



TITLE:
**SPECIFICATION FOR
PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No. KP1/3CB/TSP/10/044
Issue No. 1
Revision No. 2
Date of Issue 2013/07/29
Page 1 of 26

TABLE OF CONTENTS

0.1 Circulation List

0.2 Amendment Record

FOREWORD

1. SCOPE
2. REFERENCES
3. TERMS AND DEFINITIONS
4. REQUIREMENTS
5. TESTS AND INSPECTION
6. MARKING AND LABELLING

ANNEX A : Guaranteed Technical Particulars and Statement of Compliance *(to be filled and signed by the Manufacturer and submitted together with catalogues, brochures, drawings, technical data, sales records and certified true copies of type test certificates and reports for tender evaluation)*

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Signed:

Date: 2013/07/29

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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 2 of 26	

0.1 Circulation List

COPY NO.	COPY HOLDER
1	Research & Development Manager
2	Procurement Manager
3	Stores & Stock Control Manager
4	Technical Services Manager
5	O&M Manager
6	D&C Manager
7	Deputy Manager, Technical Audit

0.2 Amendment Record

Rev No.	Date	Description of Change	Prepared by: (Name & Signature)	Approved by: (Name & Signature)
2	2013/07/29	Amended parts covering Type tests and Functional tests	<i>(Signature)</i>	<i>(Signature)</i>
		Added Additional information required on tendering.	<i>(Signature)</i>	<i>(Signature)</i>

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Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 3 of 26	

FOREWORD

This specification has been prepared by the Research and Development Department in collaboration with the Technical Services Department and the Distribution Division of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Pad Mounted Substations. It is intended for use by KPLC in purchasing the substations.

It shall be the responsibility of the manufacturer to ensure adequacy of the design and good engineering practice in the manufacture of the Pad Mounted Substations for KPLC. The manufacturer shall submit information, which confirms satisfactory service experience with products which fall within the scope of this specification.

It is expected that manufacturers will provide energy efficient standard design that will provide high level of efficiency and significant initial cost saving.

CROSS REFERENCES

THIS SPECIFICATION SHALL ALWAYS BE READ IN CONJUNCTION WITH THE FOLLOWING SPECIFICATIONS TO BE ISSUED AT THE TENDERING STAGE:

- a) Specification no.KP1/3CB/TSP/10/001/3 – SPECIFICATION FOR DISTRIBUTION TRANSFORMERS: Part 3: Ground Mounted Three Phase Transformers (315,630 & 1000KVA).
- b) Specification no.KPLC1/3CB/TSP/11/042/B for Low Voltage Distribution Board.
- c) Specification no. KPLC1/ 3CB/TSP/11/041 Specification for Ring Main Unit in SF6

OR

Specification no. KPLC1/ 3CB/TSP/11/041/A Specification for Ring Main Unit in Solid insulation

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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 4 of 26	

1. SCOPE

1.1 This specification is for newly manufactured outdoor (**NON- WALK IN TYPE**) prefabricated distribution pad-mounted substations for both oil filled and dry type of transformers for the following voltage ratios and ratings:

315KVA, 630 KVA and 1000 KVA 11/0.433KV transformers

These are cable connected and are to be operated from outside (non-walk in type). The prefabricated substations shall be located in areas with public accessibility.

1.2 The specification also covers inspection and test of the substation as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted for tender evaluation.

1.3: This specification stipulates the minimum technical requirements of design, engineering, manufacturing, inspection, testing and performance of outdoor Package Substation (PS) intended to be used in the company and it shall be the responsibility of the manufacturer to ensure adequacy of the design and good engineering practice in the manufacture of the transformer for KPLC.

Note: The specification does not purport to include all the necessary provisions of a contract.

2. REFERENCES

The following standards contain provision which, through reference in this text, constitute provisions of this specification. Unless otherwise stated, the latest edition of the referenced document (including and amendments) applies.

IEC 62271: High Voltage switchgear and control gear – Part 200: Metal enclosed switchgear and control gear for rated voltages above 1kV and up to and including 52kV.

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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 5 of 26	

IEC 62271: High Voltage switchgear and control gear - Part 202: High voltage/low voltage prefabricated substation.

IEC 60439: Low Voltage switchgear and control gear assemblies - Part 1: Type tested and partially type tested assemblies

IEC 60947: 1: Low voltage switchgear and control gear

IEC 60694: Common specifications for high voltage switchgear and control gear standards

IEC 60071: Insulation Coordination

IEC 60076 (All parts): Power Transformers

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

IEC 62262: Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK Code).

IEC- 61330: High-voltage / low-voltage prefabricated substation

BS 381C: Specification for colours for identification, coding and special purposes.

ISO 1461: Hot dip galvanized coatings on fabricated iron and steel.

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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 6 of 26	

3. TERMS AND DEFINITIONS

For the purpose of this specification the terms and definitions given in the reference standards shall apply.

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 Operating conditions

4.1.1.1 The substation shall be suitable for continuous operation outdoors in tropical areas at altitudes of up to 2200m above sea level, humidity of up to 90%, average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C in direct sunlight, heavy saline conditions along the coast and isokeraunic levels of 180 thunderstorm days per year

4.1.2 System characteristics

4.1.2.1 The primary shall be 11000V, 50Hz while the secondary shall be 433V, 50Hz, with the neutral solidly earthed.

4.1.2.2 The 11kV overhead system is of unearthed construction (i.e. without aerial earth wire).

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SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 7 of 26	

4.2 DESIGN AND CONSTRUCTION

4.2.1 General

4.2.1.1 The substation shall comprise the following components: an enclosure, 3 – phase distribution transformer, Ring Main Unit, LV circuit breakers, HV/ LV interconnections and auxiliary circuits. All the three major components shall be completely assembled, interconnected and fixed to the common base frame which shall also have provision for MV cable entry and LV cables exits. Removable bus bar coupling shall be allowed.

4.2.1.2 All the components shall comply with their relevant IEC standards; i.e

- Transformers according to IEC 60076
 - High Voltage switchgear and control gear according to IEC 62271-200
 - Low voltage switchgear according to IEC 60947-1 and IEC 60439-1.
- The enclosure shall be as per IEC- 61330 High-voltage / low-voltage prefabricated substation

The design of the substation shall be compact enough to be installed in limited space. The manufacturer shall provide the dimensions of the substation which shall be within the details shown on Table 1. The general layout shall also be provided along with the tender documents for evaluation.

4.2.1.3 The maximum permissible temperature rise for HV and LV interconnections are those specified in 60694 and IEC 60439-1 as applicable for contacts, connections and metal parts in contact with insulation.

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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 8 of 26	

- 4.2.1.4 The substation shall be suitable for installation on a concrete pad footing.
- 4.2.1.5 A main earthing conductor system shall be provided to connect all metallic parts of the prefabricated substation not belonging to the main or secondary circuit of the equipment. The earthing conductor shall be able to carry the maximum fault current at the substation.
- 4.2.1.6 Prefabricated substations shall be designed such that in normal service, inspection and maintenance can be carried out safely. The substation shall be designed and constructed to avoid the risk of unauthorized access.
- 4.2.1.7 Each Substation shall be suitable for mounting at the ground level.
- 4.2.1.8 The Substation shall be designed to prevent the occurrence of internal faults. The Internal Arc Classification of the substation shall be class IAC-AB for the protection of both the operators and the general public as per IEC 62271-202. Type test certificates to verify this requirement shall be submitted with the tender as evidence of the effectiveness of the design. The tests shall have been carried out to the requirements of IEC 62271-202.
- 4.2.1.9 The substation shall be protected against external mechanical impacts on covers, doors and ventilation openings. The degree of protection against mechanical impacts shall be IK10 as per IEC 62262.
- 4.2.1.10 A retention tank shall be provided inside the substation to retain transformer oil, preventing the soil to be polluted. The capacity of the retention tank shall be as per IEC 62271 – 202 .where galvanization is done, this shall be as per ISO 1461.

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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 9 of 26	

- 4.2.1.11 All bolts, nuts, and washers exposed to atmosphere and in contact with non-ferrous parts which carry current shall be of phosphor bronze.
- 4.2.1.12 If bolts and nuts are placed so that they are inaccessible by means of ordinary spanners, suitable special spanners shall be provided by the supplier.
- 4.2.1.13 Except for hardware, which may have to be removed at site, all external surfaces shall receive at least four coats of paint. The total dry film thickness shall be between 100 and 130 microns.
- 4.2.1.14 Descriptive labels for mounting indoors or inside cubicles and kiosks shall be of material that will ensure permanence of the lettering. A matt or satin finish shall be provided to avoid dazzle from reflected light. Labels mounted on dark surface shall have white lettering on a black background. Danger notices shall have red lettering on a white background.
- 4.2.1.15 All interior surfaces of chambers that are in contact with air shall receive at least three coats of paint, of which the topcoat shall be of a light shade. The final colour shade shall be Dark Admiralty Grey, colour No. 632 as per BS 381C.
- 4.2.1.16 Every care shall be taken to ensure that the design and manufacture of the substation shall be such as to have minimum noise and vibration levels following good modern manufacturing practices. The maximum noise levels shall be stated in the bid and shall not exceed 60db.

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Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 10 of 26	

4.2.1.17 The pad mounted substation shall be complete with all necessary components and accessories.

4.2.1.18 The complete Pad mounted substation and each individual component shall be provided with lifting facilities and shall be marked to indicate its weight.

4.2.1.19 The bidder shall submit for (evaluation) a single line diagram of the compact substation with all the electrical components.

4.2.1.20 The manufacturer shall provide special instructions as per IEC 62271-202 covering the following areas:-

- Transportation
- Storage
- Unpacking and lifting
- Installation
- Dismantling and recycling

4.2.1.21 The manufacturer shall provide complete maintenance manuals covering at least the following :-

- Complete maintenance instructions for main components as required in their relevant standards.
- Maintenance instructions (if any) for the enclosure including frequency and procedure for maintenance.

4.2.2 Enclosure

4.2.2.1 The enclosure shall be made of either **GALVANISED STEEL** or of **GLASS REINFORCED CONCRETE** .The type of enclosure required shall be stated

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SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 11 of 26	

in the tender document. The minimum thickness of the enclosure shall be 5mm for steel type and 45mm for the GRC type.

4.2.2.2 The degree of protection of the enclosure shall be IP25D.

4.2.2.3 The class of enclosure shall be determined according to the service conditions in 4.1.1 and the requirements of IEC 62271-202. This is recommended to be **class 10**.

4.2.2.4 The manufacturer shall provide the transformer derating factor for the stated minimum, average and maximum temperatures as per clause 4.1.1 .

4.2.2.5 The enclosure shall be designed to provide natural circulation of air for cooling the substation. If parts of the enclosure are made of non conductive materials, such materials shall comply with special dielectric requirements as per IEC 62271-202.

4.2.2.6 Measures shall be taken to avoid deformation, which could be caused during transportation, lifting or handling of the substation.

4.2.2.7 The materials used in the construction of the enclosure of the pad mounted substation shall be non-flammable.

4.2.2.8 The materials of the enclosure shall be able resist deterioration under the environmental conditions stated in 4.1.1 during its expected lifetime. The manufacturer shall state the characteristics of the materials coating and painting.

4.2.2.9 The substation enclosure shall be painted to protect against corrosion, and the final colour of the exterior surface shall be Dark Admiralty Grey, colour

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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 12 of 26	

No. 632 as per BS 381C. The external surface of the enclosure shall receive at least four coats of paint. The total dry film thickness shall be between 100 and 130 microns. The characteristics of the painting shall be stated by the manufacturer during tendering. the paint thickness does not apply to GRC enclosures

- 4.2.2.10 All the equipment inside the substation shall be fixed such that it shall **not** be possible to remove or replace any of the equipment by unauthorised personnel. The manufacturer to indicate mechanisms in place to deter such unauthorized removals.
- 4.2.2.11 The degree for mechanical impact for the body of the substation shall be IK 10 as per IEC 62262. Manufacturer shall provide test certificates to support the same for similar substations.
- 4.2.2.12 When the covers and doors are closed, they shall provide the degree of protection specified for the enclosure. Locking facilities shall be provided on the access doors to deter unauthorized access. The doors shall open outwards upto an angle of 180° and be equipped with a device able to maintain them in an open position.
- 4.2.2.13 Ventilation openings on the enclosure shall be so arranged or shielded such that the same degree of protection (IP code) and the same degree of protection against mechanical impacts (IK Code) as specified for the enclosure are maintained.
- 4.2.2.14 If there are partitions between the various components of the substation, the degree of protection of the partitions shall be specified as per IEC 60529.

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SUBSTATIONS**

Doc. No. KP1/3CB/TSP/10/044

Issue No. 1

Revision No. 2

Date of Issue 2013/07/29

Page 13 of 26

- 4.2.2.15 Access shall be provided to the cable test points of the MV switchgear and control gear in order to carry out dielectric tests on the cables.
- 4.2.2.16 Adequate space shall be provided in the enclosure for keeping accessories, e.g. operating handles.
- 4.2.2.17 The width of the operation space inside the substation shall be adequate for performing any operation or maintenance.
- 4.2.2.18 Labels for warning on the enclosure and any manufacturer's instructions shall be durable and clearly legible.
- 4.2.2.19 The manufacturer shall provide the corresponding plinth preparation details for the transformer size on tender. These shall be as indicated on table 1 clause 4.2.2.8.

4.2.2.20 EXPERIENCE

The manufacturer shall have more than 7 years experience in both manufacturing and sales of the complete pad mounted substation of equal or higher ratings as in the tender

4.2.3 TRANSFORMER

- 4.2.3.1 The rating of the transformer shall be stated in the tender document.
- 4.2.3.2 The transformer shall be either oil filled or dry type. The transformer type required shall be stated in the tender document.
- 4.2.3.3 Where the transformer required is the **OIL FILLED TYPE** this shall be designed as per the requirements of IEC 60076 and Specification no. KPLC1/TSP/10/001-03 – *SPECIFICATION FOR DISTRIBUTION TRANSFORMERS: Part 3: Ground Mounted Three Phase Transformers (315, 630 & 1000KVA)* attached with the tender document.
- 4.2.3.4 Where the transformer required is the **DRY TYPE**, this shall be designed as per IEC 60076 and KPLC specifications as provided.

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SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 14 of 26	

4.2.3.5 The transformer shall be fitted with cable boxes for termination of HV cables (11kV) and LV cables. The option of removable bus bars(not solidly coupled to the switchgears) is allowed

4.2.3.6 The dimensions for transformer compartment shall be within the figures shown on the table1 below. The transformer when fixed shall leave adequate space so as to allow routine inspection and maintenance.

ENCLOSURE TYPE	Type 1 (315 kva) transformer)	Type 2 (630,1000KVA) transformer)
Maximum Overall dimensions(LxWxH)	2mx2.5mx2.5m	2mx3mx2.5m
Transformer compartment(LxW)	1mx0.8m	1.2mx1.2m

Table 1

4.2.4 MV switchgear

4.2.4.1 The type of MV switchgear shall consist of either a Ring Main Unit (RMU) with Ring switches and vacuum circuit breaker in an SF6 Insulation as per the IEC 60694 and *Specification numbers: KPLC1/ 3CB/TSP/11/041.*

4.2.4.2 *A Ring Main Unit of similar arrangement as per 4.2.4.1 above but whose medium of insulation is solid insulation shall also be acceptable. The construction shall be as per specification (Air Insulated with Vacuum Circuit breaker) and a KPLC1/ 3CB/TSP/11/041A*

4.2.4.3 It shall be possible to automate the switching operations of the RMU

4.2.4.4 The bidder shall complete the annexure on Guaranteed Technical Particulars contained in the RMU specification and return the same for evaluation.

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Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 15 of 26	

4.2.5 Low Voltage switchgear

- 4.2.5.1 The Low Voltage Switchboard shall be manufactured as per KPLC specification number KPLC1/3CB/TSP/11/042B against which details on the individual items in the LV Board and their ratings and requirements shall be referred from.
- 4.2.5.2 The Low Voltage Switchboard shall be fixed inside the Compact Substation enclosure so as to allow easy access while operating **from outside** for both operation and maintenance.
- 4.2.5.3 All the necessary inter-connections shall be carried out as detailed in Specification for the LV Board such that no damage takes place during transportation and installation of the complete compact substation.
- 4.2.5.4 The bidder shall complete the annexure on Guaranteed Technical Particulars in the RMU, Transformers and Low Voltage panel and return the same for evaluation.
- 4.2.5.5 The low voltage switchboard incomers shall be rated 1600A for 630KVA and 1000KVA transformer; and 600A for 315KVA transformers.

4.2.6 Auxiliary Supply

- 4.2.6.1 Low voltage installation shall be provided inside the substation for illumination and auxiliary supply as detailed in specification for Low Voltage Switchboard.

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SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 16 of 26	

4.3 TRAINING

The manufacturer shall arrange for the following training for atleast two days.

- i) Training for 10 Enigneers in installation, handling, commissioning and maintenance.
- ii) Training for 20 Technicians and Craftsmen on installations and maintenance

4.4 QUALITY MANAGEMENT SYSTEM

4.4.1 The supplier shall include a Quality Assurance Program (QAP) that will be used to ensure that the substation 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 9001:2000.

4.4.2 The Manufacturer's Declaration of Conformity to reference standards and copies of quality management certifications including copy of valid ISO 9001: 2000 certificate shall be submitted with the tender for evaluation

5.0 TESTS AND INSPECTION

5.1 The Pad mounted substation shall be inspected and tested in accordance with the requirements of IEC 62271-202 and this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.

5.1 Dielectric tests shall be carried out on (i) the interconnection between the high voltage switchgear and the transformer; and (ii) the interconnection between the transformer and low voltage switchgear as per IEC 62271-202.

5.2 Temperature rise tests shall be carried out on the complete substation as per IEC 62271-202.

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Date: 2013/07/29



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SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 17 of 26	

5.3 Functional tests shall be carried out as per the following list:

- Operation of the switchgear and control gear
- Mechanical operation of the substation doors;
- Fixing of insulating barriers
- Checking of temperature and liquid level of the transformer
- Voltage indication check
- Fitting of earthing devices
- Cable testing
- Replacement of fuses
- Cleaning of ventilation grids.
- Interlocks between different components if any.

5.4 Mechanical tests and calculations shall be carried out as per IEC 62271-202.

5.5 The degree of protection shall be verified in accordance with the requirements specified in IEC 60529.

5.6 Type tests Reports

Certified true copies of previous Type Test Certificates and Type Test Reports issued by the relevant International or National Testing/ Standards Authority or ISO/IEC 17025/ILAC accredited laboratory shall be submitted with the offer for evaluation (all in English Language). A copy of the accreditation certificate for the laboratory shall also be submitted. Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Authority. These shall include but not limited to:

- Tests to verify the insulation level of the prefabricated substation
- Temperature rise tests to determine class of housing
- Tests to prove the temperature rise of the main components contained in the prefabricated substation
- Tests to prove the capability of earthing circuit to be subjected to the rated peak and rated short time withstand currents
- Functional tests to prove the degree of protection
- Tests to verify the withstand of the housing of the prefabricated substation against mechanical stress
- Tests to assess the effects of arcing due to internal fault
- Tests to verify the sound level of a prefabricated substation

5.7 Routine Rest Reports

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Date: 2013/07/29

Date: 2013/07/29



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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 18 of 26	

Routine test reports for the pad mounted substation and components to be supplied shall be submitted to KPLC for approval before shipment/delivery. The substation shall be subject to acceptance tests at the manufactures' works at no cost to KPLC before dispatch. These shall include, but not limited to:

- Tests to verify conformity with specifications, standard and approved drawings for all major components
- Tests to verify locking devices and interlocks
- Tests to verify electrical continuity of metallic frame and earthing system
- Dielectric tests of MV
- Verification of clearances and other fittings
- Verification of correct wiring

5.8 Sample Tests

The following quality acceptance tests shall be carried out in the presence of KPLC engineers on the selected samples of the prefabricated substation

- Verification of dimensions of various components and specified parameters
- Functional tests of all major components according to specifications and relevant standards
- Visual inspection to confirm material ,finish(quality of workmanship), and construction of all fine details

The Factory Acceptance tests shall be witnessed by Engineers appointed by The Kenya Power and Lighting Company Limited. KPLC will meet the cost of accommodation and air travel to the nearest airport for the officials and the supplier will be required to meet local transportation costs during the visit.

5.9 Site Test (Commissioning tests)

The bidder /supplier shall carry out electrical and function tests when installation of the prefabricated substation is complete. These shall include but not limited to the following:

- Visual and wiring checks for the equipment installation and wiring
- Power frequency voltage tests
- Insulation resistance tests
- Secondary injection tests
- Relay tests
- Checking of proper annunciation system operation

Issued by: Head of section Power System Research

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Date: 2013/07/29



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PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 19 of 26	

Calibration and adjustment of instrumentation
Interlocking checks
Functional checks

The scope of the tests shall be finalized and submitted to KPLC for approval prior to implementation

Testing Facility

- 5.10 The manufacturer shall provide current e-mail address, fax and telephone numbers and contact person at the International or National Standards and Testing Facility of the country where the substation is manufactured and tested.
- 5.11 Test reports for each substation (including its individual components) shall be submitted to The Kenya Power and Lighting Company for approval before shipment.
- 5.12 On receipt of the pad mounted substation, KPLC will inspect it and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The manufacturer shall replace/rectify without charge to KPLC, equipment which upon examination, test or use fail to meet any or all of the requirements in the specification.

6.0 MARKING AND LABELLING

- 6.1 Each Pad mounted substation shall be provided with a weatherproof, durable material, and clearly legible nameplate, which shall contain at least the following information:
- Manufacturer's name or trade mark;
 - Type designation
 - Internal Arc Classification
 - Serial Number
 - Number of this standard
 - Year of manufacture
 - KPLC P O (Purchase Order) number.
 - Transformer Loading factor for minimum, average and maximum temperature.
- 6.2 In addition to the name plate the inscription 'PROPERTY OF KENYA POWER AND LIGHTING CO.' shall be marked indelibly as in 6.1 above on the enclosure. This inscription shall be of fonts such that it is legible by a person standing 10m away from the enclosure.
Include DANGER HIGH VOLTAGE inscription on the enclosure

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**SPECIFICATION FOR
PACKAGE DISTRIBUTION
SUBSTATIONS**

Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 20 of 26	

7.0 Additional Information

Each manufacturer must supply the following information along with the offer:

1. Brief description of product being offered along with details of name of manufacturer, product type/model, country of origin
2. Detailed layout drawings with all views including plan, elevation, side elevation, dimensions, components
3. A plan showing the minimum clearances required around the package substations when Installed.
4. Details of materials to be used in frame and cladding
5. Detailed drawing of interconnection between RMU and Transformer, Transformer and LV panel.
6. Details of arc pressure relief device in the housing
7. Details of ventilation arrangements
8. Details of door locking and lifting arrangements
9. Detailed technical data sheets containing rated values and characteristics.
10. Original product catalogues and not photocopies.
11. A set of assembly instructions
12. Compliance statements against each clause of this specification document

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Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 21 of 26	

APPENDIX A

TENDER FORM FOR 11000/433V PAD MOUNTED SUBSTATION

(TECHNICAL PARTICULARS OF EQUIPMENT)

1 Item no.	2 Description		3 Requirement Schedule 1 (KPLC)	4 offer Schedule 2 (TENDERER)
1	Model and Type number			
2	Country of Origin			
3	Total number on order			
4	Service conditions: (i) Ambient air temperature • Average • Minimum • Maximum (i) Altitude (ii) Pollution (iii) Wind pressure (iv) Vibrations	°C °C °C M Level N/m ²	30 -1 40 Max. 2200m asl Heavy 400 Yes (caused by heavy traffic near installation site)	
5	Rated MV Voltage	kV	11	
6	Rated power for transformer	KVA		
7	Rated maximum power for prefabricated sub station.	KVA		
8	Rated operational low voltage	V	433	
9	Number of phases		3	
10	Type of HV neutral earthing		Neutral earthed directly without a 4 th conductor	
11	Type of LV neutral earthing		Solidly earthed at the neutral	
12	Rated Frequency	Hz	50	

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Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 22 of 26	

13	Plinth preparation details		To provide	
14	Class of enclosure		10	
15	Class of enclosure protection		IP25D	
18	Mechanical impact protection		1K10	
19	Lifting facilities provided			
20	Sound level	dB	Specify	
21	Internal Arc Classification		IAC-AB	
22	Fault Current Duration	kAs	31.5 KA 3	
23	Rated Insulation Levels HV: (i) Rated Lightning Impulse Withstand Voltage (ii) Rated short duration power frequency withstand voltage	kV kV	95KV (11kV) 38kV (11kV)	
24	Rated Normal Current: i) MV switchgear • Incomer • Busbar • Feeder • Interconnection between MV and transformer ii) LV switchgear: • Incoming • Busbar • LV outgoings iii) Auxilliary circuits	A A A A A A A A	630 850 630 200 (i)1,600 for 630& 1000KVA (ii)600A for 315KVA Tx. (i)400Ax3circuits for 315KVA Tx (ii) 400Ax6circuits for 630kva &1000KVA TX	
25	Rated duration of short circuit (t _k)			

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Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 23 of 26	

	<ul style="list-style-type: none"> • Medium Voltage • Low Voltage • Transformer • Earth Circuit 	sec s s s	3 3 3 3	
26	Degree of protection of the enclosure with closed doors <ul style="list-style-type: none"> • Degree of protection of the LV compartment • Degree of protection of the MV compartment • Degree of protection of the transformer compartment 		IP25D State State State	
27	Type of Components <ul style="list-style-type: none"> • MV switchgear • LV switchgear • Transformer 	Oil or dry type	RMU LV MCCBs As per tender document	
28	Substation type: <ul style="list-style-type: none"> • Operated from inside/ outside • At ground level 		Outside(Non Walk-in) Yes	
29	Rated Value of Transformer <ul style="list-style-type: none"> • Power • Load loss P_{cu} • No Load Loss P_o • No Load Current I_o • Short – circuit impedance • Temperature rise 	KVA W W A % K	As per tender requirements State State State Specify As per IEC 60076	

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Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 24 of 26	

30	Materials of the enclosure	Steel metal or GRC	As per tender document
31	Maximum Enclosure dimensions	(Lxwxh)	Type1-3m x 2.5mx2.5m Type2-3mx3mx2.5m
32	Gross weight		State
33	List of recommended spare parts		
34	Surface treatment of the enclosure external paint		High Quality Paint, Admiralty Grey colour No. 632 as per BS 381C
35	Cooling Method		Natural Ventilation
36	Corrosive environment		high
37	Degree of Mechanical Impact	IK	IK 10 as per IEC 62262
38	Number of copies of routine test results to be provided		Two
39	Details of previous Type Test results and Stamped Certificate with serial numbers for All the mandatory type tests listed in IEC 62271-202.		Type Test Reports Required
40	Details of previous routine Test results and Stamped Certificate with serial numbers for All the mandatory routine tests listed in IEC 62271-202.		Type Test Reports Required
41	Manufacturer capacity of Testing		To provide
42	List of Dielectric Test to be carried out		To list and provide
43	Functional Tests to be carried out		To list and provide
44	List of mechanical Tests and calculations		To list and provide
45	BIL Tests	kV	To be done during FAT
46	List all test to witnessed by Kenya Power Engineers during FAT		To provide

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Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 25 of 26	

47	List of commissioning Tests	To provide
48	Marking and labeling (i) Material (ii) method of marking	Provide
49	Additional information provided	Provide
50	Completed GTPs for individual Transformer, RMU and LV Board.	To complete as per attachment.
51	List of previous customers for similar unit	Provide
52	Experience in manufacturing and sales of complete compact substations	7years (minimum)
53	Single line diagram	To provide with details
54	Recommended maintenance manuals and schedules for enclosure, RMU, Transformer, and LV panel	To state and provide
55	Statement of deviation to specifications	To state
56	Statement of compliance to specifications and warranty of major components	To state
57	warranty of major components	To provide

Manufacturer's Declaration: Ion behalf of.....

Declare that the above submitted information conforms to the pad mounted distribution substation ratedkV.....kVA, being offered for this tender.

Signature.....

Date.....Stamp/Seal.....

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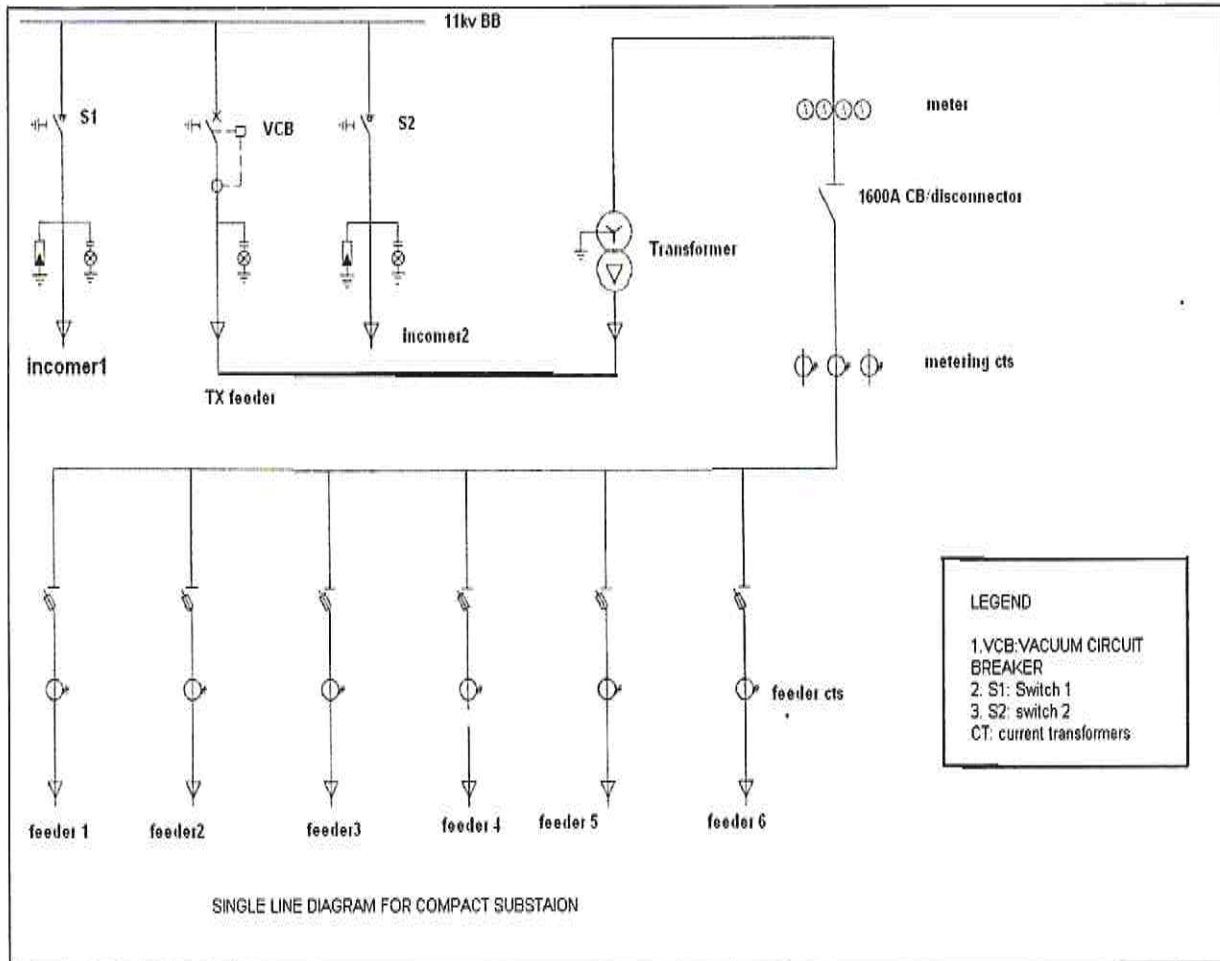
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Doc. No.	KP1/3CB/TSP/10/044
Issue No.	1
Revision No.	2
Date of Issue	2013/07/29
Page 26 of 26	

Single line diagram of prefabricated substation



LEGEND	
1. VCB: VACUUM CIRCUIT BREAKER	
2. S1: Switch 1	
3. S2: switch 2	
CT: current transformers	

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