DOCUMENT NO.:

Kenya Power

SPECIFICATION FOR CENTRIFUGAL OIL WATER SEPARATOR SYSTEM

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

TABLE OF CONTENTS

KENYA POWER LIGHTING CO. LTD. 01 JAN 2... ISIOLO ROAD NO...

0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	In Charge, E/Plant Workshop
2	

0.2 AMENDMENT RECORD

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FOREWORD

This specification has been prepared by the E/plant workshop of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for centrifugal transformer oil water separator system. The centrifugal transformer oil water separator system.is intended for use by the e/plant workshop for pre- treating dirty transformer oil before regeneration. This specification was prepared to establish and promote uniform requirements for centrifugal transformer oil water separator system to be used at Kenya Power and Lighting Company Ltd. There are no other specifications in this series. This specification stipulates the minimum requirements for centrifugal transformer oil water separator system 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 centrifugal transformer oil water separator system for KPLC.

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

1. SCOPE

1.1. This specification is for centrifugal transformer oil water separator system for use by company's E/plant workshop.

1.2. The specification covers requirements, inspection and tests, schedule of Guaranteed Technical Particulars, marking and packaging of centrifugal transformer oil water separator system.

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 61557: Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c - Equipment for testing, measuring or monitoring of protective measures - Part 1: General requirements;

IEC 60815: Selection and dimensioning of high voltage insulators intended for use in polluted conditions –Part 1: Definitions, information and general principles

OIML D 11: General Requirements for Measuring Instruments - Environmental Conditions

IEC 61000: Electromagnetic Compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test; – Part 6-2: Generic standards – Immunity for Industrial environment.

IEC 60529: Degrees of protection provided by enclosures (IP code)

ISO 9001: Quality Management systems – Requirements

ISO/IEC 17025: General Requirements for the competence of testing and calibration laboratories

3. DEFINITIONS AND ABBREVIATIONS

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

3.1. ABBREVIATIONS

KPLC- Kenya Power and Lighting Company Limited

ISO – International Organization for Standardization.

LED –Light Emitting Diode

Kg –Kilogram

KV - Kilovolt

IP – Ingress Protection

LV – Low Voltage

EMC – Electromagnetic Compatibility

EU – European Union

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 The centrifugal transformer oil water separator system shall be suitable for use outdoors/indoors 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 +50°C

d) Pollution: Degree 2

4.2. DESIGN, CONSTRUCTION AND OPERATION

4.2.1. Design

4.2.1.1. The centrifugal transformer oil water separator system shall be rated for continuous operation, designed, manufactured and tested according to IS 6034.

4.2.1.2. The centrifugal transformer oil water separator system shall be capable of doing the following functions:

a) Suck and filter dirty transformer oil from a holding tank to a preheating tank.

b) Separate water and sludge from transformer oil

c) Discharge processed oil to a holding tank for further treatment.

d) Discharge water and sludge to a holding tank for disposal.

4.2.1.3. The plant shall be capable of processing the oil on single pass basis at rated flow.

4.2.1.4. The plant shall be suitable for operation on 50Hz, 3 phase system with neutral solidly grounded, the 3 phase voltage supply shall be 415 V $\pm$ 10%. The plant shall be of latest design, sturdy in construction and requiring minimum maintenance.

4.2.2. Construction

4.2.2.1. The Plant shall be suitable for outdoor/indoor use. All components including control panel shall have outdoor weather protected enclosures of sheet metal. The casing shall be provided with large doors for easy access to the various components

4.2.2.2. Locking of the casing doors where applicable shall be provided with latching from inside wherever possible. Good locking arrangement for main entry door and on the doors wherever inside latching is not possible shall also be provided.

4.2.2.3. All bought out components shall be of reputed makes. Manufacturer's test reports for pumps and motors will be supplied.

4.2.2.4. Oil-bearing lines and piped items shall be seamless steel pipes.

4.2.2.5. Water-bearing lines shall be made of stainless steel and valves of brass, cast stainless steel or equal.

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4.2.2.6. Air –bearing lines shall be made of oil resistant flexible rubber hoses with nitrile and valves made of aluminium, brass or equal.

4.2.2.7. One sampling valve in the outlet pipe after filter process shall be provided

4.2.2.8. Flow meter with totalizer in the inlet and outlet pipes after filter process shall be provided.

4.2.2.9. One moisture sensor in the outlet pipe shall be provided

4.2.2.10. A valve for draining water shall be provided.

4.2.2.11. The centrifugal transformer oil water separator frame shall be of grey cast iron construction. The hood made of silumin and main bowl parts made of stainless steel. Internal and external surface including oil heater, filter vessel, and structural steel work to be painted and shall be shot or sand blasted to remove all rust and scale of foreign adhering matter or grease. All steel surface in contact with insulating oil shall be painted with two coats of heat resistant oil insoluble, insulating vanish/paint

4.2.2.12. All internal painted steel surface shall be given a primary coat for zinc chromate second coat of oil and weather resistant varnish of a colour distinct from primary and final two coats of glossy oil and weather resisting paint

4.2.2.13. All paints shall be carefully selected to withstand heat and extremes of weather. The paint shall not scale off or crinkle or be remove by abrasion due to normal handling

4.2.2.14. The machine external overall dimensions shall not exceed L-1500mm,width 1000mm,H-1500mm

4.2.2.15. The gross weight of the centrifugal transformer oil water separator shall not exceed 3500Kg

4.2.2.16. Lifting Hooks for Plant shall be provided to facilitate ease of Plant Loading / Unloading

4.2.2.17. Schematic diagram for centrifugal transformer oil water separator system shall be offered indicating all arrangements and Flow diagram of oil separator plant, pumps, valves, measurement devices and heating chamber shall be submitted with tender, clearly

detailing important dimensions, any special features of the offered design, components, accessories and fittings.

4.2.2.18. Complete list of components, instruments and accessories offered with their make and accompanied with catalogue/brochure/pamphlets/literature/write-ups shall be submitted with the tender.

4.2.3. Operation

4.2.3.1. Operation sequence and dangers sign plates shall also be provided

4.2.3.2. Oil shall be taken in through inlet valve

4.2.3.3. This oil shall be filtered through a strainer to remove major portion of coarse dirt and pumped to the oil water separator.

4.2.3.4. Dehydrated oil from the separator shall be pumped to filtered oil holding tank and the sludge and water to the sludge-holding tank.

4.3. TECHNICAL PARTICULARS

4.3.1. OIL PUMP (INLET PUMP AND OIL FEED PUMP)

4.3.1.1. The pumps shall be single stage positive displacement gear type with a feed pressure of 0 to 1 bar.

4.3.1.2. The pump motor shall have insulation class-F with IP-55 protection.

4.3.1.3. Suitable mechanical seals shall be provided to ensure vacuum tightness.

4.3.1.4. Suction lift of the pump shall be at least 5 meters of transformer oil at atmospheric pressure and temperature.

4.3.1.5. The pumps shall be provided with an interlock with delay such that if there is no oil flow for 30 sec. the pump shall trip automatically.

4.3.1.6. The following oil inlet pump details shall be provided

a) Pump Make
b) Pump Type
c) Pump Capacity
d) Motor make and type
e) Motor Rating

f) Motor type of starter

4.3.2. MAGNETIC STRAINER

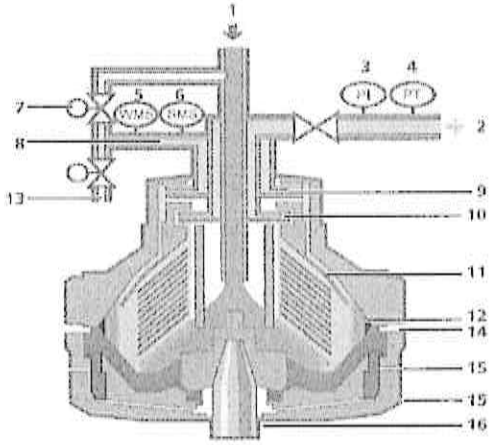
4.3.2.1. The plant shall be provided with a suitable magnetic strainer with wire mesh to filter all particles of sizes above 0.5 mm and all magnetic particles.

4.3.2.2. The strainer shall be installed at the suction of the oil pump described at 4.3.1

4.3.3 CENTRIFUGAL SEPARATOR.

4.3.3.1 The separators shall be equipped with a self-cleaning disc type bowl.

4.3.3.2 The separator shall be equipped with the parts indicated in the diagram.



1 Dirty oil feed/displacement water feed
2 Clean oil discharge
3 Pressure gauge
4 Pressure transmitter
5 WMS sensor
6 SMS sensor
7 Solenoid valve (circulation)
8 Sensing liquid line
9 Centripetal pump, sensing liquid
10 Centripetal pump, clean oil
11 Separating disc
12 Sludge holding space
13 Dirty water discharge
14 Sludge discharge
15 Operating water discharge
16 Operating water feed

4.3.3.3 Dirty oil shall be conveyed to the centrifuge by means of a pump.

4.3.3.4 The pump motor shall be insulation class-F with IP55 protection.

4.3.3.5 The clean oil shall be discharged under pressure by means of a centripetal pump.

4.3.4 OIL DISCHARGE PUMP

4.3.4.1 Suitable pumping system shall be provided for extracting oil from the holding tank.

4.3.4.2 The pump shall be either glandless centrifugal type with canned motors or a combination of gear pump and centrifugal pump with mechanical seals suitable for extracting oil..

4.3.4.3 The discharge pump shall be able to deliver the oil at its rated capacity (2000LPH or more) with adequate head of 15 meters of water column

4.3.4.4 The oil discharge pump shall be located at a suitable level.

4.3.4.5 The pump shall be supplied with double check valve assembly and solenoid operated non-return valve.

4.3.4.6 In order to stop reverse flow of oil in case of power failure, the pumping system shall preferably be self-priming type alternatively priming device with safety interlock to protect pump against dry running shall be provided.

4.3.4.7 Interlock logic arrangement shall be provided between low-level float switch (located in the holding tank) and discharge pump to prevent dry running.

4.3.4.8 Sampling valves shall be provided at the discharge of extraction pump for testing of oil properties

4.3.4.9 Re-circulation line with valves shall be provided to re -circulate a part of the purified oil to the inlet point if necessary during operation

4.3.4.10 The pump motor shall have insulation class-F with IP-55 protection

4.3.5 HEATING CHAMBER

4.3.5.1 The oil heater vessel shall be of mild steel welded construction and insulated with glass/mineral wool.

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4.3.5.2 The heating elements shall be divided into balanced banks among the phases, each individually controlled by a separate thermostat. For the required oil temperature.

4.3.5.3 Heater shall be capable of heating oil up to 70°C.

4.3.5.4 Heaters shall be interlocked with inlet pump and shall not be in "ON position" unless the inlet pump is working.

4.3.5.5 The heater shall be easily removed for inspection and replacement.

4.3.5.6 Each Modular type electric heaters shall be provided operating voltage of 415V/250V, with low watt density and are suitable to 50 Hz.

4.3.5.7 Selector switch shall be provided for full load operation of heaters depending upon the desirable temperature of oil.

4.3.5.8 A drain point shall be provided for the heater chamber.

4.3.6 CONTROL UNIT

4.3.6.1 The plant shall be designed both for Automatic/semi-automatic PLC based operation modes.

4.3.6.2 A centralized electrical panel with auxiliary step down transformer, contactors, back up protection fuses, indicating lamps etc. to be provided with following minimum audio and visual alarms:

4.3.6.3 All controls and annunciation equipment shall be suitable for 240 V AC

4.3.6.4 Suitable interlock as described against each equipment shall be provided for safe and trouble free operation.

4.3.6.5 All instrument control hardware and alarms shall be mounted on a suitable control panel.

4.3.6.6 Mimic diagram with indication lamps showing on off status of various equipment shall be provided on the control panel.

4.3.7 HOSES FOR TRANSFORMER OIL.

4.3.7.1 Separate reinforced rubber hoses shall be provided for each operation of oil suction and Oil discharge.

4.3.7.2 4 pieces of Oil hose of nitrile rubber reinforced with amour 1.5 inch internal diameter. Each piece shall be 10 meters long and shall be with leakage-proof, quick connect couplers for connection to installations under operation.

4.3.7.3 Hosepipes for oil service shall be suitable for transformer oil applicable up to temperature of 100°C. full vacuum and pressure up to 2.5 kg/cm^2 or 245.2kPa.

4.3.7.4 Suitable mobile hose racks shall be provided to accommodate the hoses. All pipes fittings and hoses shall be properly labelled and distinctively marked

4.3.8 PORTABLE OIL SAMPLING KIT.

4.3.8.1 Suitable oil sampling kit shall be provided consisting of:

i. A set of brass outside threaded nipples to be used with a syringe to extract oil for testing (samples to be seen at Isiolo rd. workshop).
ii. A set of Chrome plated brass ball valves.
iii. 2 meters 5mm clear silicon tubing.
iv. 5 clear glass 100mm sampling syringes with adaptor valves
v. A robust transport case

4.3.9 ELECTRICAL SYSTEM

4.3.9.1 The plant shall receive 415v, 3-phase, 50Hz, 4 wire power supply through flexible cable in the cable in the distribution panel location on the plant. The incoming of the distribution panel shall be switch fuse unit.

4.3.9.2 Provision for earthing the plant at the operating locations with earthing terminals for safety shall be provided.

4.3.10 INSTALLATION AND COMMISSIONING

4.3.10.1 Installation and Commissioning of the Plant shall be carried out by the bidder and shall include the following;

a. Placement of all components in their position.
b. Carrying out of electrical wiring between components & electrical switch panel.

4.3.10.2 Material handling equipment's like crane, chain pulley etc. for loading and unloading of equipment's at the time of installation and commissioning shall be provided by the tenderer

4.3.10.3 Consumable material i.e. oxygen, acetylene gas, cutting set, welding rods, welding machines, Grinder, hardware. Tools & tackles like spanner set, pipe range, screw jack etc. during installation of equipment at site

4.4 DRAWINGS, DOCUMENTATION AND SUPPORT

4.4.3 Warranty and training

4.4.3.1 The centrifugal transformer oil water separator system shall be backed by a minimum of 12-months factory warranty.

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

4.4.3.3 In the case of tender award, technical details for the centrifugal transformer oil water separator shall be submitted to the Kenya Power for approval before manufacture commences. The tenderer shall submit all the drawings as following

a) Schematic drawings of the plant with all piping systems, control systems and instrumentation with reference of the relevant international standards followed for the design and construction of the plant and its components/material

b) General arrangement plan, section of main and sub-assemblies, with dimensions of the plant and the size of each and every part of the equipment to be supplied under this specification

c) Complete list of accessories and auxiliaries with their make and accompanied with catalogue/pamphlets/literature/write-ups

5 MARKING, LABELLING AND PACKING

5.3 MARKING

5.3.3 The following information shall be marked legibly and in a permanent manner on the centrifugal transformer oil water separator :

a) The manufacturer's name or trade mark;

b) Type, model and serial number;

c) Nominal input voltage and Frequency

d) Individual loads ratings e.g Pumps, motors and heaters

e) Total Power (kW) Consumption

f) Flow diagram from inlet to outlet connection

g) Letters "PROPERTY OF KENYA POWER"

h) The instructions for handling and use (in the English Language).

5.4 PACKING

5.4.3 The centrifugal transformer oil water separator shall be packed in a carrying case so as to protect it from damage during transportation, handling and storage.

APPENDICIES

A: TESTS AND INSPECTION (Normative)

A.1 The centrifugal transformer oil water separator system shall be inspected and tested in accordance with the requirements of this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.

A.2 centrifugal transformer oil water separator system shall be subject to acceptance tests. Acceptance tests shall be witnessed by Three Engineers appointed by KPLC and shall include the following

a) General construction inspection i.e. visual, dimensional and material
b) Operational test of the plant
c) Test for Breakdown voltage, moisture and gas content of oil (before & after purification).
d) Plant capacity test for flow rate
e) Test for electrical check i.e. Insulation Resistance and High Voltage test of Control panel
f) Tests certificates for suction & discharge heads of pumps shall be supplied
g) Tests for checking correctness of all circuits, interlocks and sequence of operation.
h) Control Panel check
i) Any other test which is required to ensure satisfactory operation of the plant shall be performed by the supplier free of cost.

A.3 On receipt of the centrifugal transformer oil water separator , Kenya Power will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, any centrifugal transformer oil water separator system 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 centrifugal transformer oil water separator system physical properties, tests and documentation, will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil 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 AND DEMONSTRATION (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 by the manufacturer;
b) Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, Flow/Schematic Diagram and technical data;
c) Details of manufacturing capacity and the manufacturer's experience;
d) Manufacturer's warranty and guarantee; subject to 12 months from date of delivery to KPLC stores
e) Operational manual.
f) Service manual.

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) Drawings of the centrifugal transformer oil water separator system to be manufactured for KPLC.

c) Schematic drawings of the plant with all piping systems, control systems and instrumentation with reference of the relevant international standards followed for the design and construction of the plant and its components/material

d) General arrangement plan, section of main and sub-assembles, with detailed dimensions of the pants and the size of each and every part of the equipment to be supplied under this specification

e) Complete list of accessories and auxiliaries with their make and accompanied with catalogue/pamphlets/literature/write-ups

f) Product manuals, operation manuals and brochures,

g) Quality assurance plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001.

h) All documentation necessary for safety of the plant.

i) Packaging details (including packaging materials).

C.3. The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the centrifugal transformer oil water separator system to KPLC.

C.4. The successful bidder shall demonstrate to KPLC Staff (in Nairobi) the operation of the centrifugal transformer oil water separator system.

D: ACCESSORIES (MANDATORY)

The following accessories shall be part of the bid

1) A set of minor and major repair spare kits.
2) A set of maintenance tools.
3) Portable transformer oil sampling kit.
4) Bidder to indicate accessories and tools to be supplied and indicate the price of each separately.

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	Requirement	Bidder's offer
Manufacturer's Name and address		
Country of Manufacture		
Name and model Number		
1.	Scope	
2.	Normative References	
3.	Definitions and Abbreviations	
3.1.	Abbreviations	
4.1.	**SERVICE CONDITIONS**	
4.1.1	suitable for use outdoors/indoor in tropical areas and harsh climatic conditions	
a)	Altitudes	
b)	Humidity	
c)	Average ambient temperature	
4.2.	**DESIGN, CONSTRUCTION AND OPERATION**	
4.2.1.	**Design**	

Issued by: Head of Section, E/Plant Workshop	Authorized by: Head of Department, E/Plant Workshop
Signed:	Signed:
Date: 2025-1-1	Date: 2025-1-1

Clause number	Requirement	Bidder's offer
4.2.1.1.	The centrifugal transformer oil water separator system shall be rated for continuous operation, designed, manufactured and tested according to IS 6034.	
4.2.1.2.	The centrifugal transformer oil water separator system shall be capable of doing the following functions:	
a)	Suck and filter dirty transformer oil from a holding tank to a preheating chamber.	
b)	Separate water and sludge from transformer oil	
c)	Discharge processed oil to a holding tank for further treatment.	
d)	Discharge water and sludge to a holding tank for disposal	
4.2.1.3.	The plant shall be capable of processing the oil on single pass basis at rated flow.	
4.2.1.4.	The plant shall be suitable for operation on 50Hz, 3 phase system with neutral solidly grounded, the 3 phase voltage supply shall be 415 V + 10%. The plant shall be of latest design, sturdy in construction and requiring minimum maintenance.	
4.2.2.	Construction	
4.2.2.1.	The Plant shall be suitable for outdoor/indoor use. All components including control panel shall have outdoor weather protected enclosures of sheet metal. The casing shall be provided with large doors for easy access to the various components	
4.2.2.2.	Locking of the casing doors be provided with latching from inside wherever possible. Good locking arrangement for main entry door and on the doors wherever inside latching is not possible shall also be provided.	
4.2.2.3.	All plant components shall be mounted on a common base frame, including all necessary piping for oil and vacuum as well as electrical wiring	
4.2.2.4	Oil-bearing lines and piped items shall be seamless steel pipes.	
4.2.2.5	Water-bearing lines shall be made of stainless steel and valves of brass, cast stainless steel or equal.	

Clause number	Requirement	Bidder's offer
4.2.2.6	Air –bearing lines shall be made of oil resistant flexible rubber hoses with nitrile and valves made of aluminium, brass or equal.	
4.2.2.4.	All bought out components shall be of reputed makes. Manufacturer's test reports for pumps and motors will be supplied	
4.2.2.7.	One sampling valve in the outlet pipe of filter press shall be provided	
4.2.2.8.	Flow meter with totalizer in the outlet pipe of filter press shall be provided	
4.2.2.9.	One moisture sensor in the outlet pipe of filter press shall be provided	
4.2.2.10	A valve for draining water shall be provided.	
4.2.2.11	The centrifugal transformer oil water separator frame shall be of grey cast iron construction. The hood made of silumin and main bowl parts made of stainless steel. Internal and external surface including oil heater, filter vessel, and structural steel work to be painted and shall be shot or sand blasted to remove all rust and scale of foreign adhering matter or grease. All steel surface in contact with insulating oil shall be painted with two coats of heat resistant oil insoluble, insulating vanish/paint	
4.2.2.12	All internal painted steel surface shall be given a primary coat for zinc chromate second coat of oil and weather resistant varnish of a colour distinct from primary and final two coats of glossy oil and weather resisting paint.	
4.2.2.13	All paints shall be carefully selected to withstand heat and extremes of weather. The paint shall not scale off or crinkle or be remove by abrasion due to normal handling	
4.2.2.14	The machine external overall dimensions shall not exceed L-1500mm,width 1000mm,H-1500mm	
4.2.2.15	The gross weight of the centrifugal transformer oil water separator shall not exceed 3500Kg	

Clause number	Requirement	Bidder's offer
4.2.2.11.	Lifting Hooks for Plant shall be provided to facilitate ease of Plant Loading / Unloading	
4.2.2.12.	All internal painted steel surface shall be given a primary coat for zinc chromate second coat of oil and weather resistant varnish of a colour distinct from primary and final two coats of glossy oil and weather resisting paint	
4.2.2.13.	All paints shall be carefully selected to withstand heat and extremes of weather. The paint shall not scale off or crinkle or be remove by abrasion due to normal handling	
4.2.2.14.	The machine external overall dimensions shall not exceed L-3000mm,width 2100mm,H-2200mm	
4.2.2.15.	The gross weight of the High vacuum transformer oil filtration plant with separate transformer vacuuming system shall not exceed 4500Kg	
4.2.2.16.	Lifting Hooks for Plant shall be provided to facilitate ease of Plant Loading / Unloading	
4.2.2.17	Schematic diagram for centrifugal transformer oil water separator system shall be offered indicating all arrangements and Flow diagram of oil separator plant, pumps, valves, measurement devices and heating chamber shall be submitted with tender, clearly detailing important dimensions, any special features of the offered design, components, accessories and fittings.	
4.2.2.18	Complete list of components, instruments and accessories offered with their make and accompanied with catalogue/brochure/pamphlets/literature/write-ups shall be submitted with the tender.	
4.2.3.	Operation	
4.2.3.1.	Operation sequence and dangers sign plates shall also be provided	
4.2.3.2	Oil shall be taken in through inlet valve	
4.2.3.3	This oil shall be filtered through a strainer to remove major portion of coarse dirt and pumped to the oil water separator	
4.2.3.4	Dehydrated oil from the separator shall be pumped to filtered oil holding tank and the sludge and water to the sludge-holding tank	
4.3.	**TECHNICAL PARTICULARS**	
4.3.1.	**OIL PUMP (INLET PUMP AND OIL FEED PUMP)**	
4.3.1.1.	The pumps shall be single stage positive displacement gear type with a feed pressure of 0 to 1 bar	

Clause number	Requirement	Bidder's offer
4.3.1.2.	The pump motor shall have insulation class-F with IP-55 protection.	
4.3.1.3.	Suitable mechanical seals shall be provided to ensure vacuum tightness.	
4.3.1.4.	Suction lift of the pump shall be at least 5 meters of transformer oil at atmospheric pressure and temperature.	
4.3.1.5.	The pumps shall be provided with an interlock with delay such that if there is no oil flow for 30 sec. through the heater, the pump shall trip automatically and also if the pump is not operating the heater will not be energized	
4.3.1.6.	The following oil inlet pump details shall be provided	
a)	Pump Make	
b)	Pump Type	
c)	Pump Capacity	
d)	Motor make and type	
e)	Motor Rating	
f)	Motor type of starter	
4.3.2.	**MAGNETIC STRAINER**	
4.3.2.1.	The plant shall be provided with a suitable magnetic strainer with wire mesh to filter all particles of sizes above 0.5 mm and all magnetic particles.	
4.3.2.2.	The strainer shall be installed at the suction of the oil pump described at 4.3.1	
4.3.3	**CENTRIFUGAL SEPARATOR**	
4.3.3.1	The separators shall be equipped with a self-cleaning disc type bowl.	
4.3.3.2	The separator shall be equipped with the parts indicated in the diagram	
4.3.3.3	Dirty oil shall be conveyed to the centrifuge by means of a pump.	
4.3.3.4	The pump motor shall be insulation class-F with IP55 protection.	
4.3.3.5	The clean oil shall be discharged under pressure by means of a centripetal pump.	
4.3.4	**OIL DISCHARGE PUMP**	
4.3.4.1	Suitable pumping system shall be provided for extracting oil from the holding tank.	

Clause number	Requirement	Bidder's offer
4.3.4.2	The pump shall be either glandless centrifugal type with canned motors or a combination of gear pump and centrifugal pump with mechanical seals suitable for extracting oil..	
4.3.4.3	The discharge pump shall be able to deliver the oil at its rated capacity (2000LPH or more) with adequate head of 15 meters of water column	
4.3.4.4	The oil discharge pump shall be located at a suitable level.	
4.3.4.5	The pump shall be supplied with double check valve assembly and solenoid operated non-return valve.	
4.3.4.6	In order to stop reverse flow of oil in case of power failure, the pumping system shall preferably be self-priming type alternatively priming device with safety interlock to protect pump against dry running shall be provided.	
4.3.4.7	Interlock logic arrangement shall be provided between low-level float switch (located in the holding tank) and discharge pump to prevent dry running.	
4.3.4.8	Sampling valves shall be provided at the discharge of extraction pump for testing of oil properties	
4.3.4.9	Re-circulation line with valves shall be provided to re -circulate a part of the purified oil to the inlet point if necessary during operation	
4.3.4.10	The pump motor shall have insulation class-F with IP-55 protection	
4.3.5	**HEATING CHAMBER**	
4.3.5.1.	The oil heater vessel shall be of mild steel welded construction and insulated with glass/mineral wool.	
4.3.5.2	The heating elements shall be divided into balanced banks among the phases, each individually controlled by a separate thermostat. For the required oil temperature.	
4.3.5.3	Heater shall be capable of heating oil up to 70°C.	
4.3.5.4	Heaters shall be interlocked with inlet pump and shall not be in "ON position" unless the inlet pump is working.	
4.3.5.5	The heater shall be easily removed for inspection and replacement.	
4.3.5.6	Each Modular type electric heaters shall be provided operating voltage of 415V/250V, with low watt density and are suitable to 50 Hz.	
4.3.5.7	Selector switch shall be provided for full load operation of heaters depending upon the desirable temperature of oil.	
4.3.5.8	A drain point shall be provided for the heater chamber	

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Clause number	Requirement	Bidder's offer
4.3.6	**CONTROL UNIT**	
4.3.6.1	The plant shall be designed both for Automatic/semi-automatic PLC based operation modes.	
4.3.6.2	A centralized electrical panel with auxiliary step down transformer, contactors, back up protection fuses, indicating lamps etc. to be provided with following minimum audio and visual alarms:	
4.3.6.3	All controls and annunciation equipment shall be suitable for 240 V AC	
4.3.6.4	Suitable interlock as described against each equipment shall be provided for safe and trouble free operation.	
4.3.6.5	All instrument control hardware and alarms shall be mounted on a suitable control panel.	
4.3.6.6	Mimic diagram with indication lamps showing on off status of various equipment shall be provided on the control panel.	
4.3.7	**HOSES FOR TRANSFORMER OIL.**	
4.3.7.1	Separate reinforced rubber hoses shall be provided for each operation of oil suction and Oil discharge.	
4.3.7.2	4 pieces of Oil hose of nitrile rubber reinforced with amour 1.5 inch internal diameter. Each piece shall be 10 meters long and shall be with leakage-proof, quick connect couplers for connection to installations under operation.	
4.3.7.3	Hosepipes for oil service shall be suitable for transformer oil applicable up to temperature of 100°C. full vacuum and pressure up to 2.5 kg/cm2 or 245.2kPa.	
4.3.7.4	Suitable mobile hose racks shall be provided to accommodate the hoses. All pipes fittings and hoses shall be properly labelled and distinctively marked	
4.3.8	**PORTABLE OIL SAMPLING KIT.**	
4.3.8.1	Suitable oil sampling kit shall be provided consisting of: i. A set of brass outside threaded nipples to be used with a syringe to extract oil for testing (samples to be seen at Isiolo rd. workshop).	

Clause number	Requirement	Bidder's offer
	ii. A set of Chrome plated brass ball valves. iii. 2 meters 5mm clear silicon tubing. iv. 5 clear glass 100mm sampling syringes with adaptor valves v. A robust transport case	
4.3.9	**ELECTRICAL SYSTEM**	
4.3.9.1	4.3.8.1 The plant shall receive 415v, 3-phase, 50Hz, 4 wire power supply through flexible cable in the cable in the distribution panel location on the plant. The incoming of the distribution panel shall be switch fuse unit.	
4.3.9.2	Provision for earthing the plant at the operating locations with earthing terminals for safety shall be provided	
4.3.10	**INSTALLATION AND COMMISSIONING**	
4.3.10.1	Installation and Commissioning of the Plant shall be carried out by the bidder and shall include the following;	
	a. Placement of all components in their position.	
	b. Carrying out of electrical wiring between components & electrical switch panel.	
4.3.10.2	Material handling equipment's like crane, chain pulley etc. for loading and unloading of equipment's at the time of installation and commissioning shall be provided by the tenderer	
4.3.10.3	Consumable material i.e. oxygen, acetylene gas, cutting set, welding rods, welding machines, Grinder, hardware. Tools & tackles like spanner set, pipe range, screw jack etc. during installation of equipment at site	
4.4.	**DRAWINGS, DOCUMENTATION AND SUPPORT**	
4.4.1.	Warranty and training	
4.4.1.1.	The centrifugal oil water separator system shall be backed by a minimum of 12-months factory warranty.	
4.4.1.2.	The Bidder shall submit a clause by clause statement of compliance with the specifications together with copies of the manufacturer's catalogues, brochures and technical clearly marked to support each	

Clause number	Requirement	Bidder's offer
	clause, all in English for evaluation. The manufacturer's type reference/designation of the item offered shall be indicated	
4.4.1.3.	In the case of tender award, technical details for the centrifugal transformer oil water separator system shall be submitted to the Kenya Power for approval before manufacture commences. The tenderer shall submit all the drawings as following	
a)	Schematic drawings of the plant with all piping systems, control systems and instrumentation with reference of the relevant international standards followed for the design and construction of the plant and its components/material	
b)	General arrangement plan, section of main and sub-assembles, with detailed dimensions of the pants and the size of each and every part of the equipment to be supplied under this specification	
c)	Complete list of accessories and auxiliaries with their make and accompanied with catalogue/pamphlets/literature/write-ups	
5	**MARKING, LABELLING AND PACKING**	
5.1.	**MARKING**	
5.1.1.	The following information shall be marked legibly and in a permanent manner on the centrifugal transformer oil water separator system	
a)	The manufacturer's name or trade mark;	
b)	Type, model and serial number;	
c)	Nominal input voltage and Frequency	
d)	Individual loads ratings e.g Pumps, motors and heaters	
e)	Total Power (kW) Consumption	
f)	Flow diagram from inlet to outlet connection	
g)	Letters "PROPERTY OF KENYA POWER"	
h)	The instructions for handling and use (in the English Language).	
5.2.	**PACKING**	
5.2.1.	The centrifugal transformer oil water separator system shall be packed in a carrying case so as to protect it from damage during transportation, handling and storage.	
APPENDICIES		
A:	**TESTS AND INSPECTION (Normative)**	

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Clause number	Requirement	Bidder's offer
A.1	The centrifugal transformer oil water separator system shall be inspected and tested in accordance with the requirements of this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.	
A.2	The centrifugal transformer oil water separator system shall be subject to acceptance tests . Acceptance tests shall be witnessed by Three Engineers appointed by KPLC and shall include the following	
a)	General construction inspection i.e. visual, dimensional and material	
b)	Operational test of the plant	
c)	Test for Breakdown voltage, moisture and gas content of oil (before & after purification).	
d)	Plant capacity test for flow rate	
e)	Test for electrical check i.e. Insulation Resistance and High Voltage test of Control panel	
f)	Tests certificates for suction & discharge heads of pumps shall be supplied	
g)	Tests for checking correctness of all circuits, interlocks and sequence of operation.	
h)	Control Panel check	
i)	Any other test which is required to ensure satisfactory operation of the plant shall be performed by the supplier free of cost.	
A.3	On receipt of the centrifugal oil water seperator system, Kenya Power will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, any part of the system which upon examination, test or use fail to meet any or all of the requirements in the specification.	
B:	**QUALITY MANAGEMENT SYSTEM (Normative)**	

Clause number	Requirement	Bidder's offer
B.1	The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the transformer oil seperator system 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 AND DEMONSTRATION (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 by the manufacturer;	
b)	Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, Flow/Schematic Diagram and technical data;	
c)	Details of manufacturing capacity and the manufacturer's experience;	
d)	Manufacturer's warranty and guarantee; subject to 12 months from date of delivery to KPLC stores	
e)	Operational manual.	
f)	Service manual.	
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)	Drawings of centrifugal oil water separator system to be manufactured for KPLC.	
c)	Schematic drawings of the plant with all piping systems, control systems and instrumentation with reference of the relevant	

Clause number	Requirement	Bidder's offer
	international standards followed for the design and construction of the plant and its components/material	
d)	General arrangement plan, section of main and sub-assembles, with detailed dimensions of the pants and the size of each and every part of the equipment to be supplied under this specification	
e)	Complete list of accessories and auxiliaries with their make and accompanied with catalogue/pamphlets/literature/write-ups	
f)	Product manuals, operation manuals and brochures,	
g)	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.	
h)	All documentation necessary for safety of the plant.	
i)	Packaging details (including packaging materials).	
C.3	The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the plant to KPLC.	
C.4	The successful bidder shall demonstrate to KPLC Staff (in Nairobi) the operation of the plant.	
	D: TOOLS AND ACCESSORIES (MANDATORY)	
	List of the tools and accessories that shall be part of the bid	

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Manufacturer's Name, Signature, Stamp and Date

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