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Kenya Power

HAND-OPERATED CONDUCTOR PREPARATION TOOLS (COMPRESSION, CUTTING AND PEELING) — SPECIFICATION

A Document of the Kenya Power & Lighting Co. Ltd

December 2017

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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.

0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2014-10-01	New Issue	Michael Apudo	Eng. S Kimitei
1	2017-12-13	Changed the format Added clause 4.2.3.4 - Dies for hand operated hydraulic compression tools (up to 300mm2 and 300-1000mm2) Renamed drawings by adding "Typical"	John Ng'ang'a	Dr. Eng. Peter Kimemia

FOREWORD

This specification has been prepared by the Standards Department in collaboration with Network Management, both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for hand-operated cutting, compression, peeling and jointing tools for use on power lines. It is intended for use by KPLC in purchasing the tools.

In preparation of this specification, reference was made to ISO 9461, ISO 10763 and ISO 4957. A new format of writing specifications as guided by KEBS was also adopted.

This specification stipulates the minimum requirements for the hand-operated cutting, compression, peeling and jointing tools 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. The manufacturer shall exhibit good workmanship and good engineering practice in the manufacture of the hand-operated cutting, compression, peeling and jointing tools for KPLC.

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

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

Name	Division
James Njuguna	Network Management
Rotich Benard	Infrastructure Development
John Ng'ang'a	Infrastructure Development

1. SCOPE

1.1. This specification covers requirements for the Hand-Operated Conductor Preparation tools (Compression, Cutting and Peeling) for use on power lines. They shall include:

a) Hand operated hydraulic wire cutter (24" & 42")

b) Hand operated manual wire cutter (24" & 42")

c) Hand operated hydraulic compression tool (up to 300mm^2 and 300 to 1000 mm^2)

d) Split hydraulic cable jointing tool kit (150-630mm^2)

e) Cable peeling and stripping tool

1.2. The specification stipulates minimum requirements, inspection and tests of the Hand-Operated Conductor Preparation tools 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.

ISO 9461: Hydraulic fluid power -- Identification of valve ports, sub-plates, control devices and solenoids

ISO 10763: Hydraulic fluid power—Plain-end, seamless and welded precision steel tubes—Dimensions and nominal working pressures.

ISO 4957: Tool steels

3. DEFINITIONS

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

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

The Hand-Operated Conductor Preparation Tools shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:

a) 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) Humidity: up to 95%

d) 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.

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

f) Tropical sunshine conditions

4.2. DESIGN AND CONSTRUCTION

4.2.1. Hand operated hydraulic wire cutter

4.2.1.1 The Hand operated hydraulic wire cutter design and manufacture shall conform to the requirements of ISO 9461 and ISO 10763 standard requirements and those of this specification.

4.2.1.2 The cutter handle insulation shall be dielectrically tested to 10 kV AC according to IEC 60900 standard - insulated hand tools.

4.2.1.3 The cutting tool shall be designed to cut guy wires, anchor rods and most overhead and underground cables. The cutters shall be portable, lightweight, and made to last years under the toughest field conditions.

4.2.1.4 The cutter shall possess an anvil style center cut blades to eliminate jamming problems. The blades shall be easily replaced in the field.

4.2.1.5 The tools shall be made of high grade steel and have rubber handle grips. All tools shall be black zinc oxide coated to help reduce corrosion.

4.2.1.6 It shall have a flip-top latch that opens the tool jaw to easily accept cables and wires. The head shall be rotated up to 180° to facilitate easy wire positioning and operator leverage. It shall also require a minimum pumping effort to produce specified output tonnage. The dimensions and capacity shall be as per Table 1.

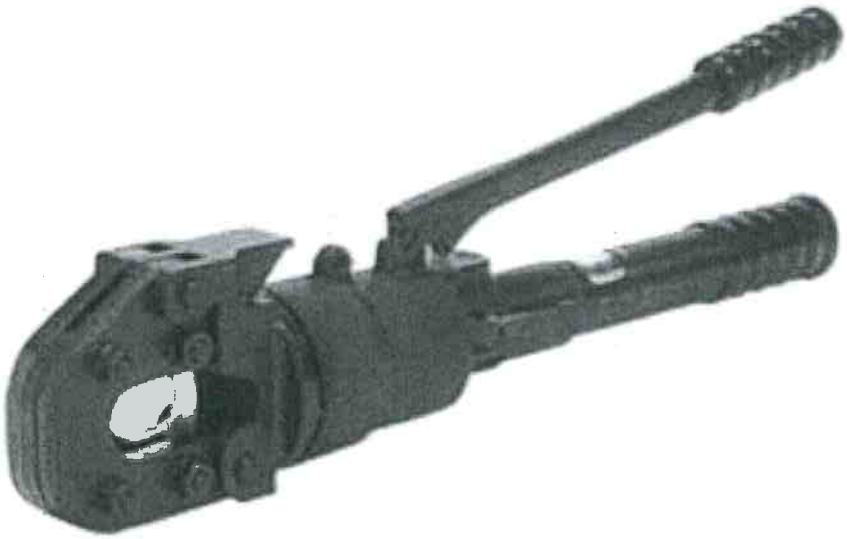

Fig. 1: Typical Hand operated hydraulic wire cutter

Table 1: Dimensions and capacity of hand operated hydraulic wire cutter

Length of the tool		Soft and medium hard materials (Up to HRC 31)		Hard materials up to HRC 48		Approximate weight
inch	mm	inch	mm	inch	mm	kg
24	610	7/8	11	5/6	8	3
36	914	9/16	14	7/16	11	6
42	1047	11/16	18	1/2	13	8

4.2.2. Hand operated manual wire cutter

4.2.2.1 This shall be a professional quality well-constructed tool used to cut from soft, medium hard to hard materials.

4.2.2.2 The cutter's jaws shall have heavy-duty strap jaws – straps shall keep the cutting edges aligned under the most demanding applications - with centre cut blade pattern, drop forged from high quality chrome vanadium steel, scientifically hardened, tempered and heat-treated to HRC 56-60 for strength.

4.2.2.3 The jaws shall be drop-forged, precision ground, alloy tool steel (grade AISI - D2) with strap connecting bolts to allow clearance adjustment that shall not work loose. They shall have slightly rounded cutting edges, beveled on both sides to broaden the cutting applications.

4.2.2.4 It shall have a high leverage handle with rubber insulated grips dielectrically tested to 10 kV AC conforming to IEC 60900 for operating safety and comfort.

4.2.2.5 Specific features of the tool shall be:

a) **Precision cutting edges** – Shall be accurately beveled for specific types of cuts and materials.

b) **Cutting jaws** – Shall be made of alloy tool steel, drop forged, precision ground for maximum wear resistance and longer cutting life.

c) **Lock plate** – Shall be able to prevent jaw bolts from turning or loosening. Shall also be suitable to eliminate "sloppy" head, and ensure trouble-free operation.

d) **Simple adjustment** – A provision for one adjustment to realign cutting edges properly.

e) **Toggle joint** – Shall transform 250N of hand pressure on handles to 18kN pressure on cutting edges of jaws.

f) **Steel tubular handles** – Shall have greater strength and lighter weight.

g) **Rubber grips** – Shall allow for easy and firmer grip for user safety.

h) **Handles closer together** – To offer more cutting power with less strain.

4.2.2.6 The Fig. 2 below illustrates the typical cutter described in this specification with replacement jaws and the cutting blade pattern. Table 2 gives the physical characteristics of various sizes.

Table 2: Hand operated manual wire cable cutter

Length of the tool		Soft and medium hard materials (Up to HRC 31)		Hard materials up to HRC 48		Approximate weight
inch	mm	inch	mm	inch	mm	kg
24	610	7/8	11	5/6	8	3
36	914	9/16	14	7/16	11	6
42	1047	11/16	18	1/2	13	8

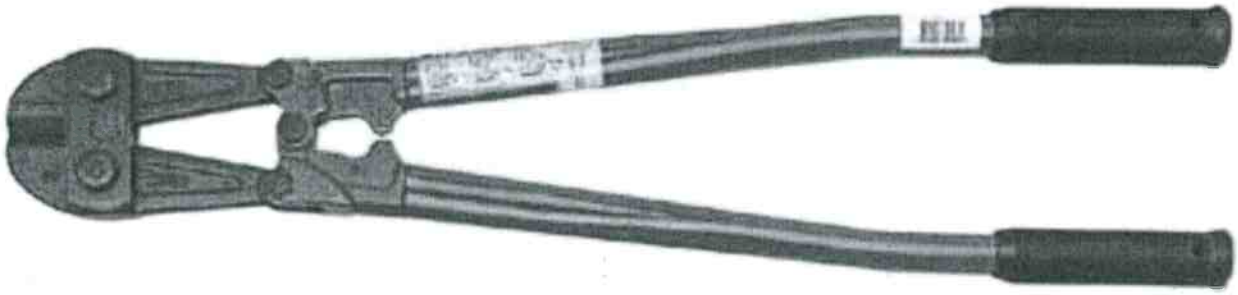

Fig. 2a: Typical Heavy-Duty Center Cut Cutters

Fig. 2b: Typical Replacement Cutter Head

Fig. 2b: Typical Replacement Black Jaws

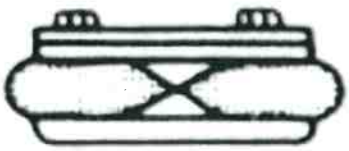

Fig. 2c. Typical Centre cut pattern

4.2.3. Hand operated hydraulic compression tool

4.2.3.1 General

4.2.3.1.1 The hand operated hydraulic crimping tool design and manufacture shall conform to the requirements of ISO 9461 and ISO 10763 standard requirements and those of this specification.

4.2.3.1.2 The hydraulic crimping tools shall be lightweight and compact for the crimping and compression of low and high voltage cable lugs, splices and connectors.

4.2.3.1.3 The tools shall be made of high grade steel and have rubber handle grips. All tools shall be black zinc oxide coated to help reduce corrosion with the crimping blades and dies made of alloy tool steel (grade AISI - D2).

4.2.3.2 Hand compression tool up to 300mm^2

4.2.3.2.1 The hydraulic crimping tool shall be ideal for installing crimp connectors to overhead line applications and accepts most semi-circular slotted dies common to 130kN tools.

4.2.3.2.2 The tool shall have a die release system, protected from accidental operation and a pressure release trigger, which can be operated at any stage of the compression.

4.2.3.2.3 The tool design shall feature spring loaded handles allowing the die sets to be advanced with one hand - the other hand free to position the connector prior to crimping.

4.2.3.2.4 For ease of operation and comfort of the operator the crimp tool head can be fully rotated through 180 degrees.

4.2.3.2.5 The hydraulic crimping tool design shall feature built-in safety valves which by-pass the oil supply when the maximum pressure is reached.

4.2.3.2.6 The crimping tool shall have a twin speed operation and automatically switches from a rapid advancing speed of the ram to a slower more powerful crimping speed as the die sets close and compress onto the connector.

4.2.3.2.7 The hydraulic crimping tool shall have the following compression capability as per Table 2:

Table 2: Compression tool capabilities

Sn. No	Type of connector	Compression tool type
1	LV Lugs	Up to 400mm^2
2	LV Splices	Up to 240mm^2
3	Insulated Terminals	Up to 240mm^2
4	HV Lugs	Up to 400mm^2
5	HV Splices	Up to 240mm^2
6	C Sleeve and C Tap Connectors	Up to 185mm^2.

4.2.3.2.8 The hydraulic crimping tool shall have the following features and shall be as per Fig. 3 (typical):

a) Crimping Force - 120kN

b) Length - 488mm

c) Width - 138mm

d) Weight - 5.7kg

Fig. 3: Typical Hand Operated Hydraulic Compression Tool of up to 300mm^2

4.2.3.3 Hand compression tool up to 300 - 1000mm^2

4.2.3.3.1 The compression tool shall be a double acting (hydraulically advancing and retracting the ram) 60 ton press with a fast ram retraction and elimination of the tool jamming.

4.2.3.3.2 The tool shall feature a four (4)-way valve to reroute the hydraulic path to the retracting chamber when retracting the ram,

4.2.3.3.3 It shall ensure that the ram retracts hydraulically and as a result, the possibility of connector jamming shall be eliminated and at the same time the ram shall be retracted much faster. The ram retracting time shall not be more than 1/3 of the spring return.

4.2.3.3.4 The tool shall use U-type dies used for 60 ton compressors with a maximum diameter of 60mm.

4.2.3.3.5 Engine driven hydraulic pumps, hand pump, foot pump and electrical pump are recommended to operate the tool. The pumps shall have a double acting mechanism.

4.2.3.3.6 The hydraulic crimping tool shall have the following compression capability as per Table 3:

Table 3: Compression tool capabilities

Sn. No	Capability	Minimum Requirement
1	Ram stroke	38.5 mm
2	Oil volume required	303 cc
3	Force at die face	517 kN
4	Oil pressure	68.5 Mpa (10, 000 PSI)
5	Porting	¼" NPSM male & female couplers
6	Coupling	BI type coupler size 06 (3/8")
7	Tightening torque	34 Nm
8	Approximate size	260 (Dia) x 446 (H) mm with Ground stand

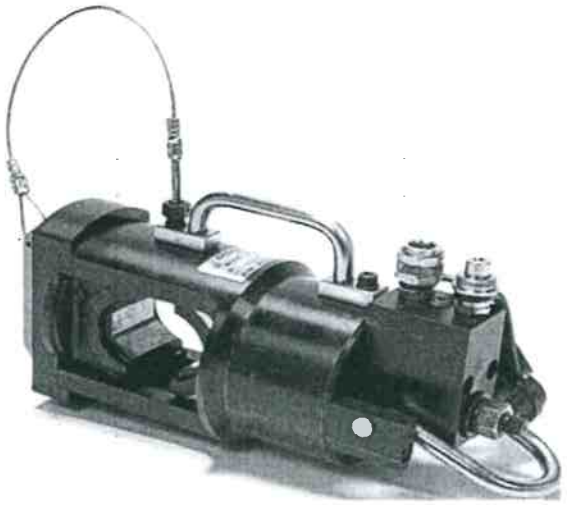

Fig. 4: Typical Hand Operated Hydraulic Compression Tool of 300 - 1000mm^2

4.2.3.4 Dies for hand operated hydraulic compression tools (up to 300mm^2 and 300-1000mm^2)

4.2.3.4.1 The die design and manufacture shall conform to the requirements of ISO 4957 standard requirements and those of this specification.

4.2.3.4.2 The die shall be hexagonal in design and of the two-part semi-slotted U type

4.2.3.4.3 The die shall be compatible with all crimping tools that accept U type dies

4.2.3.4.4 The dies shall be manufactured from alloy tool steel (grade AISI - D2), and be capable of enabling a force of up to 130kn to be applied to stranded copper and aluminum conductors and cables at both low and high voltages

4.2.3.4.5 The dies shall be capable of compressing lugs, splices, connectors and sleeves for stranded aluminum and copper conductors and cables of the following sizes:

a) Conductor: 50mm^2, 75mm^2, 100mm^2, 150mm^2 and 300mm^2

b) Cables: 16mm^2, 25mm^2, 50mm^2, 70mm^2, 95mm^2, 120mm^2, 185mm^2, 300mm^2 ,630mm^2

4.2.3.4.6 The applicable conductor/cable sizing or across flat measurement shall me marked on each die as specified in Section 6.1. (d)

4.2.3.4.7 The dies shall be supplied in a steel/plastic carrying case complete with die compartment for holding up to 10 sets of dies

4.2.4. Split Hydraulic Cable Jointing Tool Kit

4.2.4.1 The equipment shall be used for compression of aluminium/copper lugs and connectors onto aluminium/copper conductors.

4.2.4.2 The equipment shall have facilities to enable it be fitted with hexagonal dies and shall have positive push button die locks.

4.2.4.3 The swiveling head shall be able to turn 360° to allow use in confined places.

4.2.4.4 The equipment shall be used outdoor and indoor under all weather conditions.

4.2.4.5 The equipment shall be supplied with a full range of dies for cable lugs & fittings (LV/HV), overhead line connectors and fittings including ABC cable fittings covering the range 150 – 630mm2.

Fig. 5: Typical Split Hydraulic Cable Jointing Tool Kit

4.2.4.6 The oil pipe coupler shall be fitted with size 06 (3/8") thread.

4.2.4.7 The compression equipment shall be connected with hydraulic pump with maximum working pressure of 700kgf/cm^2. The hydraulic pump shall be manually operated.

4.2.4.8 It shall include the hydraulic press heads, handles and shall be complete and ready for use.

4.2.4.9 The hydraulic compression tool shall have the following typical values as a summary of its technical specifications as in Table 4:

Table 4: Typical Jointing Kit Technical Data

Item	Technical Data
Output	120 kN
Maximum weight	11kg
Swivel head	360°
Pump delivery pressure	35T
Hexagonal die range	150 to 630mm 2 Cu - Al

4.2.5. Cable Peeling and Stripping Tool

4.2.5.1 This shall be one tool, performing the following four operations:

a) Stripping of sheathing material,

b) Peeling of outer bonded semiconductor,

c) Stripping of main insulation,

d) Chamfering of main insulation,

e) Cutting a slot into the insulation.

4.2.5.2 This tool shall be suitable for preparing cables in the field, before mounting joints and terminations. The tool shall be used for creating a smooth surface on the insulation and for the transition between insulation and the semiconductor. It shall have the following technical data (typical):

a) Range of cable diameter (mm): **1.5-50**

b) Weight of tool (kg): **1.2**

c) Maximum peeling depth (mm): **1.5**

d) Minimum length of semiconductor (mm): **25**

e) Cutting depth for insulation (mm): **0..10**

4.2.5.3 During the peeling of bonded semiconductor:

a) The peeling depth shall easily be adjusted by the fine adjustment screw. As the peeling knife is firmly fixed to one of the rollers running on the surface of the cable, the knife shall follow exactly the contour of the cable, even if it is not completely round.

b) The feed for the peeling process shall be built into the guiding rollers. The knife shall have a special shape to provide a very smooth surface on the insulation.

c) The transition between insulation and semiconductor shall be designed to make an angle of some 10 degrees to provide for a perfect fit for slip on terminations and joints without any polishing rework.

4.2.5.4 The stripping of insulation and outer sheathing shall have the following features:

a) The tool has a knife with adjustable cutting angle used for stripping the insulation with a cutting angle which sets the feed for the stripping process.

b) The knife shall have a special shape of the cutting that allows a gap of about 1 mm to be left between the conductor and the bottom of the knife. This shall enable the insulation material and the inner semiconductor, to be lifted off the conductor while cutting all the way through.

c) The tool shall finish the cutting process when the desired length is reached, the feed shall automatically reset to zero. The end result shall be a circular cut, allowing the pulling off of the helical shaped strip of insulation.

4.2.5.5 The chamfering of insulation shall require that the same knife used for peeling of the semiconductor shall be used with a chamfering angle of about 30 degrees to the cable axis.

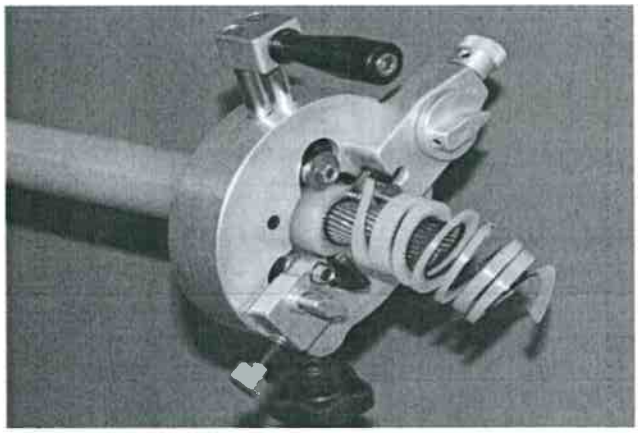

Fig. 6: Typical Cable Peeling and Stripping Tool

5. TESTS REQUIREMENTS

The Hand-Operated Conductor Preparation Tools shall be inspected and tested in accordance with the requirements of the standards and provisions of this specification.

6. MARKING AND PACKING

6.1. Markings

The hand-operated cutting, compression, peeling and jointing tools shall be clearly, legibly and indelibly marked with the following information either by embossing or inscription:

a) The manufacturer's initials or recognized trade-mark or both;

b) The year of manufacture;

c) Designation of the tool;

d) Range of wires and cables applicable for each tool;

e) Rated pressure in case of hydraulic tools;

f) Words "**Property of KPLC**"

NOTE:

a) Where lack of available space would result in lettering too small to be legible, information may be provided on supplementary literature such as instruction/maintenance sheets, catalogue sheets or accessory tags.

b) Optional information that can be given either on the component or in supplementary literature shall also be provided in the instruction sheet.

6.2. Packaging

6.2.1. Each hand-operated cutting, compression, peeling and jointing tool shall be packed in a rubberized ergonomic case with a handle at balance point making the tool much easier to carry in a manner so as to avoid damage during transportation and storage.

6.2.2. The following information shall be printed on a suitable label firmly attached to each packaging or embossed on the body of the case:

a) Purchase order number/tender;

b) Manufacturer's name;

c) Year of manufacture;

d) Tool catalog or designation number;

e) The words, "**Property of The Kenya Power & Lighting Co. Ltd.**"

APPENDICES

A. TESTS AND INSPECTION (Normative)

A.1. 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. 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. 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.

A.3. The hand-operated cutting, compression, peeling and jointing tools shall be subject to acceptance tests at the manufacturer's works before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Limited (KPLC). Routine and Sample Test Reports for the hand-operated cutting, compression, peeling and jointing tools to be supplied shall be submitted to KPLC for approval before delivery of the goods.

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 hand-operated cutting, compression, peeling and jointing tools which upon examination, test or use, fail to meet any of the requirements in the specification.

B. QUALITY MANAGEMENT SYSTEM (Normative)

B.1 The bidder shall submit a quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation of the hand-operated cutting, compression, peeling and jointing tools 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 9001:2008 or later.

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: 2008 certificate shall be submitted with the tender for evaluation.

B.3 The bidder shall indicate the delivery time of the hand-operated cutting, compression, peeling and jointing tools, manufacturer's monthly and annual production capacity and experience in the production of the type of current transformers being offered. A detailed list and contact

addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for exact or similar rating items sold in the last five years shall be submitted with the tender for evaluation.

C. **DOCUMENTATION (Normative)**

C.1 The bidder shall submit its tender complete with technical documents required by Appendix D (Guaranteed Technical Particulars) for tender evaluation. The 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) stamped and signed by the manufacturer,

b) Copies of the manufacturer's catalogues, brochures, drawings and technical data,

c) Sales records for the last five years and at least four customer reference letters,

d) Details of manufacturing capacity and the manufacturer's experience,

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

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

g) Manufacturer's warranty and guarantee;

h) Manufacturer's letter of authorization, copy of the manufacturer's ISO 9001:2008 or 2015 certificate, ISO 17025(2005) certificate.

i) Operating instructions

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) signed by the manufacturer,

b) Design drawings and technical details,

c) Quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008 or later,

d) Detailed test program to be used during factory testing,

e) Marking details and method to be used in marking the hand-operated cutting, compression, peeling and jointing tools,

f) Manufacturer's undertaking to ensure adequacy of the design, good engineering practice, adherence to the specification and applicable standards and regulations as well as ensuring

good workmanship in the manufacture of the hand-operated cutting, compression, peeling and jointing tools for The Kenya Power & Lighting Company,

g) Packaging details (including packaging materials and marking and identification of batches).

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 hand-operated cutting, compression, peeling and jointing tools to KPLC stores.

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D. 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. .....

Clause	KPLC requirement	Bidder's offer
Manufacturer's Name and address		Specify
Country of Manufacture		Specify
Bidder's Name and address		Specify
1.	**Scope**	Specify
1.1-1.2		
2.	Applicable Standards	Specify
3.	Terms & Definitions	Specify
4.	**Requirements**	
4.1	Service Conditions	Specify
4.2	**DESIGN AND CONSTRUCTION**	
4.2.1	**Hand Operated Hydraulic wire cutter**	
4.2.1.1	Shall conform to the requirements of ISO 9461 and ISO 10763 standard requirements and those of this specification.	Specify
4.2.1.2	The cutter handle insulation shall be dielectrically tested to 10 kV AC according to IEC 60900 standard - insulated hand tools.	Specify
4.2.1.3	The cutting tool shall be designed to cut guy wires, anchor rods and most overhead and underground cables.	Specify
	The cutters shall be portable, lightweight, and made to last years under the toughest field conditions	Specify
	Expected years expected to last under the toughest field conditions	
4.2.1.4	The cutter shall possess an anvil style; center cut blades to eliminate jamming problems. The blades shall be easily replaced in the field.	Specify
4.2.1.5	The tools shall be made of high grade steel and have rubber handle grips.	Specify
	All tools shall be black zinc oxide coated to help reduce corrosion.	Specify
4.2.1.6	It shall also have a flip-top latch that opens the tool jaw to easily accept cables and wires.	Specify
	The head shall be rotated up to 180° to facilitate easy wire positioning and operator leverage.	Specify
	It shall also require a minimum pumping effort to produce specified	Specify

Clause	KPLC requirement	Bidder's offer
	output tonnage. The dimensions and capacity shall be as per Table 1.	
	The dimensions and capacity shall be as per Table 1.	State dimensions
4.2.2	**Hand operated manual wire cutter**	
4.2.2.1	This shall be a professional quality well-constructed tool used to cut from soft, medium hard to hard materials	Specify
4.2.2.2	The cutter's jaws shall have heavy-duty strap jaws – straps shall keep the cutting edges aligned under the most demanding applications - with centre cut blade pattern, drop forged from high quality chrome vanadium steel, scientifically hardened, tempered and heat-treated to HRC 56-60 for strength.	Specify
4.2.2.3	The jaws shall also be drop-forged, precision ground, alloy tool steel (grade AISI - D2) jaws with strap connecting bolts to allow clearance adjustment that shall not work loose. They shall have slightly rounded cutting edges, beveled on both sides to broaden the cutting applications	Specify
4.2.2.4	It shall have a high leverage handles with rubber insulated grips dielectrically tested to 10 kV AC conforming to IEC 60900 for operating safety and comfort	Specify
4.2.2.5	Specific features of the tool shall be	Specify
	Precision cutting edges – Shall be accurately beveled for specific types of cuts and materials.	Specify
	Cutting jaws – Shall be made of alloy tool steel, drop forged, precision ground for maximum wear resistance and longer cutting life.	Specify
	Lock plate – Shall be able to prevent jaw bolts from turning or loosening. Shall also be suitable to eliminate "sloppy" head, insures trouble-free operation	Specify
	Simple adjustment – A provision for one adjustment to realign cutting edges properly	Specify
	Toggle joint – Shall transform 250N of hand pressure on handles to 18kN pressure on cutting edges of jaws.	Specify
	Steel tubular handles – Shall have greater strength and lighter weight	Specify
	Rubber grips – Shall allow for easy and firmer grip for user safety	Specify
	Handles closer together – To offer more cutting power with less strain.	Specify
4.2.2.6	Physical characteristics of various sizes	Specify
4.2.3	**Hand operated hydraulic compression tool**	
4.2.3.1	**General**	
4.2.3.1.1	The hand operated hydraulic crimping tool design and manufacture shall	Specify

Clause	KPLC requirement	Bidder's offer
	conform to the requirements of ISO 9461 and ISO 10763 standard requirements and those of this specification.	
4.2.3.1.2	The hydraulic crimping tools shall be lightweight and compact for the crimping and compression of low and high voltage cable lugs, splices and connectors.	Specify
4.2.3.1.3	The tools shall be made of high grade steel and have rubber handle grips. All tools shall be black zinc oxide coated to help reduce corrosion with the crimping blades and dies made of alloy tool steel (grade AISI - D2).	Specify
4.2.3.2	**Hand compression tool up to 300mm^2**	
4.2.3.2.1	The hydraulic crimping tool shall be ideal for installing crimp connectors to overhead line applications and accepts most semi-circular slotted dies common to 130kN tools.	Specify
4.2.3.2.2	The tool shall have a die release system, protected from accidental operation and a pressure release trigger, which can be operated at any stage of the compression	Specify
4.2.3.2.3	The tool design shall feature spring loaded handles allowing the die sets to be advanced with one hand - the other hand free to position the connector prior to crimping.	Specify
4.2.3.2.4	For ease of operation and comfort of the electrical engineer or cable jointer the crimp tool head can be fully rotated through 180 degrees.	Specify
4.2.3.2.5	The hydraulic crimping tool design shall also feature a built-in safety valves which by-pass the oil supply when the maximum pressure is reached.	Specify
4.2.3.2.6	The crimping tool shall have a twin speed operation and automatically switches from a rapid advancing speed of the ram to a slower more powerful crimping speed as the die sets close and compress onto the connector	Specify
4.2.3.2.7	The hydraulic crimping tool shall have the following compression capability as per Table 2:	Specify

Sn. No	Type of connector	Compression tool type
1	LV Lugs	Up to 400mm^2
2	LV Splices	Up to 240mm^2
3	Insulated Terminals	Up to 240mm^2
4	HV Lugs	Up to 400mm^2
5	HV Splices	Up to 240mm^2
6	C Sleeve and C Tap Connectors	Up to 185mm^2.

Clause	KPLC requirement	Bidder's offer
4.2.3.2.9	The hydraulic crimping tool shall have the following features and shall be as per Fig. 3 (typical)	Specify
	Crimping Force - 120kN	Specify
	Length - 488mm	Specify
	Width - 138mm	Specify
	Weight - 5.7kg	Specify
4.2.3.3	**Hand compression tool up to 300 - 1000mm^2**	Specify
4.2.3.3.1	The compression tool shall be a double acting (hydraulically advancing and retracting the ram) 60 ton press with a fast ram retraction and elimination of the tool jamming.	Specify
4.2.3.3.2	The tool shall feature a four (4)-way valve to reroute the hydraulic path to the retracting chamber when retracting the ram,	Specify
4.2.3.3.3	It shall ensure that the ram retracts hydraulically and as a result, the possibility of connector jamming shall be eliminated and at the same time the ram shall be retracted much faster. The ram retracting time shall not be more than 1/3 of the spring return	Specify
4.2.3.3.4	The tool shall use U-type dies used for 60 ton compressors with a maximum diameter of 60mm.	Specify
4.2.3.3.5	Engine driven hydraulic pumps, hand pump, foot pump and electrical pump are recommended to operate the tool. The pumps shall have a double acting mechanism.	
4.2.3.3.6	The hydraulic crimping tool shall have the following compression capability as per Table 3:	Specify

Sn. No	Capability	Minimum Requirement	Specify
1	Ram stroke	38.5 mm	
2	Oil volume required	303 cc	
3	Force at die face	517 kN	
4	Oil pressure	68.5 Mpa (10,000 PSI)	
5	Porting	¼" NPSM male & female couplers	
6	Coupling	BI type coupler size 06 (3/8")	
7	Tightening torque	34 Nm	
8	Approximate size	260 (Dia) x 446 (H) mm with Ground stand	

4.2.3.4	**Dies for hand operated hydraulic compression tools (upto 300mm2 and 300-1000mm2)**	

Clause	KPLC requirement	Bidder's offer
4.2.3.4.1	The die design and manufacture shall conform to the requirements of ISO 4957 standard requirements and those of this specification.	Specify
4.2.3.4.2	The die shall be hexagonal in design and of the two-part semi-slotted U type	Specify
4.2.3.4.3	The die shall be compatible with all crimping tools that accept U type dies	Specify
4.2.3.4.4	The dies shall be manufactured from alloy tool steel (grade AISI - D2), and be capable of enabling a force of up to 130kn to be applied to stranded copper and aluminum conductors and cables at both low and high voltages	Specify
4.2.3.4.5	The dies shall be capable of compressing lugs, splices, connectors and sleeves for stranded aluminum and copper conductors and cables of the following sizes: Conductor: $50mm^2$, $75mm^2$, $100mm^2$, $150mm^2$ and $300mm^2$ Cable: $16mm^2$, $25mm^2$, $50mm^2$, $70mm^2$, $95mm^2$, $120mm^2$, $185mm^2$, $300mm^2$,$630mm^2$	Specify
4.2.3.4.6	The applicable conductor/cable sizing or across flat measurement shall me marked on each die as specified in Section 6.1. (d)	Specify
4.2.3.4.7	The dies shall be supplied in a steel/plastic carrying case complete with die compartment for holding up to 10 sets of dies	Specify
4.2.4	**Split Hydraulic Cable Jointing Tool Kit**	
4.2.4.1	The equipment shall be used for compression of aluminium/copper lugs and connectors onto aluminium/copper conductors	Specify
4.2.4.2	The equipment shall have facilities to enable it be fitted with hexagonal dies and shall have positive push button die locks.	Specify
4.2.4.3	The swiveling head shall be able to turn a whole 360° to allow use in confined places.	Specify
4.2.4.4	The equipment shall be used outdoor and indoor under all weather conditions.	Specify
4.2.4.5	The equipment shall be supplied with a full range of dies for cable lugs & fittings (LV/HV), overhead line connectors and fittings including ABC cable fittings covering the range 150 – 630mm2.	Specify
4.2.4.6	The oil pipe coupler shall be fitted with size 06 (3/8") thread.	Specify
4.2.4.7	The compression equipment shall be connected with hydraulic pump with maximum working pressure of 700kgf/cm2. The hydraulic pump shall be manually operated.	Specify

Clause	KPLC requirement	Bidder's offer
4.2.4.8	It shall include the hydraulic press heads, handles and shall be complete and ready for use.	Specify
4.2.4.9	The hydraulic compression tool shall have the following as a summary of its technical specifications as in Table 4:	Specify
	Item / **Technical Data** Output: 120 kN Maximum weight: 11kg Swivel head: 360° Pump delivery pressure: 35T Hexagonal die range: 150 to 630mm 2 Cu - Al	Specify
4.2.5	**Cable Peeling and Stripping Tool**	
4.2.5.1	This shall be one tool, performing the following four operations	Specify
	Stripping of sheathing material,	Specify
	Peeling of outer bonded semiconductor,	Specify
	Stripping of main insulation,	Specify
	Chamfering of main insulation,	Specify
	Cutting a slot into the insulation.	Specify
4.2.5.2	This tool shall be suitable for preparing cables in the field, before mounting joints and terminations. The tool shall be used for creating a smooth surface on the insulation and for the transition between insulation and the semiconductor. It shall have the following technical data:	Specify
	Range of cable diameter (mm): 1.5-50	Specify
	Weight of tool (kg): 1.2	Specify
	Maximum peeling depth (mm): 1.5	Specify
	Cutting depth for insulation (mm): 0..10	Specify
4.2.5.3	During the peeling of bonded semiconductor:	
	The peeling depth shall easily be adjusted by the fine adjustment screw. As the peeling knife is firmly fixed to one of the rollers running on the surface of the cable, the knife shall follow exactly the contour of the cable, even if it is not completely round.	Specify
	The feed for the peeling process shall be built into the guiding rollers. The knife shall have a special shape to provide a very smooth surface on the insulation.	Specify
	The transition between insulation and semiconductor shall be designed to make an angle of some 10 degrees to provide for a perfect fit for slip	Specify

Clause	KPLC requirement	Bidder's offer
	on terminations and joints without any polishing rework.	
4.2.5.4	The stripping of insulation and outer sheathing shall have the following features:	Specify
	The tool has a knife with adjustable cutting angle used for stripping the insulation with a cutting angle which sets the fed for the stripping process.	Specify
	The knife shall have a special shape of the cutting that allows a gap of about 1 mm to be left between the conductor and the bottom of the knife. This shall enable the insulation material and the inner semiconductor, to be lifted off the conductor while cutting all the way through.	Specify
	The tool shall finish the cutting process when the desired length is reached, the feed shall automatically reset to zero. The end result shall be a circular cut, allowing the pulling off of the helical shaped strip of insulation.	Specify
4.2.5.5	The chamfering of insulation shall require that the same knife used for peeling of the semiconductor shall be used with a chamfering angle of about 30 degrees to the cable axis.	Specify
5	Test requirements	State
6	Marking and packing	
6.1	The hand-operated cutting, compression, peeling and jointing tools shall be clearly, legibly and indelibly marked with the following information either by embossing or inscription: a) The manufacturer's initials or recognized trade-mark or both; b) The year of manufacture; c) Designation of the tool; d) Range of wires and cables applicable for each tool; e) Rated pressure in case of hydraulic tools; f) Words "**Property of KPLC**"	Specify
	Where lack of available space would result in lettering too small to be legible, information may be provided on supplementary literature such as instruction/maintenance sheets, catalogue sheets or accessory tags.	Specify
	Optional information that can be given either on the component or in supplementary literature shall also be provided in the instruction sheet.	Specify

Clause	KPLC requirement	Bidder's offer
6.2	Packaging	Specify
6.2.1	Each hand-operated cutting, compression, peeling and jointing tool shall be packed in a rubberized ergonomic case with a handle at balance point making the tool much easier to carry in a manner so as to avoid damage during transportation and storage.	Specify
6.2.2	The following information shall be printed on a suitable label firmly attached to each packaging or embossed on the body of the case: a) Purchase order number/tender; b) Manufacturer's name; c) Year of manufacture; d) Tool catalog or designation number; e) The words, "Property of The Kenya Power & Lighting Co. Ltd."	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.3	Test reports to be submitted by supplier to KPLC for approval before shipment	State
A.4	Inspection at the stores and replacement of rejected tools	State compliance
B	**Quality Management System**	
B.1	Quality Assurance Plan	Provide
B.2	Copy of ISO 9001:2008 (or later) Certificate or KEBS Diamond mark of quality	Provide
B.3	Manufacturer's experience	Provide
	Manufacturing Capacity (units per month)	Provide
	List of previous customers	Provide
	Customer reference letters	Provide
C	**Documentation and demonstration**	
C.1	Documents submitted with tender	Provide
C.2	Documents to be submitted by successful bidder (supplier) to KPLC for approval before manufacture	Provide
C.3	Recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the hand-	Provide

Clause	KPLC requirement	Bidder's offer
	operated cutting, compression, peeling and jointing tools to KPLC stores	
	Statement of compliance to specification (indicate deviations if any & supporting documents)	Provide

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Manufacturer's Name, Signature, Stamp and Date