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| TITLE: ASSEMBLY TOOLS FOR BOLTS & NUTS Part 3: Insulated Wrenches | Doc. No. | KP1/3CB/TSP/09/057-3 |
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TITLE:
ASSEMBLY TOOLS FOR BOLTS & NUTS
Part 3: Insulated Wrenches

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0.1 Circulation List

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0.2 Amendment Record

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FOREWORD

This specification has been prepared by the Standards Department in collaboration with Network Management Division, both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Assembly tools for bolts & nuts (insulated wrenches) for use on power lines. It is intended for use by KPLC in purchasing the insulated wrenches.

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

1. SCOPE

- 1.1. This specification is for assembly tools for bolts & nuts (insulated wrenches) for use on power lines. The tools applicable are insulated hand tools used for working live or close to live parts at nominal voltages up to 1 000 V a.c. and 1 500 V d.c.
- 1.2. The insulated wrenches and associated hardware equipment covered in this specification shall include:
 - a) Heavy Duty Pipe Wrench
 - b) Open Ended Wrench (Spanner)
 - c) Adjustable Wrench (Spanner)
 - d) Ring Spanners
- 1.3. It shall be the responsibility of the manufacturer to ensure adequacy of the design and good engineering practice in the manufacture of the wrenches for KPLC. The supplier shall also submit information which confirms satisfactory service experience of the manufacturer with the wrenches which fall within the scope of this specification.

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:

ISO/CD 8458-1 Steel wire for mechanical springs: Part 1 General requirements; Part 2 Patented and cold-drawn unalloyed steel wire

ISO 3318: Assembly tools for screws and nuts -- Double-headed open-ended wrenches, double-headed box wrenches and combination wrenches -- Maximum widths of heads.

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- ISO 10102: Assembly tools for screws and nuts -- Double-headed open-ended engineers' wrenches -- Length of wrenches and thickness of the heads
- ISO 6787: Assembly tools for screws and nuts -- Adjustable wrenches
- ISO 1711-1: Assembly tools for screws and nuts -- Technical specifications -- Part 1: Hand-operated wrenches and sockets
- ISO 10103: Assembly tools for screws and nuts - Double headed, flat and offset, box wrenches.
- ISO 9717: Metallic and other inorganic coatings -- Phosphate conversion coating of metals
- ISO 4957: Tool steels
- ISO 2082: Metallic and other inorganic coatings -- Electroplated coatings of cadmium with supplementary treatments on iron or steel
- IEC 60900: Live working – Hand tools for use up to 1000 V a.c. and 1500 V d.c.

3. TERMS AND DEFINITIONS

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

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

The insulated wrenches shall be tropicalized, designed and constructed for continuous outdoor operation in tropical areas and harsh climatic conditions including areas exposed to:

- a) Sea spray (along the coast);
- b) Humidity of up to 95%;
- c) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C
- d) Altitudes of not more than 2200m above sea level.

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4.2. PARTICULAR REQUIREMENTS

4.2.1. Heavy Duty Pipe Wrench

4.2.1.1. Construction

- 4.2.1.1.1. The material, manufacture, workmanship and finish, test, preservation, packing and sampling of heavy duty pipe wrench shall conform to ISO 6787 and ISO 1711-1.
- 4.2.1.1.2. The handle shall be made of malleable steel castings or aluminium alloy conforming to requirements of Table 1. The frame shall be integral part of the handle and shall allow easy adjustment of the movable jaw for proper operation of the wrench both forward and backwards.
- 4.2.1.1.3. The movable jaw shall be a one piece forging with integral teeth. The teeth shall be of a adequate number, shape and size to enable the assembled tool to meet the test requirements without slipping and to grip positively during the operation of tightening any appropriate diameter of pipe within its safe capacity.
- 4.2.1.1.4. The heel jaw shall have teeth of adequate number, shape and size to enable the tool to meet the test requirement without slipping and to grip positively during operation of tightening any appropriate diameter of pipe within the safe capacity. Heel jaw shall be replaceable and attached to the handle with a suitable pin.
- 4.2.1.1.5. The adjusting nut shall be cylindrical, knurled and threaded integrally to engage the threads of the moveable jaw. The threads shall be of sufficiently robust form and pitch so that with the jaws at any point of adjustment within the appropriate maximum capacity, the wrench shall be capable of passing the tests conforming to ISO/CD 8458-1.
- 4.2.1.1.6. Two (2) springs shall be so provided in the wrench assembly as to balance properly the moveable jaw so that action both in forward and the backward direction shall be smooth.
- 4.2.1.1.7. Heavy duty pipe wrenches shall be free from flaws, cracks, blow holes, rust, burrs and other injurious defects.
- 4.2.1.1.8. Moveable jaws shall be properly finished. All un-machined surfaces shall be painted or suitably treated. The machined surfaces shall be protected by rust preventive treatment.

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4.2.1.1.9. The motion between the various parts of the wrench shall permit the teeth to grip and hold the pipe for successive turns without the necessity of altering the adjusting nut. The heavy duty pipe wrenches shall release freely when the direction or pressure of the handle is reversed.

4.2.1.2. Materials of components

4.2.1.2.1. The following table specifies the material components of various parts and the hardness requirement as per Table 1;

Table 1: Material components.

| Component | Material |
|------------------------|---|
| Handle | Steel casting conforming to BS 3100 : 1991 with minimum tensile strength of 620 MPa and minimum elongation of 12% or equivalent aluminium alloy of same properties. |
| Springs | Patented and cold drawn spring steel wires conforming to ISO/CD 8458-1, Medium tensile strength; static duty SM |
| Moveable and heel jaw | Forging steel with 550 to 700 HV when measured at any point within the triangular profile of any teeth, |
| Adjustable nut and pin | Suitable carbon steel conforming to PD 970: 2012 with surface hardness of 285 to 445 HV. |

4.2.1.2.2. The test loads shall be as per Table 2 with the point of load application diagrammatically shown in Fig. 1.

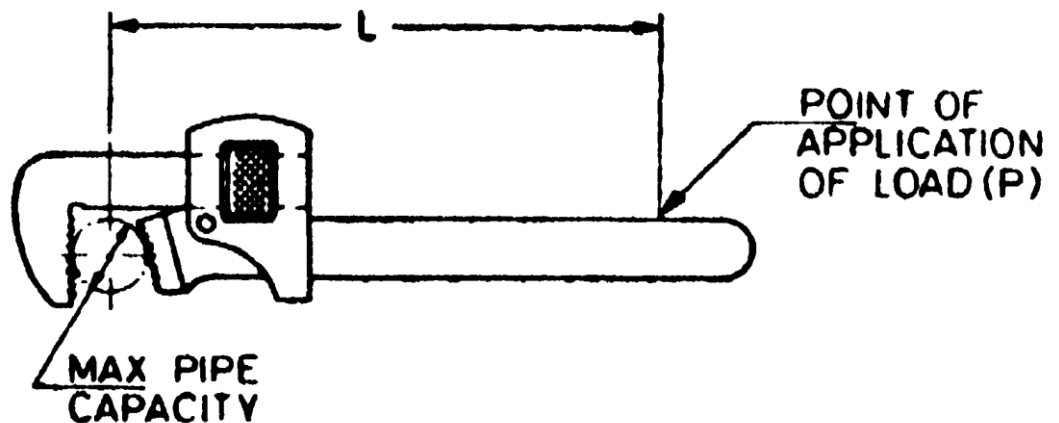


Fig. 1: Diagrammatic arrangement of load application

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Table 2: Test Loads for Pipe Wrench (Heavy Duty)

| Nominal size | Diameter of Test Bar mm | Proof Torque N.m | Load Position L mm |
|--------------|-------------------------|------------------|--------------------|
| 200 | 20 | 360 | 120 |
| 250 | 25 | 880 | 160 |
| 350 | 40 | 1470 | 220 |
| 450 | 50 | 2265 | 330 |
| 600 | 75 | 3265 | 450 |
| 900 | 100 | 5090 | 700 |
| 1200 | 125 | 5890 | 950 |

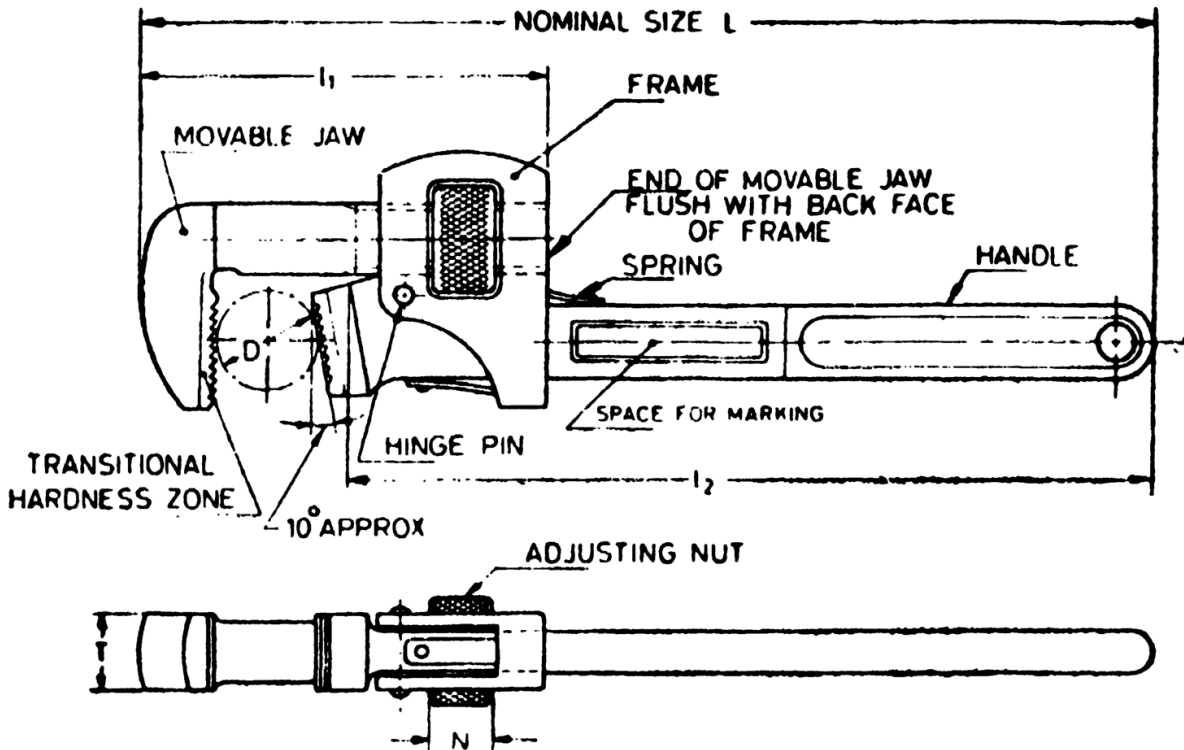


Fig. 2: Heavy duty pipe wrench.

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Table 2: Dimensional requirements of heavy duty pipe wrench.

| Nominal Size L | Capacity D | | Jaw Thickness, T Min | Length of Movable Jaw, L ₁ | Length of Handle from Heel Jaw, L ₂ | Width of Nut, N Min |
|-------------------|---------------|-----|----------------------------|--|---|---------------------------|
| | Min | Max | | | | |
| 200 | 10 | 38 | 11 | 95 | 160 | 11.0 |
| 250 | 10 | 50 | 14 | 125 | 200 | 13.8 |
| 350 | 14 | 63 | 19 | 160 | 250 | 15.0 |
| 450 | 27 | 75 | 25 | 200 | 370 | 18.0 |
| 600 | 27 | 90 | 28 | 240 | 600 | 24.0 |
| 900 | 38 | 140 | 31 | 315 | 730 | 29.0 |
| 1,200 | 50 | 165 | 35 | 420 | 990 | 35.0 |

4.2.2. Open Ended Wrench (Spanner)

4.2.2.1. Construction

- 4.2.2.1.1. The material, manufacture, workmanship and finish, test, preservation, and packing and sampling of open ended spanners shall be in accordance with ISO 3318.
- 4.2.2.1.2. The recommended material for manufacture shall be grade AISI D2 or BD2 of BS EN ISO 4957:2000, steel designation X153CrMOV12 (1.2379) with approximate tempered hardness, HRC of 61–54, and annealed hardness, BHN of 255.
- 4.2.2.1.3. The wrench (spanner) shall be hardened throughout and the hardness measured at any point on the spanner shall be within the limits specified in ISO 1711-1.
- 4.2.2.1.4. Wrenches (spanners) shall be finished smooth all over. All sharp corners shall be removed. Wrenches (spanners) shall be free from burrs, cracks, seams or other manufacturing defects.
- 4.2.2.1.5. The wrenches (spanners) shall be greased or given any suitable anti-corrosive coating.
- 4.2.2.1.6. Following are given suitable plating thicknesses in case of nickel-chromium and cadmium as per ISO 2082:
 - a) Nickel-chromium plating 5 µm Min. thickness of nickel coating
 - b) Cadmium plating - 8 µm Min, thickness- of cadmium coating

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4.2.2.2. Classification

They shall be of two types, namely;

- a) Single-Ended Open Jaw Spanner (Wrenches) for General Purposes (Torque Series C) as per Fig. 3
- b) Double-Headed Open-Ended Engineers' Spanner (Wrenches) ISO Series (Torque Series C) as per Fig 4.

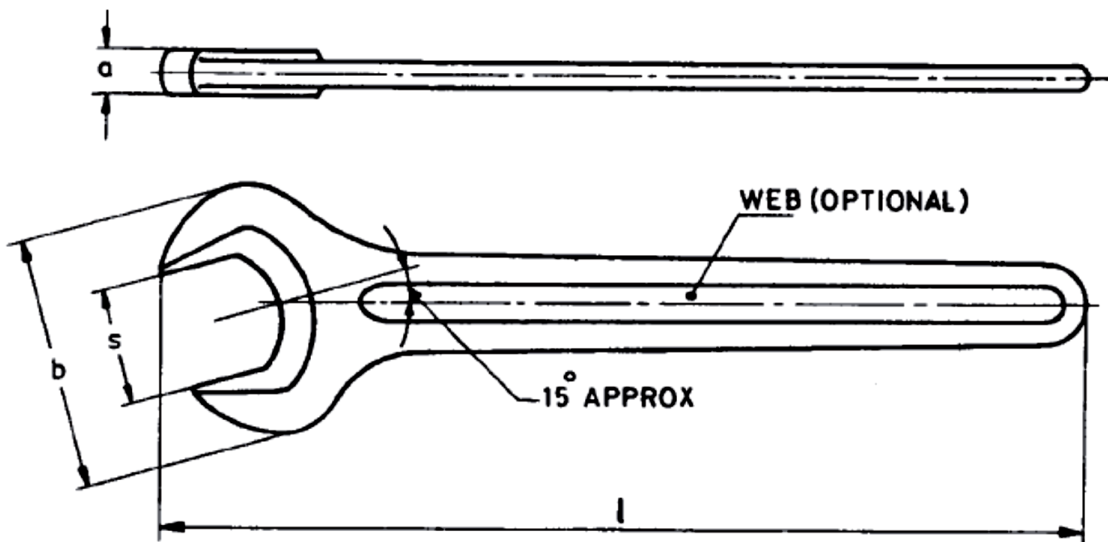


Fig. 3: Single-Ended Open Jaw Wrenches (Spanners)

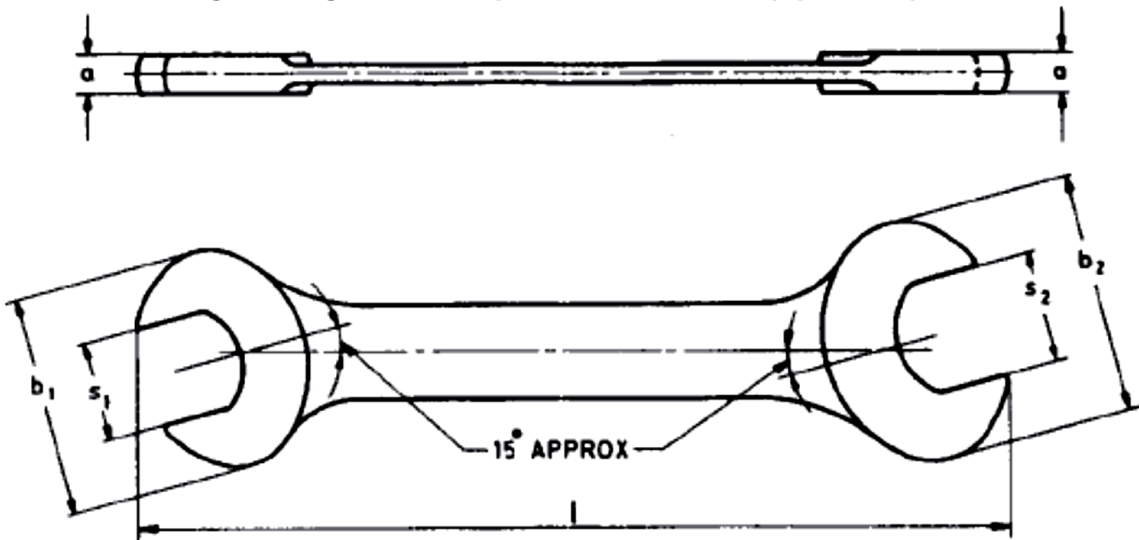


Fig. 4: Double-Headed Open-Ended Engineers' Wrenches (Spanners)

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Table 4: Dimensions of Single-Ended Open Jaw Wrenches (Spanners)

| Nominal width across flats, s mm | a max mm | b max mm | L | |
|---|----------------|----------------|-----------|-----------|
| | | | Max mm | Min mm |
| 6 | 3.5 | 15.5 | 75 | 70 |
| 8 | 4.0 | 20.5 | 100 | 90 |
| 10 | 5.0 | 24.5 | 110 | 100 |
| 12 | 5.5 | 28.5 | 130 | 120 |
| 16 | 6.5 | 37.0 | 165 | 150 |
| 18 | 6.5 | 41.0 | 175 | 155 |
| 21 | 8.5 | 47.0 | 195 | 175 |
| 22 | 8.5 | 49.0 | 205 | 185 |
| 24 | 9.5 | 53.0 | 230 | 210 |
| 30 | 11.5 | 65.0 | 275 | 250 |
| 32 | 12.5 | 70.0 | 290 | 260 |
| 34 | 13.0 | 74 | 305 | 275 |
| 36 | 13.5 | 80 | 320 | 290 |
| 41 | 15.0 | 90 | 360 | 330 |
| 46 | 16.0 | 100 | 400 | 360 |

Table5: Dimensions of Double-Headed Open-Ended Engineers' Wrenches (Spanners)

| Nominal width across flats, s ₁ x s ₂ mm | a max mm | b ₂ max mm | b ₂ | L |
|---|----------------|-----------------------------|----------------|-----------|
| | | | Max mm | Min mm |
| 6 x 7 | 3.0 | 14 | 15 | 81 |
| 7 x 8 | 4.5 | 22 | 24 | 111 |
| 10 x 11 | 6.0 | 28 | 30 | 135 |
| 12 x 13 | 7.0 | 32 | 34 | 151 |
| 14 x 15 | 7.5 | 36 | 39 | 167 |
| 16 x 17 | 8.5 | 41 | 43 | 183 |
| 18 x 19 | 9.0 | 45 | 47 | 199 |
| 20 x 22 | 10.0 | 49 | 53 | 215 |
| 21 x 23 | 10.5 | 51 | 55 | 223 |
| 24 x 27 | 12.0 | 57 | 64 | 247 |
| 25 x 28 | 12.0 | 59 | 66 | 255 |
| 30 x 32 | 13.5 | 70 | 74 | 295 |
| 34 x 36 | 14.5 | 78 | 83 | 327 |
| 41 x 46 | 17.5 | 93 | 104 | 383 |

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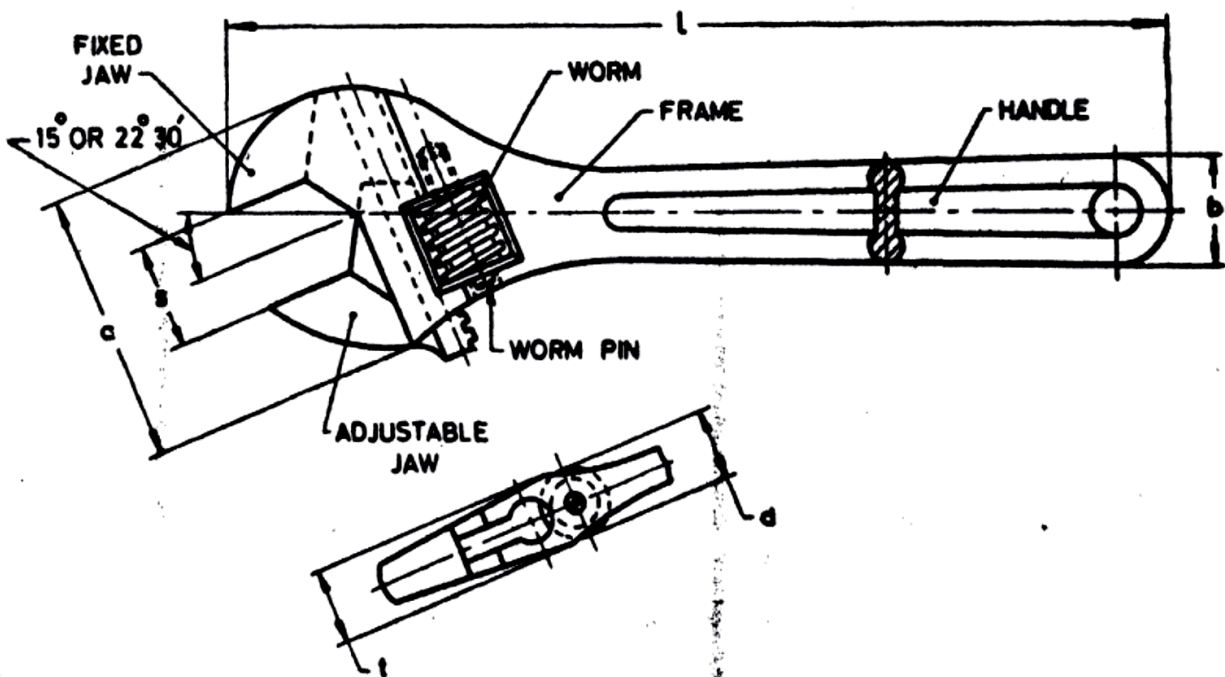
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4.2.3. Adjustable Spanner (Wrench)

- 4.2.3.1. The material, manufacture, workmanship and finish, test, preservation, and packing and sampling of single ended open jaw adjustable wrench shall be in accordance with ISO 6787 standard.
- 4.2.3.2. The single ended open jaw adjustable wrench shall consist of fixed jaw, adjustable jaw, worm, frame and handle. The opening of the jaw shall be easily and conveniently be adjusted at any opening up to the maximum opening of the wrench and shall remain in the required position till further adjustment.
- 4.2.3.3. The worm shall rotate freely and the jaw shall slide smoothly for the entire range of the wrench. The play of the moving components shall be within the limits of tests.
- 4.2.3.4. Wrenches shall not have forging defects, such as overheating, infilling, scales, pits, laps and cracks. In case of cast iron wrenches, the casting shall be uniform quality and reasonably smooth finish free from casting defects such as blow holes, porosity, shrinkage, cold shut and cracks.
- 4.2.3.5. All parts of the wrenches shall be protected against corrosion and rust. Nickel and chromium plated coatings shall be in accordance with clause 4.2.2.1.6.



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Fig. 5: Adjustable wrench (spanner)

Table 6: Dimensions and load characteristics of adjustable wrench (spanner)

| Nominal Size | L mm | Tolerance on L mm | a mm | b mm | t | | Maximum jaw opening, s mm | Longitudinal Play, Max. mm | Transverse Play, Max. mm | Torsional moment, Nm |
|--------------|------|-------------------|------|------|--------|--------|---------------------------|----------------------------|--------------------------|----------------------|
| | | | | | Min mm | Max mm | | | | |
| 100 | 100 | +10 0 | 32 | 15 | 8.5 | 8 | 13 | 1.0 | 1.2 | 49 |
| 150 | 150 | | 45 | 18 | 11.5 | 11 | 18 | 1.0 | 1.2 | 118 |
| 200 | 200 | | 53 | 22 | 14.0 | 14 | 24 | 1.2 | 1.2 | 255 |
| 250 | 250 | | 65 | 25 | 17.0 | 17 | 27 | 1.2 | 1.2 | 422 |
| 300 | 300 | | 80 | 30 | 20.0 | 19 | 34 | 1.5 | 1.5 | 687 |
| 375 | 375 | +15 0 | 90 | 35 | 21.0 | 21 | 41 | 1.5 | 1.5 | 1275 |
| 450 | 450 | | 120 | 40 | 22.5 | 21 | 55 | 1.5 | 1.5 | 1900 |

4.2.3.6. The main body of the wrench shall be made from any grade of steel conforming to PD 970:2002 standard with the following surface hardness:

- a) Frame, handle and jaw – 40 to 48 HRC
- b) Worm – 35 to 45 HRC
- c) Worm & Pin – 25 to 30 HRC

4.2.4. Ring Spanners (Wrenches)

4.2.4.1. The material, manufacture, workmanship and finish, test, preservation, and packing and sampling of double ended ring spanners (wrench) shall be in accordance with ISO 10103 standard.

4.2.4.2. The dimensions of ring wrenches (spanners) of cranked double-ended ring type shall be as given in Tables 6.

4.2.4.3. The widths across flats and the corresponding tolerances for the ring wrenches (spanners) shall be in accordance with ISO 10103.

4.2.4.4. Suitable steel for the manufacture of ring wrenches (spanners) shall be grade AISI D2 of BS EN ISO 4957:2000, steel designation X153CrMOV12 (1.2379) with approximate tempered hardness, HRC of 61–54, and annealed hardness, BHN of 255.

4.2.4.5. The ring wrenches (spanners) shall be hardened over entire length and the hardness measured at any point on the wrench shall be within the limits specified in ISO 1711-1.

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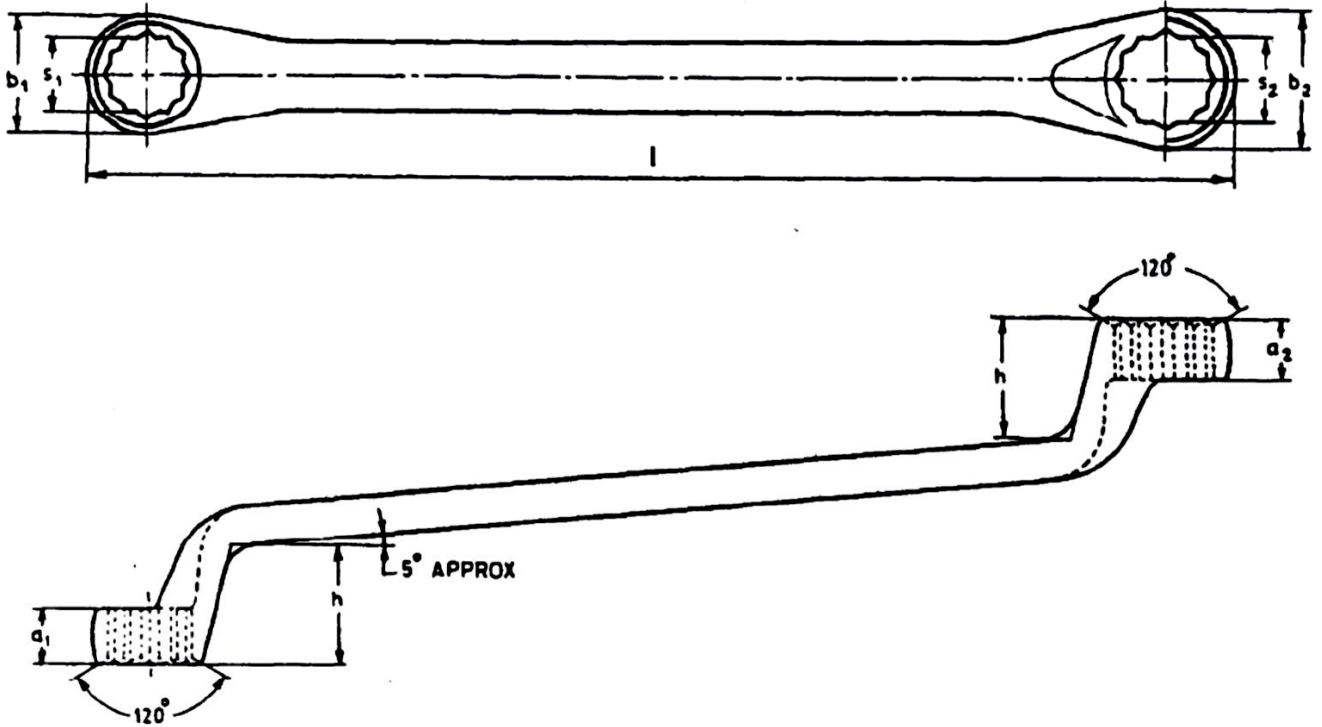


Fig. 6: Cranked Double-Ended Ring Wrenches (Spanners)

Table 7: Dimensions for Cranked Double-Ended Ring Wrenches (Spanners)

| Nominal width across flats mm | a ₁ mm | a ₂ mm | b ₁ mm | b ₂ mm | h mm | | l mm | |
|-------------------------------------|----------------------|----------------------|----------------------|----------------------|---------|-----|---------|-----|
| | | | | | max | min | max | min |
| 6 x 7 | 6 | 7 | 11 | 12.5 | 22 | 18 | 185 | 165 |
| 8 x 9 | 7 | 8 | 14 | 15.5 | 23 | 19 | 200 | 180 |
| 8 x 10 | 7 | 9 | 14 | 17 | 24 | 20 | 200 | 180 |
| 11 x 13 | 10 | 11 | 18.5 | 21.5 | 27 | 23 | 235 | 210 |
| 12 x 14 | 10 | 12 | 20 | 23 | 27 | 23 | 235 | 210 |
| 14 x 15 | 11 | 12 | 23 | 24 | 28 | 24 | 250 | 220 |
| 16 x 17 | 12 | 13 | 24 | 27 | 30 | 26 | 270 | 240 |
| 18 x 19 | 13 | 14 | 29 | 30 | 32 | 28 | 295 | 260 |
| 20 x 22 | 14 | 15 | 32 | 35 | 34 | 30 | 320 | 285 |
| 21 x 23 | 14 | 15 | 33 | 37 | 34 | 30 | 335 | 300 |
| 24 x 27 | 15 | 16 | 38 | 42 | 36 | 32 | 355 | 320 |
| 30 x 32 | 17 | 19 | 46 | 49 | 39 | 35 | 390 | 350 |
| 34 x 36 | 20 | 21 | 52 | 55 | 42 | 37 | 470 | 415 |
| 41 x 46 | 22 | 24 | 63 | 71 | 46 | 40 | 515 | 460 |

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4.3. ADDITIONAL REQUIREMENTS

- 4.3.1. All the wrenches in this specification shall be insulated with a solid plastic manufactured from cellulose acetate as per BS 1524:1993 or equivalent.
- 4.3.2. The insulating sleeve shall be tested dielectrically to 20 kV in one (1) minute and their use shall be limited to 1 kV ac or 1.5 kV dc in accordance with IEC 60900. The fact that the handle is covered with the insulating material does not guarantee the user safe working against electric shock.

4.4. QUALITY MANAGEMENT SYSTEM

- 4.4.1. 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 insulated wrenches 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.
- 4.4.2. 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.

5.0. TESTS AND INSPECTION

- 5.1. The insulated wrenches shall be inspected and tested in accordance with ISO/CD 8458-1, ISO 3318, ISO 10102, ISO 6787, ISO 1711-1, ISO 9717, ISO 4957, ISO 2082, IEC 60900 and all the provisions of this specification. It shall be the responsibility of the supplier to perform or to have performed the tests specified and whatever other tests he normally performs at works.
- 5.2. Copies of previous Type Tests 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. The accreditation certificate to ISO/IEC 17025 for the same third party testing laboratory used shall also be submitted with the tender document (all in English Language). The type tests shall include:
 - a) Hardness test for the tool steel applicable.
 - b) Chemical analysis of the tools component parts
 - c) Torque/Torsional tests
 - d) Dielectric tests of the insulation.

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- 5.3. The insulated wrenches 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 insulated wrenches to be supplied shall be submitted to KPLC for approval before delivery of the goods. The tests to be witnessed shall include;
- a) Static Load Tests
 - b) Static Shock Load Tests
 - c) Hardness Test
 - d) Torque Tests
 - e) Longitudinal/Transverse Play (Adjustable Wrenches)
 - f) Dielectric tests of the insulation.
 - g) Dimensional tests
- 5.4. 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 insulated wrenches which upon examination, test or use; fail to meet any of the requirements in the specification.

6.0. MARKING AND PACKING

6.1. MARKINGS

All insulated wrenches shall indelibly be marked / stamped on the frame in English Language the following.

- a) Standard of manufacture
- b) Identity of the manufacturer
- c) Nominal width across flat(s) on the respective ends for insulated wrenches
- d) Nominal size and length for insulated wrenches.
- e) Standardization Mark from the country of manufacture.
- f) Words “**Manufacturer’s initials - KPLC**”

6.2. PACKAGING

- 6.2.1. Insulated wrenches which are not given any protective treatment against rust, such as plating, shall be covered with grease or mineral jelly for rust-proofing. Each insulated wrench shall be wrapped in non-absorbent paper and packed in a carton.
- 6.2.2. Several insulated wrenches of different sizes shall be packed to form a set. The sizes and number of insulated wrenches to comprise such a set shall depend on the job for which it is

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required, and shall be subject to agreement between the manufacturer and the purchaser (KPLC).

6.2.3. The following information shall be printed on a suitable label firmly attached to each packaging:

- a) Purchase order number/tender
- b) Manufacturer's name
- c) Year of manufacture
- d) Insulated wrenches catalog number
- e) The words, **“PROPERTY OF KENYA POWER & LIGHTING CO.**

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:

- a) Guaranteed Technical Particulars signed by the manufacturer;
- b) Design Drawings with details of Insulated wrenches 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 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
- d) Detailed test program to be used during factory testing;
- e) Marking details and method to be used in marking the insulated wrenches;
- 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

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ensuring good workmanship in the manufacture of the Insulated wrenches 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 insulated wrenches to KPLC stores.

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Part 3: Insulated Wrenches

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ANNEX A: Guaranteed Technical Particulars (to be filled and signed by the Supplier and submitted together with copies of manufacturer's catalogues, brochures, drawings, technical data, sales records, customer reference letters and copies of certificates/test reports for tender evaluation)

Tender No.

| Clause | Description | Guaranteed Technical Particulars offered |
|--------|---|---|
| | Name of Manufacturer & Country of manufacture of the assembly tools being offered | specify |
| | Type/Model Reference Number | specify |
| 1 | Scope: Supplier to ensure adequacy of the design, good workmanship, good engineering practice and adherence to standards, specifications and applicable regulations in the manufacture of the insulators for KPLC | specify |
| 2 | Design standards complied with | specify |
| 3 | Terms and Definitions | specify |
| 4 | Requirements | |
| 4.1 | Service condition | specify |
| 4.2 | Particular requirements | specify |
| 4.2.1 | Heavy Duty Pipe Wrench | |
| | Design, manufacture and test | In accordance with ISO 6787 and ISO 1711-1 |
| | Construction | As per clause 4.2.1.1.1 - 4.2.1.1.8 |
| | Materials of components | As per table 1 |
| | Test load application | As per fig.1,table 2 |
| | Shape and dimension | As per fig.2,table 3 |
| 4.2.2 | Open ended Wrench (Spanner) | |
| | Design, manufacture and test | In accordance with ISO 3318 |
| | Material | Suitable steel of grade AISI D2 of BS EN ISO 4957, steel designation X153CrMOV12 (1.2379) with approximate tempered hardness, HRC of 61–54, and annealed hardness, BHN of 255 |
| | Hardness | Hardness measured at any point on the spanner shall be within the limits specified in ISO 1711-1 |
| | Workmanship and finish | Free from burrs, cracks, seams or other manufacturing defects. |
| | Anti-corrosive coating | nickel-chromium and cadmium as per ISO 2082 |
| | Single-Ended Open Jaw Spanner | Dimensions and shape as per fig.3 and table 4. |

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| | Double-Headed Open-Ended Engineers' Spanner | Dimensions and shape as per fig.4 and table5. | Attach drawing |
| 4.2.3 | Adjustable Spanner (Wrench) | | |
| | Design, manufacture and test | In accordance with ISO 6787 | specify |
| | Components | fixed jaw, adjustable jaw, worm, frame and handle | specify |
| | Workmanship and finish | Free from forging defects and casting defects. | specify |
| | Protection against corrosion | Nickel and chromium plated coatings. | specify |
| | Dimensions and shape | As per fig.5,table 6 | Attach drawing |
| | Material | Any grade of steel conforming to PD 970:2002 standard with the following surface hardness: a)Frame, handle and jaw – 40 to 48 HRC b) Worm – 35 to 45 HRC c) Worm & Pin – 25 to 30 HRC | Prove compliance : attach type test |
| 4.2.4 | Ring Spanner (Wrenches) | | specify |
| | Design, manufacture and test | In accordance with ISO 10103 | specify |
| | Dimensions and shapes | As per fig.6,table 7 | Attach drawing |
| | Material | Suitable steel of grade AISI D2 of BS EN ISO 4957, steel designation X153CrMOV12 (1.2379) with approximate tempered hardness, HRC of 61–54, and annealed hardness, BHN of 255 | Prove compliance : attach type test |
| 4.3 | Additional requirements | | |
| | Insulation material | solid plastic manufactured from cellulose acetate as per BS 1524:1993 or equivalent | specify |
| | Insulating sleeve | dielectrically tested to 20 kV in one (1) minute and their use shall be limited to 1 kV ac or 1.5 kV dc in accordance with IEC 60900 | Prove compliance : attach type test |
| 4.4. | Quality Management System | | |
| | Quality Assurance Plan | | provide |
| | Copy of ISO 9001:2008 Certificate | | provide |
| | Manufacturer's experience | | provide |
| | Manufacturing Capacity (units per month) | | provide |
| | List of previous customers | | provide |
| | Customer reference letters | | 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 | Test reports to be submitted by supplier to KPLC for approval | | provide |

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| 5.4 | Replacement of rejected assembly tools. | specify |
| 6.1 | Marking | specify |
| 6.2 | Packing | specify |
| 7.1 | Documents submitted with tender | provide |
| 7.2 | Documents to be submitted by supplier to KPLC for approval before manufacture | 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 | List test reports of the wrenches to be submitted to KPLC for approval before shipment | provide |
| 13.0 | Statement of compliance to specification (indicate deviations if any & supporting documents) | provide |

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Supplier's Name, Signature, Stamp and Date

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