

DOCUMENT NO.: KP1/13D/4/1/TSP/09/123



**MATERIALS FOR OVEN AND LIGHT WEIGHT GANTRY HOIST
FOR
TRANSFORMER REPAIR SHED
– SPECIFICATION**

A Document of the Kenya Power & Lighting Co. Plc
May 2023



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Issue No.

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0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	Manager, Standards
2	Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?fFolderId=23)

REVISION OF KPLC STANDARDS

In order to keep abreast of progress in the industry, KPLC standards shall be regularly reviewed. Suggestions for improvements to approved standards, addressed to the Manager, Standards Department, are welcome.

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0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1 Rev 0	2023-03-28	New Issue	Nancy Wairimu	Dr. Eng. Peter Kimemia
Issue 1 Rev 1	2023-05-23	Added the following: a) Mild Steel Square Tube b) Mild Steel Pipe c) Mild Steel Plate d) Mild Steel Gusset (I- Beam)	Rotich Benard	Dr. Eng. Peter Kimemia

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FOREWORD

This Specification has been prepared by the Standards Department in collaboration with Distribution Networks Department, both of The Kenya Power and Lighting Company Plc. (KPLC) and it lays down requirements for materials for oven and lightweight gantry hoist for transformer repair shed.

There are no other specifications in this series.

The specification stipulates the minimum requirements for materials for oven and lightweight gantry hoist for transformer repair shed acceptable for use in the company and it shall be the responsibility of the supplier to ensure that the offered design and construction is of the highest quality and guarantees excellent service to KPLC.

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

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

Name	Division
1. Angelicah Ruguru Kinyumuh	Network Management
2. Nancy Wairimu Mungai	Institute of Energy Studies & Research
3. Rotich Benard	Institute of Energy Studies & Research

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1. SCOPE

This specification specifies the requirements for materials for oven and lightweight gantry hoist for construction of transformer repair shed.

2. NORMATIVE REFERENCE

ISO 1940-1: Mechanical Vibration – Balance quality requirements for rotor in a constant (rigid) state – Part 1: Specification and verification of balance tolerance

IEC 60751: Industrial Platinum resistance thermometer and temperature sensors.

IEC 60259: Degrees of Protection provided by enclosures (IP Code)

3. ABBREVIATIONS

CFM: Cubic Feet per Minute

WC: Water Column

RPM: Revolutions per Minute

IP: Ingress Protection

NO: Normally Open

NC: Normally Closed

SPDT: Single Pole, Double Throw

DIP: Dual In-line Package

SPST: Single Pole Single Throw

PTFE: Polytetrafluoroethylene

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

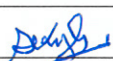
The materials for oven and lightweight gantry hoist for construction of transformer repair shed shall be suitable for use indoors in tropical areas and harsh climatic conditions including areas exposed to:

- At altitudes of up to 2200m above sea level;
- humidity of up to 95%;
- Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C;
- Pollution level IV

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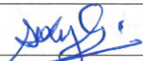
4.2. SPECIFIC REQUIREMENTS

CLAUSE No.	ITEM DESCRIPTION	REQUIREMENT
4.2.1	Mild Steel Sheet	Size: 2.4m x1.2m x 1.5mm
		Size: 2.4m x1.2m x 1.0mm
4.2.2	Mild Steel Square Tube	Width-(100*100)mm Thickness-6mm Length-6000mm
4.2.3	Mild Steel Pipe	Diameter-76mm, Thickness-13mm, Length-6000mm
4.2.4	Mild Steel Plate	Length-2400mm Width-1200mm Thickness-13mm
4.2.5	Mild Steel Gusset (I-Beam)	I-beam top-50mm I-beam column-100mm I-beam bottom 50mm Thickness-6mm Length-6000mm
4.2.6	Insulation - Fibre Glass Wool	Size: 15M x 1.2M x 50mm
4.2.7	Mild steel flat bar	Size 50mm x 5.80mm x 6m
4.2.8	Centrifugal Fan with Motor - 1.5kW,1800 rpm, 750pa	A. Type: single inlet single width (SISW) Centrifugal Blower B. Application: circulating hot air in oven C. Fan Capacity:1055CFM D. Static Pressure:2 in WC E. Fan Speed:1800rpm F. Inlet size : 500mmX500mm G. Outlet size : 500mmX500mm H. Fan Balancing Grade: As per ISO 1940 : Grade 6.3 I. Material of Construction: Mild steel J. Sound Level: 60 dB from 2.0 meter distance K. Motor Details: 1.5kW motor/ 1800 RPM, 415 volts, 3 - phase, 50 Hz, Flame proof, Insulation class F, Protection Class IP- 55 L. Drive: Direct M. Fan Direction: Backward curved wheel

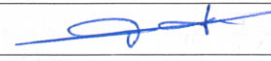
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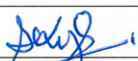
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CLAUSE No.	ITEM DESCRIPTION	REQUIREMENT
4.2.9	MCB - 32A Breaking Capacity	As per specification number KP1/6C/4/1/TSP/011/002 on Low Voltage Circuit Breakers (MCB) – Specification dated 14/8/2018
4.2.10	Contactors - 9A Coil Voltage 240 V - 440 V	<p>A. The electromagnetic contactors shall have side mounted auxiliary contacts having 2NO and 2NC contacts.</p> <p>B. Load Current rating- 9A</p> <p>C. Voltage- 420V AC</p> <p>D. No of phases - 3</p> <p>E. No of poles - 3</p> <p>F. Auxiliary contacts - 2NO- 2NC</p> <p>G. Overload relays Direct connection to the contactor</p> <p>H. Coil voltage - 230VAC</p> <p>I. Degree of protection - IP20</p> <p>J. Wire terminals - 2 x 2.5mm²</p> <p>K. Mounting - Rail mounting</p> <p>L. Operating temperature - 0-100°C</p>
4.2.11	Start Push Button	<p>A. Type: Momentary Contact Push Button</p> <p>B. Operator Construction: Round plastic operator</p> <p>C. Cap Text: START / I</p> <p>D. Cap Color: Green</p> <p>E. Contact Block(s): 1 N.O. - 1 N.C.</p>
4.2.12	Stop Push Button	<p>A. Type: Momentary Contact Push Button</p> <p>B. Cap Text: STOP / O</p> <p>C. Cap Color: Red</p> <p>D. Contact Block(s): 1 N.O. - 1 N.C.</p>
4.2.13	Timer	<p>A. Supply circuit</p> <p>i. Rated control supply voltage Us: 220-240 V AC</p> <p>ii. Control supply frequency : 50HZ</p> <p>B. Timing circuit:</p> <p>i. Starting time : 0.1-10 s</p> <p>ii. Thumbwheel for the fine adjustment of the starting time</p> <p>C. Indication of operational states</p> <p>i. Green LED – Control supply voltage applied</p> <p>ii. Red LED – Output relay energized</p> <p>D. Output circuit</p> <p>i. Kind of output 15-16/18: relay, 1 c/o (SPDT) contact</p>


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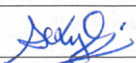
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CLAUSE No.	ITEM DESCRIPTION	REQUIREMENT
		ii. Rated operational voltage: 230V iii. Rated operational current: a. AC-12 (resistive) at 230 V:4A b. AC-15 (inductive) at 230 V :3A
4.2.14	Thermal Overload Relay Protection	A. Main circuit i. Rated operational voltage: 690 V AC ii. Rated frequency:50HZ iii. Number of poles:3 iv. Trip rating:125%FLA v. Full load amps (FLA): vi. Trip class:10A B. Auxiliary circuit i. Rated operational voltage: 500 V AC ii. Number of poles: 1 N.C. + 1 N.O.
4.2.15	Phase Sequence / Phase Failure	A. Rated input voltage UN=415-420V AC B. Number of phases:3 C. Indicators i. Power (PWR): Green, Lit when power is being supplied. ii. Output (OUT): Yellow, Lights for output (lit for normal operation) iii. OVER: Red, Lights for overvoltage error. When the input exceeds the overvoltage value, Flashes for phase loss iv. UNDER: Red Lights for under voltage error. When the input exceeds the under voltage value. Flashes for reversed phase error D. Operating time setting range i. Overvoltage/ Under voltage: 0.1 to 30 s ii. Phase sequence: 0.1 s±0.05 s iii. Phase loss: 0.1 s max iv. The rated input voltage can be switched by using the DIP switches. E. Output form: Relay: SPDT contact output F. Output relay ratings: i. Rated load 5 A at 230 VAC (Resistive load) ii. The Power ON lock time, rated voltage are set using the DIP switch located on the front of the Unit G. Setting Knobs:

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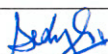
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CLAUSE No.	ITEM DESCRIPTION	REQUIREMENT
		<ul style="list-style-type: none"> Overvoltage knob (OVER): Used to set from -30% to 30% of the rated input. Under voltage knob (UNDR): Used to set from -30% to 30% of the rated input Operating time knob (T): Used to set the operating time to 0.1 to 30 s
4.2.16	Pressure Gauge	Bourdon Tube pressure gauge Operating range:
4.2.17	Pilot Light – Green	A. Rated Voltage: 230V AC B. Terminal Capacity: screw connection, 1X2.5mm ² C. Color : Green D. Dimension in mm
4.2.18	Pilot Light – Red	A. Rated Voltage 230V AC B. Terminal Capacity: screw connection, 1X2.5mm ² C. Color :Red D. Dimension in mm
4.2.19	2.5sqmm Copper Red wire	As per specification number KP1/6C.1/13/TSP/05/016 on Specification for PVC Insulated Wiring and Auxiliary cables dated 21/10/2015
4.2.20	2.5sqmm Copper Yellow wire	
4.2.21	2.5sqmm Copper Blue wire	
4.2.22	2.5sqmm Copper Black wire	
4.2.23	16sqmm Copper Red Wire	
4.2.24	16sqmm Copper Yellow Wire	
4.2.25	16sqmm Copper Blue Wire	
4.2.26	16sqmm Copper Black wire	
4.2.27	Heater – 3kW	<ul style="list-style-type: none"> The air heaters should be highly non-corrosive, lightweight and durable. They shall have thicker sheath wall, silicone seals to ensure moisture resistance in humid environments They shall incorporate design features for mounting and termination. The termination provisions shall be able to accommodate 16sqmm single core/stranded cable. Technical Particulars for heater element 3000w Operating Voltage 220-250 Vac Frequency 50 Hz Rating Range 3000 – 3200 watts
4.2.28	MCB – 125A	A. Rated Current (I _n):125A B. Rated Operational Voltage:420V

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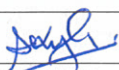
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CLAUSE No.	ITEM DESCRIPTION	REQUIREMENT
		C. Number of Poles:4
4.2.29	Contactor – 100A	The electromagnetic contactors shall have side mounted auxiliary contacts having 2NO and 2NC contacts. Load Current rating- 100A Voltage- 420V AC No of phases- 3 No of poles- 3 Auxiliary contacts- 2NO-2NC Overload relays Direct connection to the contactor Coil voltage- 230VAC Degree of protection- IP20 Wire terminals- 2 x 16sqmm2 Mounting- Rail mounting Operating temperature- 0-100°C
4.2.30	Temperature Sensor	A. Material Body: Stainless steel B. Sensing Elements: PT100 Platinum Elements per IEC751 C. Accuracy : $\pm 0.03^{\circ}\text{C}$ to $\pm 0.3^{\circ}\text{C}$ D. Operating Temperature: from 0 to + 250°C E. Number of Wires:4 wire F. Cable Length in meters:8 Meters G. Cable Type: Selection – PTFE, Silicone Rubber = SR, Fiberglass with Braid, Stainless Steel Flexible Conduit = SSFC
4.2.31	Humidity Sensor	Measuring Range-0-100% RH
4.2.32	Temperature And Humidity Controller	A. Power supply voltage:230V AC,50Hz B. Operating voltage range:85-110% of rated supply voltage C. Sensor Input: Pt100 and humidity sensor D. Number of inputs:2 or more E. Control output: Relay output: SPST-NO, 230 VAC, 2-5 A (resistive load), F. Auxiliary output: Number of outputs: 1 or 2 G. Setting method: Digital setting using front panel keys H. Input sampling period:50ms I. Control method: ON/OFF or 2-PID control
4.2.33	Heat resistant wire/cable 16sqmm	A. Insulation of the cable shall be highly non-corrosive, durable and contain no asbestos


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CLAUSE No.	ITEM DESCRIPTION	REQUIREMENT
		B. Cores shall be of stranded copper conductors C. Cable shall be fire resistant/proof(should be able to maintain normal operation with an external flame) D. The package shall come in form of rolls of 100m E. Operating voltage- 600Vac F. Temperature tolerance-300°C G. Size- 16sqmm
4.2.34	Control panel	Size 550mm x 600mm
4.2.35	Steel beam	Size (200mm x 100mm x 6mm) 6m long
4.2.36	Steel tube	Size 100mm x 100mm x 6mm thick, 6m long
4.2.37	Steel pipe	Size 76mm diameter, 13mm thick
4.2.38	Steel plate	Size 2.4*1.2*13mm thick
4.2.39	Steel gusset	(100mm*50mm)
4.2.40	Caster Wheel	A. With a swivel plate : Yes, B. Bolt hole swivel: Yes C. Weight Capacity:3 Tonnes D. swivel plate with total lock, fixed plate, brakes: Yes
4.2.41	3ton chain block 5m chain	As per specification number KP1/3CB/TSP/09/060-4, Specification for overhead lines load handling devices part 4: chain sling and snatch block
4.2.42	3-Ton Geared Trolley - Manual 5M Chain	Capacity : 3 Tonnes Hand Chain Length: 5m
4.2.43	3 ton chain block 5m chain	As per specification number KP1/3CB/TSP/09/060-4 on Overhead lines load handling devices- Part 4: Chain Sling and Snatch block dated 8/7/2014

5. TESTS REQUIREMENTS

The materials for oven and lightweight gantry hoist shall be inspected and tested as per the requirements of the relevant standards and this specification.

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APPENDICIES**A: TESTS AND INSPECTION (Normative)**

- A.1 It shall be the responsibility of the supplier to test or to have all the relevant tests performed.
- A.2 On receipt of the materials, KPLC will inspect and may perform any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to KPLC materials, which upon examination, test or use fail to meet any or all of the requirements in this 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 design, material, workmanship, tests, service capability, 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 reference standards and copies of quality management certifications including copy of valid and relevant ISO 9001: 2015 certificate shall be submitted with the tender for evaluation.

C: DOCUMENTATION (Normative)

- C.1 The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:
- Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer.
 - Drawings
 - Details of supplier's capacity and experience;
- C.2 The successful bidder (supplier) shall submit the following documents/details to KPLC for approval before manufacture:
- Fully filled clause-by-clause Guaranteed Technical Particulars (GTP) stamped and signed by the manufacturer.
 - Drawings

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D: GUARANTEED TECHNICAL PARTICULARS (Normative)

(To be filled and signed by the Supplier and submitted together with relevant copies of technical data, details of suppliers' capacity and experience)

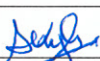
Tender No.

Clause number	Item Description	Bidder's offer
1.	Bidder's Name and address	Specify
	Manufacturer's Name, address and country	Specify
	Scope	Specify
4.1	Service Conditions	Specify
4.2	Specific requirements	
4.2.1	Mild steel sheet	
	Size: 2.4m x 1.2m x 1.5mm	Specify
	Size: 2.4m x 1.2m x 1.0mm	Specify
4.2.2	Mild Steel Square Tube	
	Width	Specify
	Thickness	Specify
	Length	Specify
4.2.3	Mild Steel Pipe	
	Diameter	Specify
	Thickness	Specify
	Length	Specify
4.2.4	Mild Steel Plate	
	Length	Specify
	Width	Specify
	Thickness	Specify
4.2.5	Mild Steel Gusset (I-Beam)	
	I-beam top	Specify
	I-beam column	Specify
	I-beam bottom	Specify
	Thickness	Specify
4.2.6	Insulation Fiber Glass Wool	
	Size: 15M x 1.2M x 50MM	Specify
4.2.7	Mild steel flat bar	
	Size 50mm x 5.80mm x 6m)	Specify
4.2.8	Centrifugal Fan with Motor - 1.5kW, 1800 rpm, 750pa	
	Fan type	Specify
	Application	Specify

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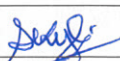
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Clause number	Item Description	Bidder's offer
	Fan capacity	Specify
	Static Pressure	Specify
	Fan speed	Specify
	Inlet size	Specify
	Outlet size	Specify
	Fan balancing grade	Specify
	Material of construction	Specify
	Sound Level	Specify
	Motor details	Specify
	Drive	Specify
	Fan direction	Specify
4.2.9	MCB - 32A Breaking Capacity Provide GTP for MCB as per specification number KP1/6C/4/1/TSP/011/002 on Low Voltage Circuit Breakers (MCB) – Specification dated 14/8/2018	Provide
4.2.10	Electromagnetic Contactors - 9A Coil Voltage 230 V - 420 V Side mounted auxiliary contacts with 2NO and 2NC contacts Current rating Voltage rating No of phases No of poles Auxiliary contacts Overload relay connection Coil voltage Degree of protection Wire termination Mounting Operating temperature	Specify Specify Specify Specify Specify Specify Specify Specify Specify Specify Specify Specify
4.2.11	Start push button Type Operator construction CAP text CAP colour Contact block(s)	Specify Specify Specify Specify Specify
4.2.12	Stop push button Type Cap text Cap colour Contact block(s)	Specify Specify Specify Specify


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Clause number	Item Description	Bidder's offer
4.2.13	Timer	
	Supply circuit	Rated control supply voltage Specify
		Control supply frequency Specify
	Timing circuit	Starting time Specify
		Thumbwheel for the fine adjustment of the starting time Specify
	Indication of operational states	Green LED Specify
		Red LED Specify
	Output circuit	Kind of output 15-16/18 Specify
		Rated operational voltage Specify
		Rated operational current Specify
	Connection diagram	Provide
4.2.14	Thermal overload relay protection	
	A. Main circuit	
	Rated operational voltage	Specify
	Rated frequency	Specify
	No of poles	Specify
	Trip rating	Specify
	Full load amps	Specify
	Trip class	Specify
	B. Auxiliary circuit	
	Rated operating voltage	Specify
4.2.15	Phase sequence/phase failure	
	Rated input voltage	Specify
	No of phases	Specify
	Indicators	Specify
	Operating time setting range	Specify
	Output form-relay	Specify
	Output relay rating	Specify
	Setting knobs	Specify
4.2.16	Pressure gauge	
	Type	Specify
	Operating range	Specify
4.2.17	Pilot Light- Green	
	Rated Voltage	Specify
	Terminal Capacity	Specify
	Colour	Specify
	Dimensions	Specify

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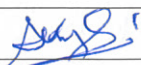
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Clause number	Item Description	Bidder's offer
4.2.18	Pilot Light- Red	
	Rated Voltage	Specify
	Terminal Capacity	Specify
	Colour	Specify
	Dimensions	Specify
4.2.19	2.5sqmm copper Red wire	Provide GTP as per as per specification number KP1/6C.1/13/TSP/05/016 on Specification for PVC Insulated Wiring and Auxiliary cables dated 21/10/2015
4.2.20	2.5sqmm copper Yellow wire	
4.2.21	2.5sqmm copper Blue wire	
4.2.22	2.5sqm copper m Black wire	
4.2.23	16sqmm copper Red Wire	
4.2.24	16sqmm copper Yellow Wire	
4.2.25	16sqm copper m Blue Wire	
4.2.26	16sqmm copper Black wire	
4.2.27	Heater element 3000W requirements	
	Quality of heater.	Specify
	Sheath and termination qualities	Specify
	Features for termination and mounting	Specify
	Termination provision	Specify
	Operating voltage	Specify
	Operating frequency	Specify
	Rating	Specify
4.2.28	MCB- 125A	
	Rated current	Specify
	Rated operational voltage	Specify
	No of poles	Specify
4.2.29	Electromagnetic contactor 100A	
	Side mounted auxiliary contacts with 2NO and 2NC contacts	Specify
	Current rating	Specify
	Voltage rating	Specify
	No of phases	Specify
	No of poles	Specify
	Auxiliary contacts	Specify
	Overload relay connection	Specify
	Coil voltage	Specify
	Degree of protection	Specify
	Wire termination	Specify
	Mounting	Specify
	Operating temperature	Specify

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Clause number	Item Description	Bidder's offer
4.2.30	Temperature sensor	
	Sheath qualities (Oil resistant, high temperature application and non-corrosive)	Specify
	Good thermoelectric stability and excellent resistance to high temperature oxidation	Specify
	Temperature range	Specify
	Probe termination	Specify
	Probe length	Specify
	Probe diameter	Specify
	Accuracy	Specify
4.2.31	Humidity sensor	
	Measuring range	Specify
4.2.32	Temperature and humidity controller	
	Power supply voltage	Specify
	Operating voltage range	Specify
	Sensor input	Specify
	No of inputs	Specify
	Control output	Specify
	Relay output	Specify
	Auxiliary output	Specify
	No of outputs	Specify
	Setting method	Specify
	Input sampling period	Specify
	Control method	Specify
4.2.33	Heat resistant cable/wire 16sqmm	
	Insulation of the cable	Specify
	Conductors core	Specify
	Cable properties	Specify
	Package	Specify
	Operating voltage	Specify
	Temperature tolerance	Specify
	Size	Specify
4.2.34	Control panel box	
	Size 550mm X 600mm	Specify
4.2.35	Steel beam	
	Size 200mm x 100mm x 6mm	Specify
	Length	Specify
4.2.36	Steel tube	
	Size 100mm x 100mm x 6mm(thick)- 6m long	Specify

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Clause number	Item Description	Bidder's offer
4.2.37	Steel pipe Size 76mm diameter, 13mm thick	Specify
4.2.38	Steel plate Size 2.4*1.2mm*13mm(thick)	Specify
4.2.39	Steel gusset Size 100mm*50mm	Specify
4.2.40	Caster wheel With a swivel plate(yes/no) Bolt hole swivel(yes/no) Weight capacity Swivel plate with total lock, fixed plate and brakes(yes/no)	Specify Specify Specify Specify
4.2.41	3ton chain block 5m chain As per specification number KP1/3CB/TSP/09/060-4, Specification for overhead lines load handling devices part 4: chain sling and snatch block	Provide GTP
4.2.42	3ton geared trolley-manual 5m chain Type Capacity Hand chain length	Specify Specify Specify
4.2.43	3 ton chain block 5m chain - As per specification number KP1/3CB/TSP/09/060-4 (The specification o be attached with tender)	Specify
5	Test Requirements	State
	APPENDICES	
A	Test and inspection	
A.1	Responsibility of carrying out tests	State
A.2	Inspection at the stores and replacement of rejected materials at no cost to KPLC	State compliance
B	Quality Management System Supplier's experience Supplier's Capacity	State State
C	Documentation	
C.1	Documents submitted with tender	Provide
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture	List
	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

.....
Manufacturer's Name, Signature, Stamp and Date

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