



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 1 of 17	

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 INSTRUCTIONS

ANNEX A: *Guaranteed Technical Particulars (to be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for past five years, four customer reference letters, details of manufacturing capacity, the manufacturer's experience, copies of complete type test reports and accreditation certificate to ISO/IEC 17025 for the third party testing laboratory for tender evaluation, all in English Language)*

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:

**SPECIFICATION FOR
TERMINAL LUGS
(Compression Type)**

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 2 of 17	

0.1 Circulation List

COPY NO.	COPY HOLDER
1	Standard Manager
Electronic copy (pdf) on Kenya Power Server (http://172.16.1.40/dms/browse.php?FolderId=23)	

0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 2 Rev 0	2010-11-12	Cancels and replaces Issue 1 Rev 0 and all other previous issues	Eng. Simon Kimitei	George Owuor
Issue 3	2015-06-18	Cancels and replaces Issue 2 Rev 0 and all other previous issues	Michael Apudo	Dr. Eng. Peter Kimemia

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 3 of 17	

FOREWORD

This specification has been prepared by the Standards Department in collaboration with Network Management Division and Design and Construction Departments all of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for cable terminal lugs (compression lugs). It is intended for use by KPLC in purchasing the compression lugs.

The supplier shall submit information which confirms satisfactory service experience with products which fall within the scope of this specification.

1. SCOPE

- 1.1. This specification is for Terminal Lugs (Compression Lugs) for use on distribution power lines operating at a nominal voltage of up to 66kV and frequency of 50Hz. The lugs are class "A" connectors intended for electricity distribution or industrial networks which can be subjected to short-circuit of relatively high intensity and duration.
- 1.2. This specification covers the following:
 - a) Copper Tubular Compression Lugs;
 - b) Tinned Aluminium Tubular Compression Lugs;
 - c) Bi-metallic Tubular Compression Lugs.

NOTE: Particular requirements for each type of Compression Lugs as may be relevant for a specific requisition are given in section 4.3, 4.4 and 4.5.

- 1.3. The specification also covers inspection and test of the lugs as well as schedule of Guaranteed Technical Particulars to be filled, signed by the supplier and submitted for tender evaluation. The specification stipulates the minimum requirements for lugs acceptable for use in the company (KPLC) and it shall be the responsibility of the Manufacturer to ensure adequacy of the design, good workmanship and good engineering practice in the manufacture of the lugs for KPLC.
- 1.4. The specification does not purport to include all the necessary provisions of a contract.

2. REFERENCES

The following standards contain provisions which, through reference in this text constitute provisions of this specification. Unless otherwise stated, the latest editions (including amendments) apply.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed: 

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 4 of 17	

- ISO 25239-1 to 5: Friction stir welding – Aluminium (All parts)
- ISO 2859-1: Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
- BS EN 61238-1: Compression and mechanical connectors for power cables for rated voltages up to 36 kV (Um = 42 kV)—Part 1: Test methods and requirements
- BS EN 13600: Copper and copper alloys. Seamless copper tubes for electrical purposes.
- BS EN 754-1&2: Aluminium and aluminium alloys. Cold drawn rod/bar and tube –Part 1: Technical conditions and inspection –Part 2: Mechanical properties
- DIN 46235: Cable lugs for compression connections cover plate type, for copper conductors
- DIN 46329: Cable lugs for compression connections, ring type for aluminium conductors

3. TERMS AND DEFINITIONS

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

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

The lugs 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 and
- Heavy saline conditions along the coast.

4.2. GENERAL REQUIREMENTS

- 4.2.1. The lugs in this specification shall be classified as Class A connectors and shall undergo both heat cycle and short-circuit tests in accordance with BS EN 61238-1;

Issued by: Head of Section, Standards Development

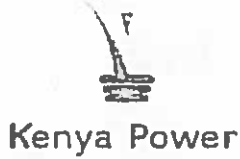
Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 5 of 17	

- 4.2.2. The lug shall be tubular type and be suitable for jointing to insulated cables and stranded conductors by use of compression tools. It shall correctly fit the cable or conductor it is intended for use with.
- 4.2.3. The lug shall comprise a barrel (tube) and a straight palm. The palm shall have a hole for making connection between the cable and apparatus by means of a bolt or stud.
- 4.2.4. To prevent entry of water/moisture in outdoor applications, inspection/filling hole shall not be provided.
- 4.2.5. The faces on each side of the palm shall be sufficiently parallel and flat to provide a suitable contact surface.
- 4.2.6. The lug shall have a current rating at least equal to that of the cable it is to be used with and a mechanical breaking load not less than 60% of that of the conductor it is to be used with.
- 4.2.7. All parts of the lug including the stud hole shall go through deburring and polishing operations (during manufacture) to eliminate all sharp edges.
- 4.2.8. The connectors shall be able to pass the tensile tests prescribed in Table 3 of BS EN 61238-1 and the crimping force for each category shall be as follows:
- a) Up-to 240 mm² - 1.2 x 10⁵ N.
 - b) 300 mm² to 630 mm² - 2.0 x 10⁵ N
 - c) Above 630 mm² - 4.0 x 10⁵ N

4.3. COPPER TUBULAR COMPRESSION LUGS

4.3.1. Design and construction

- 4.3.1.1. The copper tubular compression lugs shall be made from oxygen-free high purity copper that is immune against hydrogen embrittlement suitable for use in a high electrical and thermal conductivity requirement in accordance with BS EN 13600.
- 4.3.1.2. Annealed and electrolytically tin-plated with a minimum thickness of 3µm to avoid oxidation. The annealing process optimizes the structural features of the material and allows an easier crimping and guarantees the use of the connector even with mechanical solicitations of various nature

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS
(Compression Type)**

Doc. No. KP1/3CB/TSP/05/029
Issue No. 3
Revision No. 0
Date of Issue 2015-06-18
Page 6 of 17

- 4.3.1.3. The copper shall easily be joined with all welding and brazing methods and shall be suitable for manufacturing processes requiring extreme deformability.
- 4.3.1.4. The chemical, physical, electrical/thermal and jointing and machinability characteristics of the copper tube shall be as per Table 1.

Table 1: Characteristics of the tube as per BS EN 13600

Sr. No.	Particulars	Requirements	
A	Chemical properties		
1	Chemical composition, Cu + Ag, %	99.95	
B	Physical properties		
1	Coefficient of linear expansion, 1/k	0.0000177	
2	Specific heat capacity, J/(kg x K)	385	
3	Melting temperature	1083	
4	Hardness (Soft temper) , HV	35 - 65	
5	Tensile strength, N/mm ²	200 - 220	
6	0.2% Yield Strength, N/mm ²	35 - 65	
7	Elongation at break, min, %	12	
C	Electrical and thermal properties		
1	Electrical conductivity	Volume, % IACS, min	100.6
		Mass, % IACS, min	100.0
		MS/m, min	58.3
2	Electrical resistivity	Volume, Ωmm ² /m	0.0171
		Mass, Ω.g/m ²	0.1532
	Thermal conductivity, W/m.K	390	
D	Jointing and machinability		
1	Machinability rating (free cutting brass =100)	20	
2	Soldering	Excellent	
3	Brazing	Good	
4	TIG and MIG	Good	

4.3.2. Dimensions

- 4.3.2.1. The copper tubular compression lugs shall have a barrel to accommodate stranded copper conductor and palm with a single stud hole. The dimensions are according DIN 46235 and Table 2.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
 TERMINAL LUGS**
(Compression Type)

Doc. No. KP1/3CB/TSP/05/029
Issue No. 3
Revision No. 0
Date of Issue 2015-06-18
 Page 7 of 17

4.3.2.2. The barrel shall be counter-bored to accommodate the insulation of cable. As per Table 2 suitable for cable sizes 1.5mm² – 630mm².

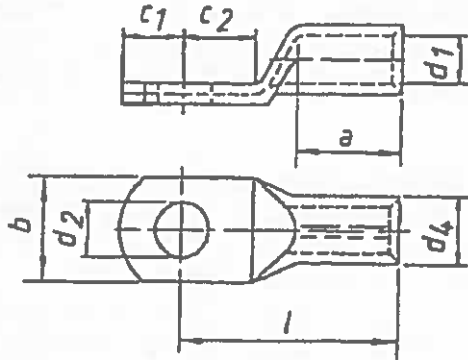


Fig. 1: Illustration of tinned tubular copper compression lugs to DIN 46235

Table 2: Copper Tubular Compression Lugs to (dimensions as per DIN 46235)

Conductor nominal cross section	Size of bolt ø	Len. a mm	Len. b Mm	Dia. d1 Mm	Dia. d2 mm	Dia. d4 mm	Dia. c1 mm	Dia. c2 mm	Len. l mm	Tube thick. mm	Palm thick. mm	Weight/ 100 pcs. - kg
Tolerance		min	±2	0, +4	min	min	0, -3	min.	+2.0	±0.5	±0.5	max
1.5	M6	8	11.0	1.8	6.4	2.4	6.0	5.0	15	0.3	1.0	0.07
2.5	M6	8	12.0	2.7	6.4	3.5	6.0	5.0	15	0.4	1.2	0.11
4	M6	10	12.0	3.3	6.4	4.3	6.0	5.5	17.5	0.5	1.5	0.18
6	M8	10	14.0	3.8	8.4	5.5	10.0	10.0	24	0.6	1.5	0.3
10	M8	10	15.0	4.5	8.4	6.0	10.0	10.0	27	1.0	1.5	0.38
16	M12	20	17.0	5.5	13.0	8.5	12.0	13.0	36		2.5	1.30
25	M12	20	19.0	7.0	13.0	10.0	13.0	13.0	38		3.0	1.66
50	M16	28	28.0	10.0	17.0	14.5	16.0	16.0	52		4.0	4.57
70	M16	28	30.0	11.5	17.0	16.5	16.0	16.0	55	2	4.5	6.13
95	M16	35	32.0	13.5	17.0	19.0	16.0	16.0	65		5.0	9.00
120	M20	35	38.0	15.5	21.0	21.0	21.0	22.0	70		5.5	11.03
150	M20	35	40.0	17.0	21.0	23.5	21.0	22.0	78		6.0	15.90
185	M20	40	40.0	19.0	21.0	25.5	21.0	22.0	82	2	6.0	18.69
240	M20	40	45.0	21.5	21.0	29.0	21.0	22.0	92		6.5	26.88
300	M20	50	46.0	24.5	21.0	32.0	22.0	22.0	100		7.0	33.24
400	M20	70	54.0	27.5	21.0	38.5	25.0	25.0	115		7.5	63.019
500	M20	70	60.0	31.0	21.0	42.0	25	25.0	125	3	8.0	75.264
630	M20	80	64.0	34.5	21.0	44.0	25.0	27.0	135		10.0	79.69

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 8 of 17	

4.4. TINNED ALUMINIUM TUBULAR COMPRESSION LUGS

4.4.1. General design requirements

- 4.4.1.1. The tinned aluminium tubular compression lugs shall be manufactured from a forged high purity electrolytic EC grade Aluminium 99.5% tubes in accordance with DIN 46329 and shall have a tin coating with minimum tin coating thickness of 150µm.
- 4.4.1.2. The tinned aluminium tubular compression lugs shall be suitable for connecting to aluminium and copper bus-bars/terminations the following types of conductors:
- (i) Stranded copper and aluminium cables;
 - (ii) Stranded all aluminium conductors
 - (iii) Stranded aluminium conductor steel reinforced (ACSR)
 - (iv) Stranded all aluminium alloy conductor (AAAC)
- 4.4.1.3. The barrel shall be packed with abrasive neutral high melting point soft grease (oxide inhibiting compound) and the ends sealed (capped). The quantity of grease shall be approximately half the volume of the bore.
- 4.4.1.4. The tinned aluminium tubular compression lugs shall be attached to the aluminium conductor by compression jointing and recommended compressing positions shall be clearly marked on the barrel.
- 4.4.1.5. The palm faces shall be flat and shall have a single hole for termination. The palm shall be protected with oil impregnated strippable plastic or other strippable suitable coating.

4.4.2. Sizes and dimensions

- 4.4.2.1. The tinned aluminium tubular compression lugs shall have a barrel to accommodate 10 – 630mm² solid and stranded copper and aluminium cables, ACSR conductors as per clause 4.4.1.2 and the palm shall have a single stud hole. The dimensions shall be according to DIN 46329 and Table 3.
- 4.4.2.2. The barrel shall be counter-bored to accommodate the insulation of the corresponding cable sizes. The shape of the tinned aluminium tubular compression lugs shall resemble Fig. 2.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18

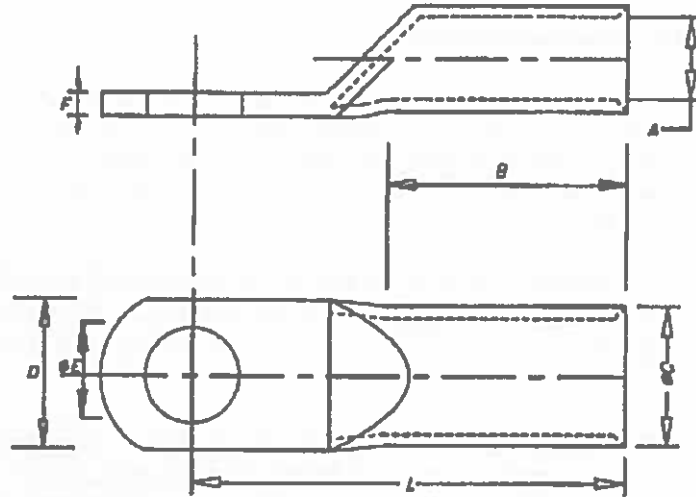


Fig. 2: Illustration of Tinned Aluminium Tubular Compression Lugs to DIN 46329

Table 3: Aluminium Tubular Compression Lugs (dimensions as per DIN 46329)

Sr. No.	Cable size	Stud Hole E	Bolt	Dimensions					Palm thickness f
				A	C	D	B	L	
	mm ²	mm		mm	mm	mm	mm	mm	mm
Tolerance	Nominal	min		0, +4	min	min	min	+2.0	min
1	10	8.4	M8	4.7	10	20	28	45	2.0
2	16	8.4	M8	5.8	12	20	30	50	2.5
3	25	10.5	M10	6.8	12	25	30	50	3.0
4	50	10.5	M10	9.8	16	25	42	62	3.5
5	70	13.0	M12	11.2	19	25	56	72	4.0
6	95	17.0	M16	13.2	22	25	56	75	5.0
7	120	17.0	M16	14.7	23	30	56	80	5.5
8	150	21.0	M20	16.3	25	30	60	90	6.0
9	185	21.0	M20	18.3	28.5	30	60	91	6.0
10	240	21.0	M20	21.0	30	38	70	103	6.5
11	300	21.0	M20	23.3	34	38	70	103	7.0
12	400	21.0	M20	25.0	38	38	73	116	7.2
13	500	21.0	M20	29.0	42	44	79	122	7.5
14	630*	23.0	M22	34.0	48	52	92	135	10.1

*- The tinned aluminium compression lug for sizes 10 and 630mm² cables shall not be to DIN 46329 but shall be as per KPLC requirement

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:



Signed:



Date: 2015-06-18

Date: 2015-06-18

4.5. BI-METAL TUBULAR COMPRESSION LUGS

4.5.1 Construction requirements

- 4.5.1.1 The Bi-Metal tubular compression lugs shall be constructed from forged circular copper palm (grade of copper as per clause 4.3.1.1), friction welded to an EC grade Aluminium (grade of aluminum as per clause 4.4.1.1) circular barrel in accordance with ISO 25239 - thus achieving transition aluminium - copper bi-metal terminals.
- 4.5.1.2 The Bi-Metal tubular compression lugs shall be manufactured in accordance with DIN 46329 in shape and dimensions and shall be suitable for connecting stranded aluminium conductor to copper bus-bar or equipment with copper terminal studs.
- 4.5.1.3 The barrel shall be packed with abrasive neutral high melting point soft grease (oxide inhibiting compound) and the ends sealed (capped). The quantity of grease shall be approximately half the volume of the bore.
- 4.5.1.4 The lugs shall be suitable for use in cable sizes 10mm² to 630mm² as per Table 4.

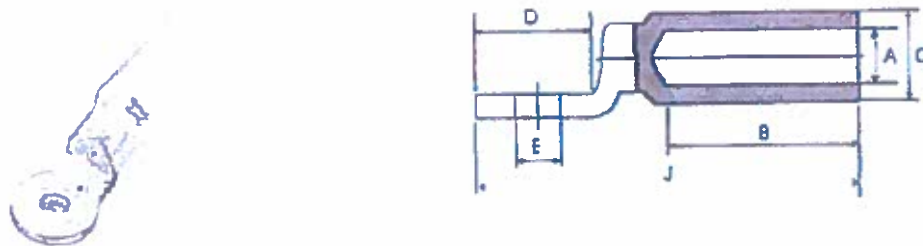


Fig. 2: Bi-Metal tubular compression lugs

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed: 	Signed: 
Date: 2015-06-18	Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
 TERMINAL LUGS**
 (Compression Type)

Doc. No. KP1/3CB/TSP/05/029
 Issue No. 3
 Revision No. 0
 Date of Issue 2015-06-18
 Page 11 of 17

Table 4: Illustration of Bi-Metal tubular compression lugs (dimensions as per DIN 46329)

Sr. No.	Cable size mm ²	Stud Hole E mm	Bolt	Dimensions						
				A	C	D	E	J	B	Palm thickness
				mm	mm	mm	mm	mm	mm	mm
Tolerance		min		0, +4	min	min	min	min	+2.0	min
1	10	10.5	M10	4.7	13	26	10.5	76	40	2.0
2	16	10.5	M10	5.8	15	26	10.5	76	40	2.5
3	25	13.0	M12	6.8	16	26	13.0	79	43	3.0
4	35	13.0	M12	8.0	16	32	13.0	79	43	3.0
5	50	13.0	M12	9.0	20	32	13.0	85	43	3.5
5	70	17.0	M16	11.0	20	32	17.0	85	43	4.0
6	95	17.0	M16	12.5	20	32	17.0	85	43	5.0
7	120	17.0	M16	13.7	25	36	17.0	108	59	5.5
8	150	21.0	M20	15.5	25	36	21.0	108	59	6.0
9	185	21.0	M20	17.0	32	36	21.0	115	59	6.0
10	300	21.0	M20	23.3	40	43	21.0	137	86	6.5
11	400	21.0	M22	26.0	40	44	21.0	153.5	86	7.0
12	630*	21.0	M20	33.5	47	60x60	409	196	95	10.0

*- The Bi-metal compression lug for sizes 10, 16 and 630mm² cables shall not be to DIN 46329 but shall be as per KPLC requirement.

4.6. SAMPLING FOR TESTS

- 4.6.1. Test specimens shall be selected at random from each inspection lot (or articles) in accordance with ISO 2859-1.
- 4.6.2. The number of samples selected from each lot shall comply with Table 5 of this specification.

Table 5: Number of test samples

Lot size	Sample size	Lot size	Sample size
25 or less	5	501 to 1,200	80
26 to 50	8	1,201 to 3,200	125
51 to 90	13	3,201 to 10,000	200
91 to 150	20	10,000 to 35,000	315
151 to 280	32	35,001 to over	500
281 to 500	50		

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS
(Compression Type)**

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 12 of 17	

4.7. Quality Management System

4.7.1. The supplier 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 compression lugs, will fulfill the requirements stated in the contract documents, standards, specifications and regulations.

4.7.2. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008. 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.

5. TESTS AND INSPECTION

5.1 The compression lugs shall be tested in accordance with the relevant requirements of BS EN 61238-1, ISO 25239-1 to 5, BS EN 13600, BS EN 754-1&2, DIN 46235, DIN 46329 and this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified.

5.2 Copies of previous Test Reports by the relevant International or National Testing/ Standards Authority of the country of manufacture or ISO/IEC 17025 accredited testing laboratory shall be submitted with the tender (including certificate of accreditation for laboratory) for the purpose of technical evaluation, all in English Language. The type test reports to be submitted shall include:

- a) Short circuit and heat cycle tests – BS EN 61238-1
- b) Chemical composition of copper and aluminium – BS EN 13600 & BS EN 754-1&2
- c) Friction stir welding – ISO 25239-1
- d) Crimping force as per clause 4.2.8.
- e) Dimensional checks to DIN 46235 & DIN 46329

5.3 Routine test reports for the compression lugs to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods. KPLC may witness acceptance tests at the factory. Supplier shall invite KPLC in adequate time to facilitate good preparation for the exercise. The witness/acceptance tests shall include:

- a) Crimping force as per clause 4.2.8.
- b) Dimensional checks to DIN 46235 & DIN 46329

5.4 On receipt of the compression lugs, KPLC shall inspect and may perform tests in order to verify compliance with this specification. The supplier shall replace without charge to KPLC,

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
 TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 13 of 17	

any compression lugs which upon examination, test or use fail to meet any of the requirements in this specification.

6. MARKING AND PACKING

6.1 MARKING

The following information shall be marked by engraving/etching and legibly, indelibly and in a permanent manner on each compression lug:

- (a) Name or trade mark of the manufacturer,
- (b) Type reference number,
- (c) Cable sizes applicable and inside diameters of the lug,
- (d) Crimping force and position,
- (e) The letters 'KPLC'.

6.2 PACKING

6.2.1 The compression lugs shall be packed in such a manner so as to avoid damage during transportation and storage.



6.2.2 Instructions for installation and details on applicable tools shall be included in each package, all in English Language.

7. DOCUMENTATION

7.1. The bidder shall submit its tender complete with technical documents required by Annex A (Guaranteed Technical Particulars) for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

- a) Guaranteed Technical Particulars 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 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) Manufacturers letter of authorization, ISO 9001:2008 certificate and other technical documents required in the tender.

7.2. The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed: 	Signed: 
Date: 2015-06-18	Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 14 of 17	

- a) Guaranteed Technical Particulars signed by the manufacturer.
- b) Design Drawings with details of compression lugs to be manufactured for KPLC.
- 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
- d) Detailed test program to be used during factory testing;
- e) Marking details and method to be used in marking of the compression lugs;
- 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 compression lugs for The Kenya Power & Lighting Company;
- g) Packaging details (including packaging materials).

7.3 The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the compression lugs to KPLC stores.

—————SPACE LEFT BLANK—————

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
 TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 15 of 17	

ANNEX A: Guaranteed Technical Particulars (to be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for past five years, four customer reference letters, details of manufacturing capacity, the manufacturer's experience, copies of complete type test reports and accreditation certificate to ISO/IEC 17025 for the third party testing laboratory for tender evaluation, all in English Language)

Tender No.

Clause	Description	KPLC REQUIREMENTS		Bidder's offer (indicate full details of the values offered)
	Bidder's Name and address			State
	Name of Manufacturer			State
	Country of manufacture			State
1	Scope			State
	Manufacturing standards applicable			State
4	Requirements			
4.1	Service conditions - compliance			State
4.2	General requirements			
	Compliance to all clauses			State
	Crimping force	Up to 240mm ²	1.2 x 10 ⁵ N	Provide a test report
		300mm ² – 630mm ²	2.0 x 10 ⁵ N	
		Above 630mm ²	4.0 x 10 ⁵ N	
4.3	Copper compression lugs			
	Type/Model Reference Number			State
	Compliance to all clauses			State
	Minimum thickness of lin		3µm	State
	Characteristics of the copper tube as per BS EN 13600			
A	Chemical properties			
	Chemical composition, Cu + Ag, %		99.95	State
B	Physical properties			
	Coefficient of linear expansion, 1/k		0.0000177	State
	Specific heat capacity, J/(kg x K)		385	State
	Melting temperature		1083	State
	Hardness (Soft temper) , HV		35 - 65	State
	Tensile strength, N/mm ²		200 - 220	State
	0.2% Yield Strength, N/mm ²		35 - 65	State

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
TERMINAL LUGS**
(Compression Type)

Doc. No. KP1/3CB/TSP/05/029
Issue No. 3
Revision No. 0
Date of Issue 2015-06-18
Page 16 of 17

	Elongation at break, min, %	12	State
C	Electrical and thermal properties		
Electrical conductivity	Volume, % IACS, min	100.6	Provide a test report
	Mass, % IACS, min	100.0	
	MS/m, min	58.3	
Electrical resistivity	Volume, $\Omega\text{mm}^2/\text{m}$	0.0171	Provide a test report
	Mass, $\Omega\text{g}/\text{m}^2$	0.1532	
	Thermal conductivity, W/m.K	390	Provide a test report
D	Jointing and machinability		
	Machinability rating (free cutting brass =100)	20	State
	Soldering	Excellent	State
	Brazing	Good	State
	TIG and MIG	Good	State
	Sizes and dimensions	As per fig. 1 and table 2	Provide a drawing
4.4	Tinned Aluminium Compression lugs		
	Type/Model Reference Number		State
	Compliance to all clauses		State
	Material	high purity electrolytic EC grade Aluminium 99.5%	State
	Thickness of tin coating	150 μm	Provide a test report
	Sizes and dimensions	As per table 3 and Fig. 2	Provide a drawing
4.5	Bi-metal compression lugs		
	Type/Model Reference Number		State
	Compliance to all clauses		Provide a test report
	Sizes and dimensions	As per table 4 and Fig. 3	Provide a drawing
4.6	Sampling		
	Number of test samples	As per table 5	Specify
4.7	Quality Management System		
	Quality Assurance Plan		Provide
	Copy of ISO 9001:2008 Certificate		Provide
5.1	Test standards and responsibility of carrying out tests		Provide
5.2	Copies of Type Test Reports submitted with tender		Provide
5.3	Acceptance /Routine tests to be witnessed by KPLC at factory before shipment		Provide
	Test reports to be submitted by supplier to KPLC for approval before shipment		Provide
5.4	Replacement of rejected lugs		State
6.1	Marking		State

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18



TITLE:
**SPECIFICATION FOR
 TERMINAL LUGS**
(Compression Type)

Doc. No.	KP1/3CB/TSP/05/029
Issue No.	3
Revision No.	0
Date of Issue	2015-06-18
Page 17 of 17	

6.2	Packing	State
7.1	Documents submitted with tender	State
7.2	Documents to be submitted by supplier to KPLC for approval before manufacture	State
7.3.	Recommendations for use, care, storage and routine inspection/testing procedures	Provide
8.0	Manufacturer's Guarantee and Warranty	Provide
9.0	List catalogues, brochures, technical data and drawings submitted to support the offer	Provide
10.0	List customer sales records and reference letters submitted to support the offer.	Provide
11.0	List Test Certificates submitted with tender	Provide
12.0	Manufacturer's experience and Manufacturing Capacity (units per month)	Provide
13.0	Statement of compliance to specification (indicate deviations if any & supporting documents)	Provide

NOTE:

- 1) Bidders shall give full details and the offered values of the items on order as per Annex A. The details provided shall conform to the test reports and their certificates as required by clause 5.2., well labeled drawings complete with dimensions, catalogues or brochures for the purpose of tender evaluation.
- 2) Bidder who shall have not complied by this requirement in bullet 1 shall be automatically disqualified from bidding this item.

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

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2015-06-18

Date: 2015-06-18

