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Kenya Power

LOW VOLTAGE SERVICE TURRET - SPECIFICATION

A Document of the Kenya Power & Lighting Co. Plc
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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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Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2022-11-15	Date: 2022-11-15

0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1 Rev 0	01/08/2005	New Issue	R&D	
Issue 1 Rev 1	15/11/2022	Cancels and replaces Issue 1 Rev 0 and all previous issues	Eng. Faith Gicugu	Dr. Eng. Peter Kimemia

FOREWORD

This specification has been prepared by the Standards Department in collaboration with Technical services and Distribution Network departments, all of The Kenya Power and Lighting Company Plc (KPLC) and lays down requirements for Low voltage service Turret. It is intended for use by KPLC in purchasing these items.

The other Specification in this series are: -

1. KP1/3CB/TSP/11/042B: Specification for low voltage distribution panel for use in ground mounted substation.

This Specification stipulates the minimum requirements for the service turrets acceptable for use in the company and it shall be the responsibility of the supplier and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, and exhibits good workmanship and good engineering practice in the manufacture.

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	Division
Eng. Stephen Nguli	Standards, IESR
Eng. Julius Ruathe	Technical Services, Network Management
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1. SCOPE

1.1. This Specification is for Low voltage Fused Service Turret in heavy duty hot dip galvanized steel cabinet, finished in epoxy paint and supplied with holding root for outdoor use in three phase low voltage distribution system.

1.2. The specification stipulates minimum requirements, inspection and tests of the Low Voltage Service Turret as well as schedule of Guaranteed Technical Particulars.

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 TR 61439-0:2022:	Low-voltage switchgear and control gear assemblies- Part 0: Guidance to specifying assemblies
IEC 61439-1:2020 RLV:	Low-voltage switchgear and control gear assemblies - Part 1: General rules
IEC 61439-3:2012:	Low-voltage switchgear and control gear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO)
IEC 61439-5:2014:	Low-voltage switchgear and control gear assemblies - Part 5: Assemblies for power distribution in public networks
IEC 60529:2013 CSV:	Degrees of protection provided by enclosures (IP Code)
IEC TS 60815-1:2008:	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 1: Definitions, information and general principles
ISO/IEC 17025:	General requirements for the competence of testing and calibration laboratories
ISO 1461:	Specification for hot dip galvanized coatings on iron and steel articles.
BS 381C:	Specification for colours for identification, coding and special purposes.
BS 1361:	Specification for cartridge fuses for a.c. circuits in domestic and similar premises.

3. DEFINITIONS

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

4. REQUIREMENTS

4.1. Service Conditions

4.1.1 Operating Conditions

The LV Service Turret shall be suitable for use in tropical areas and harsh climatic conditions including areas exposed to: -

a) At altitudes of up to 2200m above sea level and humidity of up to 95%.

b) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C, in direct sunlight.

c) Pollution: Design pollution level to be taken as "Heavy" (Pollution level III) for inland and "Very Heavy" (Pollution level IV) for coastal applications in accordance with IEC 60815.

d) Isokeraunic levels of up to 180 thunderstorm days per year.

4.1.2 System Characteristics

The Service Turret shall be suitable for use in a 4-wire underground distribution system operating at voltages not exceeding 600/1000V, frequency 50Hz.

4.2. Design and Construction

4.2.1. The Service Turret shall be designed and constructed in accordance with IEC 61439-5 and the requirements of this specification.

4.2.2. The Service Turret shall be stationary and suitable for outdoor installation in places, which are exposed to the public, but where only authorized persons have access to their use.

4.2.3. The Service Turret shall be fused and shall be safe for use in public three-phase systems. The rated current shall be carried without the temperature rise of the individual parts exceeding the limits specified in IEC 61439-5.

4.2.4. The Service Turret shall be manufactured from heavy-duty hot dip galvanized steel of thickness not less than 2mm. The coating thickness shall not be less than 55µm (mean coating thickness) as per tables 2 in ISO 1461.

Alternatively, the Service Turrets shall be finished in epoxy powder electrostatic oven cured paint. The final colour shall be Dark Admiralty Grey Colour No. 632 as per BS 381C and **paint thickness shall be not less than 85 micro-m anywhere on the panels (including the sharp edges)**

4.2.5. The top cover of the Service Turret shall have inclined surface(s) to avoid accumulation of rainwater. It shall have a canopy over the door.

4.2.6. All ferrous parts of the Service Turret shall be heavy-duty hot-dip galvanized. Terminals shall be of high conductivity and corrosion resistant material.

4.2.7. The Service Turret shall be equipped with insulated busbar, neutral and earthing busbars and terminals for incoming cables and outgoing cables. The neutral and earth shall have a bolted link.

4.2.8. The bus bars shall be hard drawn high conductivity copper, shrouded and staggered providing IP 2X to the operator. The insulating materials used shall have resistance to thermal stress and flame retardant properties as per IEC 61439-5.

4.2.9. The Service Turret shall be suitable for one incoming cable from source and several outgoing cables to consumers, all bottom entry/exit. It shall have provision for looping to another Service Turret.

4.2.10. The Service Turret shall have 18 No. outgoing circuits of 100 Amps rating (outgoing circuits in a 6 x 3 - phase configuration) with cutouts arranged to allow for the replacement of fuses in safety. The cutouts shall be complete with fuse links and shall be in accordance with BS 1361 Type IIa.

4.2.11. The cutout fuses and holder shall be withdrawable cartridge type and shall be arranged and replaced without the use of tools. Provision shall be given for sealing the fuse carrier (holder) to the fuse base by use of a wire seal.

4.2.12. The Service Turret shall incorporate circuit identification/labelling facility.

4.2.13. The base plate shall have knockout points for incoming/outgoing cables. Two(2) knockout points for 300mm^2 incoming cables, six(6) knockout points for 25mm^2 outgoing cables and twelve(12) knockout points for 16mm^2 outgoing cables.

4.2.14. The Service Turret shall be vermin proof and suitably ventilated to minimize ingress of dust and impurities. The ventilation shall comprise of Zinc Gauze ventilation screens. The **minimum degree of protection** shall be IP33 in accordance with IEC 60529.

4.2.15. The service turret shall be free standing with anchor iron support at base for bolting/grouting on plinth block or foundation. The size of the anchor iron support shall be at least 50 x 50 x 6mm.

4.2.16. The Service Turret shall be provided with hinged door, able to be opened through half turn, of hexagonal key in two safety locks. The two safety locks shall be evenly located on the door and shall have identical keys.

4.3. Rating and Sizes

Description		Requirement
Rated Voltage		0.6/1kV
Frequency		50Hz
Current Rating		600A
Cable Size, incoming & Outgoing (source & Loop)		300mm² PVC/SWA/PVC 4C Aluminum
Cable Size, outgoing (load)		25mm² PVC/SWA/PVC 4C Aluminum 16mm² PVC/SWA/PVC 1C Aluminum
Dimensions	Cabinet Size	Width: 600mm Depth: 325mm Height: 965mm
	Base (Root)	250mm

4.4. Marking and Packing

4.4.1 The Service Turret shall be packed in such a manner as to protect it from damage during transportation and storage.

4.4.2 The Service Turret shall have a nameplate of corrosion resistant material. The nameplate shall contain the following information engraved legibly and indelibly:

a) Manufacturer's name
b) Rated Voltage
c) Rated Current
d) The words "PROPERTY OF KPLC"
e) Caution Notes (in the English Language)

APPENDICES

A. TESTS AND INSPECTION (Normative)

A1. The Service Turret shall be tested and inspected in accordance with the requirements of this specification and IEC 61439-5. It shall be the responsibility of the manufacturer to perform or to have performed the tests specified and whatever other tests normally performed at works.

A.2 Copies of Type Test Certificates and Type Test Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation, all in English Language. The test reports shall include type tests as per IEC 61439-5. A copy of the accreditation certificate to ISO/IEC 17025 for the testing laboratory shall also be submitted. Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Laboratory that carried out the tests.

For offers from local manufacturers of Service Turrets, a detailed test report in accordance with IEC 61439-5 and this specification, obtained from Kenya Bureau of Standards shall suffice.

A.3 The Service Turrets shall be subject to acceptance tests at the manufacturer's premises before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Plc (KPLC).

A.4 On receipt of the product, KPLC will perform any of the tests specified in order to verify compliance with this specification. The supplier shall replace without charge to KPLC the Items, which upon examination, test or use fail to meet any of the requirements in this specification.

B. QUALITY MANAGEMENT SYSTEM (Normative)

B.1 The manufacturer shall submit a quality assurance plan (QAP) that will be used to ensure that the items 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 9001:2015 or later or KEBS diamond mark of quality.

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/ KEBS diamond mark of quality shall be submitted with the tender for evaluation.

C. WARRANY

C.1. The Manufacturer warrants the purchaser that all goods supplied shall have no defects arising from design, materials or workmanship.

C.2. The manufacturer shall offer a warranty of twenty four (24) months from the date of delivery of the LV service turrets to KPLC store.

D. TECHNICAL DOCUMENTATION

D.1. The Manufacturer shall submit duly filled guaranteed technical particulars together with copies of the product catalogues, brochures, technical data, drawings and copies of type test reports from a third party laboratory, all in the English Language for evaluation. The third party laboratory shall have a valid ISO/IEC 17025 or equivalent accreditation and valid certificates submitted with the bid. For local manufacturers, type test reports from KEBS shall suffice.

D.2. Duly filled Guaranteed Technical Particulars, Quality Assurance Plan, Technical drawings and documentation for the Service Turret shall be submitted to KPLC for approval before manufacture commences.

D.3. Complete test reports for the Service Turret shall be submitted to KPLC for approval before shipment/delivery.

D.4. Experience of the Manufacturer

D.4.1. A detailed list & contact addresses of previous major customers (utilities) in the past five years shall be submitted with the tender for evaluation.

D.4.2. The manufacturer shall have at least five (5) years experience in the manufacture of the LV Distribution Panels and Service Turrets. Documentary evidence shall be submitted to support this.

GUARANTEED TECHNICAL PARTICULARS (Normative)

To be filled and signed by the Supplier 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 requirement	Bidder's offer
Manufacturer's Name and address		State
Country of Manufacture		State
Bidder's Name and address		State
1.	**Scope**	State
1.1-1.2		
2.	Applicable Standards	State
3.	Terms & Definitions	State
4.	**Requirements**	
4.1	**Service Conditions**	
4.1.1	Operating Conditions	Specify
4.1.2	System Characteristics	Specify
4.2	**Design and Construction**	
4.2.1	Standard of Construction	State
4.2.2	Suitability for outdoor use	Specify
4.2.3	Public Safety requirements	
	Fusing requirement	Specify
	Suitable for public 3-phase system	Specify
	Temperature rise as per IEC 61439	Specify
4.2.4	Manufacturing material	Specify
	Steel Thickness (>2mm)	Specify
	Finishing: Heavy duty hot deep galvanized steel or Epoxy powder electrostatic oven cured paint	Specify
	Heavy-duty hot deep galvanized coating mean thickness as per table 2 in ISO 1461.	Specify
	Epoxy powder electrostatic oven cured paint final colour	Specify
	Epoxy powder electrostatic oven cured paint Thickness as per BS 381C	Specify
4.2.5	Inclined top surfaces to avoid accumulation of water	Specify
4.2.6	Treatment of all ferrous parts to be hot-dip galvanized	Specify
	Terminals properties - High conductivity and corrosion resistant	Specify

Clause number	KPLC requirement		Bidder's offer
4.2.7	Bus bars requirement	Neutral and earthing bus bars	Specify
		Terminals for incoming cables	Specify
		Terminals for outgoing cables	Specify
		Bolted link for neutral and earth	Specify
		Insulated bus bars	Specify
4.2.8	Bus bar material	Hard drawn high conductivity copper	Specify
		Shrouded and staggered providing IP 2X	Specify
4.2.9	Cable connection	Suitable for one incoming cable	Specify
		Provision for looping to another turret	Specify
		Number and size of outgoing cable	Specify
		Bottom entry for all cables	Specify
4.2.10	Outgoing circuits	Number of outgoing circuits	Provide
		Outgoing circuit configuration	Specify
		Ampere rating – 100A per phase	Specify
		Cut outs complete with fuse links	Specify
		Arranged to allow for safe replacement of fuse	Specify
		BS 1361 compliance	State compliance
4.2.11	Fuses and holders	Cut out fuses and holders type	State
		Fuse carrier(holder) sealing provision	State
		Removal of fuse holder without tools	Provide
4.2.12	Circuit identification	Provide labeling facility for circuits	Provide
4.2.13	Base plate	Shall have knock out points for incoming/outgoing cable	Provide
		No. of $300mm^2$ incoming cables knockouts	State
		No. of $25mm^2$ outgoing cables knockouts	State
		No. of $16mm^2$ outgoing cables knockouts	State
4.2.14	Ventilation and protection	Vermin proof	Specify
		Zinc gauze ventilation screens	Specify
		Dimensions of anchor iron support	Specify
		Minimum degree of protection	Specify
4.2.15	Anchor iron support	Dimensions of the base	Specify
4.2.16	Door	Hinged, with half turn opening	Specify
		Hexagonal key in two safety locks, evenly located with identical keys	Provide
4.3	**Rating and sizes**		
	Rated Voltage	0.6/1kV	Specify
	Frequency	50Hz	Specify
	Current Rating	600A	Specify

Clause number	KPLC requirement			Bidder's offer
	Cable Size, incoming (source)		300mm² PVC/SWA/PVC 4C Al	Specify
	Cable Size, outgoing (load)		25mm² PVC/SWA/PVC 4C Al 16mm² PVC/SWA/PVC 1C Al	Specify
	Dimensions	Cabinet size	W: 600mm, D: 325mm, H: 965mm	Specify
		Base (Root)	250mm	Specify
4.4	**Marking and Packing**			
4.4.1	Packaged in order to provide Protection from damage during transportation and storage			Specify
4.4.2	Nameplate material			Specify
	Nameplate material shall be corrosion reistant			Specify
	Information contained on the nameplate			State
	Method of marking			Specify
	Marking shall be legible and Indelible			Specify
A	**Tests and Inspection**			
A.1	Responsibility of carrying out tests			State
A.2	Copies of Type Test Reports submitted with tender			State
A.3	Acceptance tests to be witnessed by KPLC at factory before shipment			State
A.4	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	**Warranty**			
C.1.	Warranty that goods are new and without defect			Provide
C.2.	Warranty period			State
D	**Documentation and demonstration**			
D.1.	Documents submitted with tender			List
D.2.	Documents to be submitted by supplier to KPLC for approval before manufacture			List
D.3.	Routine Test reports to be submitted before shipment			List
D.4.	Manufacturer's Experience			State
D.4.1.	Detailed list & contacts of previous major customers (past 3 years)			Provide
	Customer reference letters			Provide
D.4.2.	Experience in manufacture of the LV Distribution Panel and Service Turret (at least 5 years)			State
	Statement of compliance to specification			Provide

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Manufacturer's Name, Signature, Stamp and Date