thermal expansion of the envelope if a direct seal is made.	State
4.2.1.17.3	Stationary and movable rods shall be made of oxygen-free, high conductivity (OFHC) copper and shall form the main electrical contacts	State
	One shall be fixed while the other moves to separate the contacts	State
4.2.1.17.4	Metal vapour condensing shields shall be made from (OFHC) copper, nickel or stainless steel.	State
	They shall serve as a condensing surface for the metal vaporized arc and shall be capable of preventing the metal from condensing on the insulating portion of the envelope	State
4.2.1.17.5	Flexible metallic bellows shall be made of stainless steel or monel.	State
	Their design shall permit the motion to be transferred into the interrupter without a loss of vacuum	State
	Insulation creepage distance	State
4.2.2	OPERATING MECHANISM	State
4.2.2.1	Operating mechanism shall be suitable for mounting at the circuit breaker supporting structure, and below the circuit breaker in a weather-proof, dust-proof, vermin-proof and well ventilated housing.	State
	The degree of protection shall be at least IP 54 as per IEC 60529	State
4.2.2.2	Operating mechanism shall open and close the circuit breaker within the specified opening and closing time of the circuit breaker and in any case, the opening times will be ≤ 50ms and the closing time will be ≤ 100ms, on average	State
4.2.2.3	The operating mechanism shall after charging, carry out an Open-Close-Open (O-0.3s-CO) sequence with no external power supply to the operating mechanism	State
4.2.2.4	The circuit breaker shall after a closing operation always be able to trip immediately without intentional time delay	State
4.2.2.5	Operating mechanism shall be trip free during the entire closing sequence	State
4.2.2.6	Operating mechanism shall be provided with motor wound spring actuated mechanism with provision for hand charge	State
4.2.2.7	Motor operating voltage shall be 110 Volts d.c.	State

Clause number	KPLC Requirements	Bidder's offer
4.2.2.8	Operating mechanism shall be at ground potential, and shall house the secondary wiring for interface of the circuit breaker with the networks control and protection system	State
4.2.2.9	A set of at least ten normally closed and ten normally open spare potential free contacts shall be provided for remote electrical indication as well as electrical interlocking and shall be wired to a terminal block in the housing	State
4.2.2.10	A minimum of twenty (20) spare terminals shall be provided	State
4.2.2.11	The circuit breaker shall be provided with local/remote selector switch	State
	The selection of local operation shall inhibit the operation of the circuit breaker from any remote source	State
	A spare contact for local selection and remote selection shall be provided on the switch for remote indications.	State
	The circuit breaker shall be provided with a local switch for Open/Neutral/Close Operation. The Position for Open, Neutral and close positions shall be clearly indicated on the switch	State
4.2.2.13	Mechanically operated indication to show the status of the circuit breaker position (open/close and springs charged/discharged) shall be provided	State
	"ON" or "I", shall be used for CB closed status and "OFF" or "O" for CB open status.	State
4.2.2.14	The circuit breaker shall be provided with suitable terminals for connecting clamps for up to 3" outside diameter copper or aluminium tubes	Provide
4.2.2.15	Circuit breaker shall be provided with means to prevent contact pumping while the closing circuit remains energized, should the circuit breaker either fail to latch or be tripped during closing due to operation of the protective relays	Provide
4.2.2.16	An anti-condensation heater of adequate design and with suitable hygrostat and temperature controls shall be provided in the circuit breaker mechanism operating box, to prevent condensation	Provide
	The anti-condensation heater shall be adequately rated and located in a position that ensure safety of personnel and effectiveness in keeping the whole cubicle dry to prevent condensation	State
	It shall not cause deterioration in the wiring or in operation of the components	State
4.2.2.17	Cable plate shall be provided at the bottom of the circuit breaker mechanism box. The cable plates shall be factory drilled, but blocked	Provide

Clause number	KPLC Requirements	Bidder's offer
	with removable stoppers to ensure integrity of IP degree of enclosure for the mechanism box and central control cabinet	
	The stoppers shall be easily knocked off at site	State
4.2.2.18	Circuit breaker mechanism box shall be fitted with suitable lifting lugs for ease of lifting and assembly of the circuit breaker	State
4.2.2.19	Circuit breaker mechanism box shall be fitted with a 230±10%V AC socket outlet with three square terminals (Live, Neutral & Ground) as per BS 1363 standard.	State
	The 230+10%V AC Outlet will be controlled by an embedded ON/OFF switch.	State
4.2.2.20	All terminal blocks used inside the operating mechanism box shall as a minimum comply with IP20 degree on enclosure to ensure adequate personnel safety	State
4.2.2.21	Wiring of the Mechanism Box shall be done in 2.5 mm2 stranded and flexible copper conductors	State
	All wiring connections to the terminal Block will be lugged and labelled using ferrules.	State
	The terminal Blocks with be indelibly marked with numbers	State
4.2.2.22	All doors or shutters which give access to live parts shall be interlocked in such a way that these cannot be opened unless the circuit breaker is in the open position	State
	Other interlocks shall be provided as deemed necessary for safety	State
4.2.2.23	Painting of the circuit breaker mechanism box shall be such that the paint work shall not wear due to weather conditions and ultra violet radiation during the duration of service	State
4.2.3	RATINGS	
4.2.3.1	Rated Voltage, kV	State
	Frequency, Hz	State
	Normal Current, A	State
	Rated short circuit current, kA	State
	Duration of short circuit	State
	Rated short circuit making current	State
	First pole to clear factor	State
	Operating sequence	State
	Auxiliary D.C Voltage for closing & tripping coils	State
	Auxiliary A.C Voltage	State
	Lightning Impulse withstand voltage, kV peak	State
	One minute power frequency withstand voltage, kV r.m.s.	State
	Creepage distance	State

Clause number	KPLC Requirements	Bidder's offer
	Minimum clearance between phases	State
	Minimum clearance to earth	State
	Temperature Class of Circuit Breaker	State
5	**Test Requirements**	
	Test standard	State
6	**Marking and Packing**	
6.1	Details marked indelibly and legibly on nameplate	specify
	Nameplate and their fixings shall be weatherproof and corrosion proof.	State
6.2	**Packing**	
6.2.1	Shall be packaged for outdoor storage in tropical conditions defined in clause 4.1	State
6.2.2	Set of five (5) Original Hard Cover Installation, Operation and Maintenance Manuals for the circuit breakers shall be supplied with each complete breaker.	Provide
6.2.3	Recommendations for use, care, storage and routine inspection/testing procedures, all in English language shall be submitted.	submit
6.3	MANUFACTURER'S EXPERIENCE AND CAPACITY	
6.3.1	Minimum of 25 years' experience in the manufacture of 36kV Vacuum Circuit Breakers with ganged three pole operating mechanism	State
6.3.2	Circuit breaker on offer 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: i) Europe ii) North America iii) Africa iv) Asia or South America	Attach references
6.3.3	Circuit breakers failed in service or mal-operated while in service on the Kenyan power system	State
6.3.4	5 years warranty	State
A	**Tests and Inspection**	
A.1	Responsibility of the supplier to test or to have all the relevant tests performed	State
A.2	Copies of type test reports submitted for evaluation	list
A.3	Tests to be witnessed by KPLC Engineers at the factory	list
A.4	Manufacturer shall conduct Virtual Training on Installation, Testing and Maintenance of the Circuit Breaker to Ten (10) Kenya Power	State

Clause number	KPLC Requirements	Bidder's offer
	Engineers & Technicians. Maintenance shall cover both the operating mechanism and the interruption chamber.	
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 for evaluation	List
C.2	Documents submitted for approval before manufacture	List
C.3	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

NOTE:

1) Bidders shall give full details of the item(s) on offer as per the specification and applicable standards. The details provided shall conform to the test reports and their certificates, as well as labeled drawings complete with dimensions, catalogues and/or brochures for the purpose of tender evaluation.

2) Bidders should note that the above Guaranteed Technical Particulars Schedules must be fully completed and submitted with the bid. Wherever there is conflict between the GTPs and the clauses in the specification, the clauses in the specification take precedence. Failure to complete the schedules shall lead to rejection of the bid.

3) Guaranteed values shall be specified.

** Words like 'agreed', 'confirmed', 'As per KPLC specifications', Yes, etc. shall not be accepted and shall be considered non-responsive.*

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Manufacturer's Name, Signature, Stamp and Date