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0.1 Circulation List

COPY NO.	COPY HOLDER
1	In charge E/plant workshop
2	

REVISION OF KPLC STANDARDS

In order to keep abreast of progress in the industry, KPLC standards shall be regularly reviewed. Suggestion to improvements to approved standards, addressed to the in charge, E/plant workshop department, are welcomed.

0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2023-03-27	New Issue	DANIEL ACHEDO	George Welimo

FOREWORD

This specification has been prepared by the Mbaraki-E/plant workshop of the Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for **tools, equipment's and spares** for use in the E/Plant workshop Mbaraki.

The Specification is to be used by KPLC in procurement of the items.

1. SCOPE

1.1 This specification is for electrical spares for use specifically for transformer drying oven.

1.2 The specification also covers inspection and test of electrical spares as well as schedule of Guaranteed Technical Particulars to be filled, signed by the supplier and submitted for tender evaluation.

1.3 The specification stipulates the minimum requirements for the electrical spares acceptable for use in the company and it shall be the responsibility of the supplier to ensure adequacy of the design, good workmanship and good engineering_practice in the manufacture of the accessory for KPLC.

2. REFERENCES

The terms and definitions given in the reference standards shall apply.

3. DEFINATIONS AND ABBREVIATIONS

4. REQUIREMENTS

4.1. Requirements for Oxygen Gas Regulator

4.1.1. The oxygen regulators shall be suitable for oxy-fuel cutting.

4.1.2. Shall be suitable for flame brazing

4.1.3. Safe operation with up to 230bars cylinder pressure

4.1.4. Offer oxygen adiabatic shock safety

4.1.5. Shall be compatible to existing BOC cylinders

4.1.6. Ergonomic hose coupling ready for installation of flashback arrestor.

4.1.7. Excellent constant flow and pressure regulation.

4.1.8. Designed for gas welding & cutting operations

Table 4.1: Technical Particulars for Oxygen Regulators

Parameter	Requirement
Gas	Oxygen
Maximal Inlet Pressure	230bars
Outlet Pressure range	0-4bars; 0-10bars
Body	Brass forged
Bonnet	Brass forged
Stem-Nuts& fittings	Brass
Diaphram	EPDM
Seat Sealing	PA
Weight (approximately)	1.3kg
Standard to comply	ISO 2530
Pressure Gauges calibration	Bar; Kpa; Psi

4.2. Requirements for Acetylene Regulators

4.2.1. For gas welding and cutting operations.

4.2.2. Shall be compatible to existing BOC cylinders

4.2.3. Ergonomic hose coupling ready for installation of flashback arrestor.

4.2.4. Excellent constant flow and pressure regulation.

Table 4. 2: Technical Particulars for Acetylene Regulators

Parameter	Requirement
Gas	Acetylene
Maximal Inlet Pressure	25 bars
Outlet Pressure range	1.5bars
Body	Brass forged
Bonnet	Brass forged
Stem-Nuts& fittings	Brass
Diaphram	EPDM
Seat Sealing	CR
Weight (approximately)	1.3kg
Standard to comply	ISO 2530
Pressure Gauges calibration	Bar; Kpa; Psi

4.3. requirements for Earth clamp

4.3.1. Heavy duty direct fits style.

4.3.2. Heavy duty frame & strong spring.

4.3.3. One piece solid brass terminal & jaw.

4.3.4. Direct cable connection, no lug required.

Table 4.3: Technical Particulars for Earth Clamp

Parameter	Requirement
Jaws	Solid Brass
Current	Upto 500 amperes
Handle	Ergonomic & non-slip
Construction	Welder alligator clamps

4.4. General requirement for Electrode Holder

4.4.1. For stick welding.

4.4.2. Powerful grip & multi position head.

4.4.3. Cooling ribs in the handle

4.4.4. Isolation head between the head, spring and body

Table 4.4: Technical particulars for Electrode Welder

Parameter	Requirement
Compliance standard	EN60974-11
Electrode diameter	2.5 up to 35mm
Cable connection	2*9/16
Cable diameter	25 up to 95mm
Current	400Amperes

Construction	Made of high quality brass material
Handle	Suitable insulation
Compatibility	Various kinds of stick electrodes

4.5. General requirements for Bench Grinder

4.5.1. Bust proof guard ensures maximum user safety.

4.5.2. On or off slide switch for one hand control and user safety

4.5.3. Spindle lock for quick and easy change of accessories

4.5.4. Compact housing shape design

Table 4. 5. Technical particulars for Bench Grinder

Power output	½ HP
Voltage	240 AC
No of phases	1
Power input	600Watts
Disc size	100mm

4.6. General requirements for Angle Grinder

4.6.1. Shall be used for metal surfaces cutting and grinding applications

4.6.2. Externally accessible carbon brushes for ease of serviceability.

4.6.3. Wheel guard for operators protection.

4.6.4. Shaft lock for easy wheel changing.

4.6.5. Specialized construction to protect the motor, bearings &gears from damage.

4.6.6. Shall have corded power type.

4.6.7. Shall have rear trigger switch with lock on.

4.6.8. Shall have spiral bevel gears for smooth rotation and more efficient transfer of power.

4.6.9. Side handle for ease of use and safety

4.6.10. Lock nut for securing disc

Table 4.6. Technical particulars for Angle Grinder

No load speed	Approximately 8,500rpm
Wheel diameter	180mm(7 inches)
Rated power	Approximately 2,200watts
Dimensions	provide
Alternating voltage	220-240v
Frequency	50hz

4.7. General requirements for MIG Welder

4.7.1. Flexibility of use with a wide range of materials such as steel, stainless steel, high tensile steel, and aluminum.

4.7.2. Shall be robust and reliable brand

4.7.3. Numerous steps for regulation of arc voltage

4.7.4. Regulation of spot welding time

4.7.5. Two positions for reactance

4.7.6. Thermostatic protection

4.7.7. MIF-MAG/FLUX/BRAZING

4.7.8. Offer training for safety and use of the machine

4.7.9. Accessories Argon Gas IT adaptor; Torch hook; cable 25mmq,3M work clamp-Atlas 50mmq; MT25 MIG Torch 3M; Feed roll 4R 1,0FE-!,2FE “P-K”; Feed Roll 4R).6FE-0.8/0.9FE “P-K”; Gas Regulator 2 Manometer 12L/min

Table 4. 7. Technical particulars for Mig Welder

Current range	40-300A
Voltage	420V AC
No of phases	3
DC current	200A
Power factor	0.9
Adjustments Positions	12
Steel welding wire diameter	0.6-1.2mm
Inox wire welding diameter	0.6-1.2mm
Aluminium welding wire diameter	0.8-1.2mm
Flux cored welding wire diameter	1.0-1.2mm
Brazing wire diameter	0.8-1.2mm
Protection degree	IP22
Approximate weight	96kg
Maximum absorbed power	11.5kw
Maximum no load voltage	41.5V

4.8. General requirements for Plasma Cutter

4.8.1. Dross free and taper-free cu high efficiency & power factor reduces power consumption.

4.8.2. Pilot arc facility to enhances consumable durability

4.8.3. Easy and clean cut in a fast & higher cutting productivity.

4.8.4. Suitable for cutting stainless steel, copper, carbon steel, aluminium and other metals

4.8.5. Minimum change in metallurgical properties of the metal under cut.

4.8.6. Improved cooling of the torch

4.8.7. Quality cutting thickness with fast cutting speeds, smooth cutting, minimal deformation and less hang slag.

4.8.8. Basic training for safe and optimal use of the equipment

4.8.9. Provide standard accessories required for machine operation.

Table 4.8. Technical particulars for Plasma Cutter

Required air pressure(kg/cm2)	4.5-6
Cutting Thickness	1-30mm
Efficiency (%)	85
Power (KVA)	15.1
No-Load voltage	295V
Input voltage	AC 415 +/-15%
Frequency	50/60hz
Duty cycle (%)	60
Rated input current (A)	21
Housing Protection Grade	IP 21
Approximately Net weight	39kg
Arcing way	Pilot arc transfer

4.9. General Requirements for Oil-Motor Pump

4.9.1. Shall be thermally protected.

4.9.2. For continuous duty rated

Table 4.9: Technical Particulars for Oil-Motor pump

Parameter	Requirement
Voltage	240Volts
C	20micro farads
KW/HP	0.75/1
RPM	2900
HZ	50

P	1100W
H (max)	51m
H (min)	13m
IP	X4
Ins Cl	F

4.10. General requirements for G-Clamps.

4.10.1. Shall be dropped forged steel frame.

4.10.2. Shall have swivel shoe design for clamping on uneven surfaces.

4.10.3. Twin-startacme cold rolled thread for faster and smoother operation.

4.10.4. Fused steel handle that will bend before clamp can be overstressed

Table.4.10 Technical particulars for G-Clamps

Size (Jaw opening)	250mm
Throat depth	standard

4.11. General requirements for Spray painting Gun

4.11.1. Ergonomic lighter body.

4.11.2. Softer trigger pull to reduce fatigue.

4.11.3. Polished surface to allow for easier cleanup.

Table 4.11 . Technical particulars for Spray Painting Gun

Body material	Aluminium
Air pressure (psi)	50-70psi
Cup capacity(ml)	600ml
Nozzle size(mm)	1.3mm-1.4mm
Type of feed	Gravity
Operating pressure	2 bars
Air consumption	4.1-4.5cm

4.12. General requirements for Cleaning Gun.

4.12.1. For cleaning transformer surfaces with compressed air jet and a cleansing agent

4.12.2. Shall have a tank below the long nozzle.

4.12.3. Shall have a long nozzle to enable cleaning even in hardly accessible places

4.12.4. Provide standard air supply connection

4.12.5. Outlet nozzle and check out nut be of robust construction

Table 4.12.Technical particulars for Cleaning Gun

Tank capacity	0.95 litres
Operating pressure (Mpa)	0.4
Maximum air pressure (Mpa)	0.8

4.13. General requirements for Impact Wrench.

4.13.1. Cordless

4.13.2. Brushless motor

4.13.3. High torque-Nut busting torque (1,700Nm)

4.13.4. Powered by 18V LI-ion battery

4.13.5. Twin LED job light

4.13.6. Electronic 3 stage impact power selection (hard/medium/soft)

4.13.7. Compact and lightweight design

4.13.8. Ergonomic soft grip

4.13.9. Electric brake

4.13.10. Forward/reverse rotation

4.13.11. Provide all related accessories

4.13.12.

Table 4.13. Technical particulars for Impact Wrench

Voltage	18V
Driving shank	¾'' square
Standard bolt	M12-M24
High tensile bolt	M10-M24
Noise sound power	109dB(A)
No load speed(hard/med/soft)	0-1800/1000/900
Max fastening torque	1050Nm
Approximate weight	3.4-3.7kg
Battery type	Lithium-ion

4.14. General requirements for Workshop Compressor.

4.14.1. Quiet and compact

4.14.2. Rotary screw air compressor

4.14.3. 100% duty cycle

4.14.4. Tank capacity 200litres

4.14.5. Fitted with controller for real time monitoring and controls option-display to include run hours and service warnings

4.14.6. Receiver mounted air compressor

Table 4.14. Technical particulars for Workshop Compressor

Capacity	F.A.D:16.4 l/s
Min working pressure	4 bar.g
Noise level	67 dB(A)
Motor rating	7.5KW
Electrical supply	400V/3ph/50hz
Compressed air connection	G ½" female
Approximate weight	195kgs

4.15. General requirements for Portable Compressor.

4.15.1. Pressure switch with "off" and "Automatic operation" buttons

4.15.2. Cable and power plug for single phase models

4.15.3. Safety valve

4.15.4. Adjustable pressure regulators(receiver pressure and regulated outlet pressure)

4.15.5. Quick coupling for ease of use

Table 4. 15. Technical particulars for Workshop Compressor

Capacity	F.A.D:16.4 l/s
RPM	950
Noise level	89 dB(A)
Receiver	90Liters
Electrical supply	230V/ 1ph/50hz
Free air delivery (l/s; cfm)	3.2;6.8
Approximate weight	66 kgs
Max working pressure (bar.g/psi.g)	10 / 145

4.16. General requirements for Electric motor (Rewinding Machine)

4.16.1. Ac induction motor

4.16.2. Shall have appropriate pulley for power transmission

Table 4.16. Technical particulars for Electric Motor (Rewinding Machine)

Rating	2.2kW
Coupling	Belt drive
speed	1500rpm
Electrical supply	415V/ 3ph/50hz
Operating temperature	Max 80degrees centigrade
Approximate weight	

4.17. General requirements for Variable Frequency Drive

4.17.1. For control of ac motor

4.17.2. Plc integrated

4.17.3. Easy macros

4.17.4. Automatic restart

4.17.5. Multiple parameter settings via parameter set switching

Table 4. 17. Technical particulars for Variable frequency drive

Input	Voltage- 200/240
	Frequency-50/60Hz
	Current- 22.1/18.6A
Output	Voltage 400-3phase
	Frequency-0.5/500
	Current -11ampere

4.18. General requirements for foot switch.

4.18.1. Rugged cast metal enclosure to keep switch from sliding when operated

4.18.2. The latch for switch activation to be placed under full shield to prevent accidental switching by a falling object

4.18.3. Holes provision for either floor/equipment mounting.

Table 4.18. Technical particulars for foot switch

Contact resistance	25mΩ initial value
Insulation resistance	100mΩ above Dc 500v
Withstand voltage	≥2000Vac
Operating temperature	-20°c to 70°c
Operating humidity	≤ 85%
Material	Aluminum
Inner switch rating load	5-15A/250Vac
Cable length	1.5-2 meters

4.19. General requirements for heaters element 3850

4.19.1. The heaters shall be suitable for continuous operation indoors:

4.19.2. At temperatures 0 to 400 above degrees C.

4.19.3. High humidity

4.19.4. The air heaters should be highly non-corrosive, lightweight and durable.

4.19.5. They shall have thicker sheath wall, silicone seals to ensure moisture resistance in humid environments

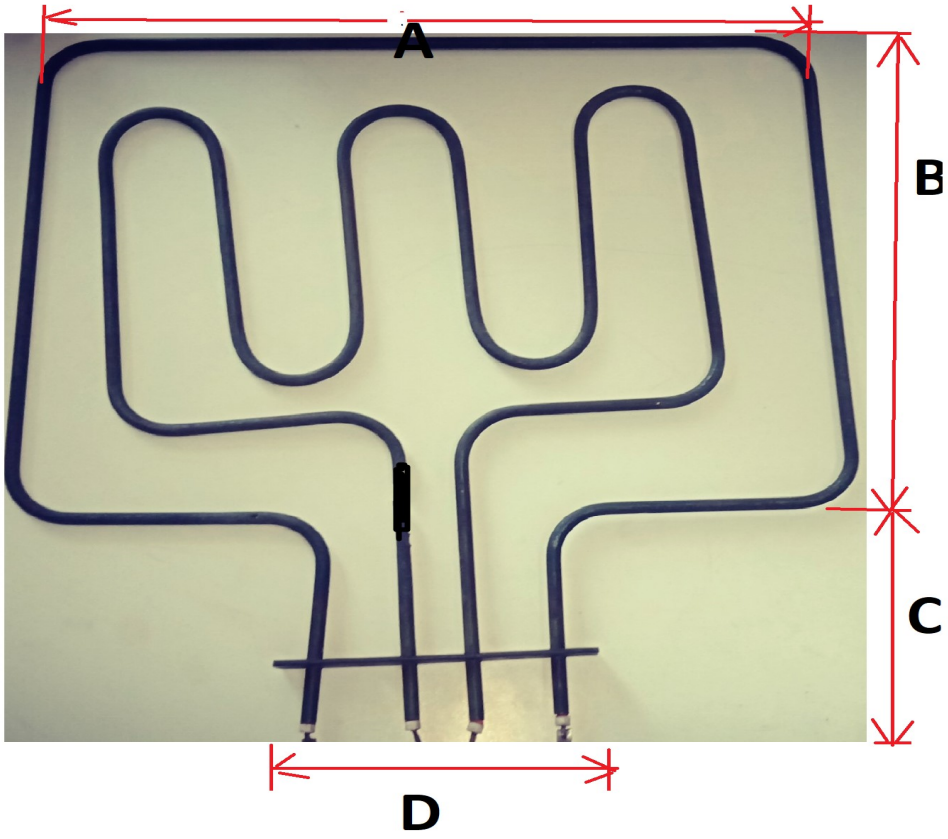
4.19.6. They shall incorporate design features for mounting and termination.

4.19.7. The termination provisions shall be able to accommodate 2.5/4mm2 single core/stranded cable.

Table 4.19: Technical Particulars for heater element 3850w

Parameter	Requirement
Operating Voltage	220-250 Vac
Frequency	50 Hz
Rating Range	3850 – 4000 watts

Fig 4.19 : Dimensions of the heater element



A = 38 cm
B = 29 cm
C= 11 cm
D =13.5 cm

4.20. General requirements for electromagnetic contactors 80A

4.20.1. The electromagnetic contactors shall have side mounted auxiliary contacts having 2NO and 2NC contacts.

Table 4.21. Technical particulars for electromagnetic contactors 80A

Load Current rating	80A
voltage	420V AC
No of phases	3
No of poles	3
Auxiliary contacts	2NO-2NC
Overload relays	Direct connection to the contactor
Coil voltage	240VAC
Degree of protection	IP20
Wire terminals	2 x 2.5mm^2
Mounting	Rail mounting
Operating temperature	0-100

4.21. General requirements for three phase motor (Oven)

4.21.1. The motor housing shall be suitable for high temperatures, severely corrosive environment and oil resistant,

Table 4.21 . Technical particulars for three phase motor (Oven)

Rated power (Hp)	5.5Hp
Rated voltage	415V ac 50 Hz
Duty	Continuous
Speed (rpm)	1400 -1500
Housing	Flame proof
Cooling method	Fan
Housing Protection Grade	IP 55
Model of connection	Star/Delta
Ambient temp (◦C)	15 -50
Approximate weight	43kgs
Terminal box	top/side mounted

4.22. General requirements for 2 legged sling (3.2 tons)

4.22.1. The transformers lifting sling shall be appropriate to lift transformers and other heavy loads

4.22.2. Shall have a shortening clutch on both sides of the chain, permanently fitted

4.22.3. The shortening clutch, sling hooks and mater links shall be properly painted signal red color and fitted on the two legged sling

4.22.4. Shall have a robust latch to prevent accidental detachment of the load.

Table 4.22 . Technical particulars for two legged sling

Max lifting load	3.2 tonnes
Dimensions (R:D:S) mm	(107:37;27)
T (No Latch: Width latch)	(35mm:31mm)
Length (two lengths 1.4m+1.4m	2.8meters
High tensile chain	10mm
Sling hook with latch	10mm
Masterlink	Appropriate for 3.2 tonnes
Kupler	10mm

4.23. General requirements for ¼ inch Socket Set

4.23.1. Chrome vanadium alloy steel construction

4.23.2. The rachet shall have quick release mechanism

4.23.3. Rachet handle shall have cushion thermos rubber grip

4.23.4. The socket shall be hexagonal and metric sizes

4.23.5. Socket sets shall be chrome vanadium alloy steel

4.23.6. Socket sets shall be chrome plated bright finish

4.23.7. The socket sets shall be in a box made of high density polyethylene

Table 4.23 . Technical particulars for ¼ inch Socket Set

Standards (DIN)	DIN3120; DIN3125; DIN3122
Sockets	9mm to 32mm

4.24. 2000 PSI electric (240 Volts) Pressure machine washer

4.24.1. Pressure: 2000psi and above

4.24.2. Main voltage: 220-250V

4.24.3. Main frequency: 50 Hz

4.24.4. Min. operating pressure: 2000PSI

4.24.5. Water consumption: 6 litres per minute

4.24.6. Max.pressure water supply: 40-80PSI

4.24.7. Water temperature: 5-60°C

4.24.8. list of components

- 4.24.8.1. Stainless Steel Gun
- 4.24.8.2. Hose Reel with 50ft High Pressure Hose pipe
- 4.24.8.3. 4 High Pressure Nozzles 0°, 15°, 40° and Soap
- 4.24.8.4. Wheel For Easy Mobility
- 4.24.8.5. Protected Power Cord

4.25. 100L Electric 3hp, Belt Driven compressor

4.25.1. Start :Direct

4.25.2. Drive :V-belt driven

4.25.3. Cylinders :3

4.25.4. Voltage (V): 220-250 V / 50 Hz / 1 Ph

4.25.5. Air receiver: Yes

4.25.6. Capacity air receiver (l) :100

4.25.7. Galvanized tank: No

4.25.8. Intake capacity (l/min) :400

4.25.9. Free air delivery (l/min): 320

4.25.10. Free air delivery (m3/h) :19.2

4.25.11. Cut-in pressure (bar): 8

4.25.12. Maximum pressure (bar) :10

4.25.13. Noise level dB(A) (0 m): 92

4.25.14. Noise level dB(A) (4 m) :72

4.25.15. Noise level dB(A) (7 m) :67

4.25.16. Sound volume reduction :No

4.25.17. Air connection ("): 1/2

4.25.18. Stages :1

4.25.19. Oilfree: No

4.25.20. Filter with reducer :No

4.25.21. Pump speed (RPM) :1000

4.25.22. Motor power :(hp / kW) 3.0 HP / 2.2 kW

4.26. Digital Laser Tachometer (Handheld RPM Meter)

4.26.1. Measuring min 2.5 RPM (Need to cooperate with reflective strip measurement)

4.26.2. Measuring above 5000RPM

4.26.3. Resolution:0.1RPM,at 2.5~999.9RPM;1RPM,at 1000~99,999 RPM

4.26.4. Measure RPMs of motors, machinery such as circular saws, speed of a lathes and other rotating devices

4.26.5. Accurate to +/- 0.02 percent

4.26.6. capable of measuring at a distance from 50mm and above

4.26.7. RPMs measured over 0.5 second sampling time

4.26.8. Readings are displayed on a large, easy-to-read LCD screen;

4.26.9. stores last, minimum, and maximum reading; features auto-zero adjustment

4.26.10. Detection: Laser diode / contact

4.26.11. Update Time: 1 second (typical)

4.26.12. **List of components Includes:**

4.26.12.1. 1 x Digital Tachometer

4.26.12.2. 1 x English Operation Manual

4.26.12.3. 1 x Carry Pouch

4.26.12.4. 2 x Battery

4.26.12.5. 1 x 20cm Reflective Tape

4.26.12.6. 1 x Standard Packaging Box

4.27. Heavy duty electric Drilling Machine(1050W)

4.27.1. No load speed : two speed (RPM)-1200 and 300

4.27.2. Power Rating: 1050W(continuous)

4.27.3. Net weight-less than 6kg

4.27.4. Max Capacity in steel- 13 mm (1/2")

4.27.5. Max drilling capacity in wood: 38mm auger bit, 118mm self-feed bit,152mm hole saw

4.27.6. Voltage: AC 220 - 250V

4.27.7. Motor current: 10Amps

4.27.8. Overall length: greater than 460mm

4.27.9. Power cord length: not less than 2m

4.27.10. Motor provides 145Nm of max. torque in low speed

4.27.11. Torque limiter automatically disengages gears should the bit jam

4.27.12. Forward/Reverse trigger with 2 speed change lever

4.27.13. Built-in clutch to reduce gear damage by automatically disengaging gears if the bit binds

4.27.14. Accessories

4.27.14.1. Drill bits

4.27.14.2. Chuck key

4.27.14.3. Hex wrench

4.27.14.4. Plastic carrying case

4.28. Power extension Cable-extension cord reel cable25meter power cable

4.28.1. Amps: 13Amps

4.28.2. Voltage: AC 220 - 240V

4.28.3. Cable Rating: 2.5mm 3 Core

4.28.4. Cable Length: 25 Meters

4.28.5. Load Rotating: 3600 Watts

4.28.6. Material: PVC

4.28.7. Additional Features: 4x13A Sockets

4.29. Open-end spanners

4.29.1. Manufactured from Drop Forged, chrome vanadium steel with each head set at a 15 angle.

4.29.2. Conforms to DIN ISO 1711 , DIN 3113B

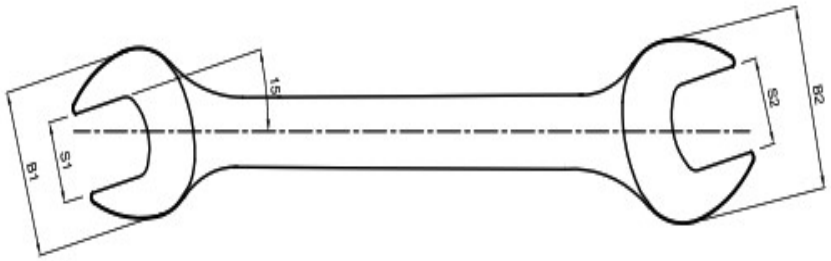
4.29.3. Top-grade industrial quality for the hardest of continuous use

4.29.4. Protected from wear and corrosion

4.29.5. High corrosion and wear protection

4.29.6. Finish - CS (Chrome plated)

4.29.7. Double open end spanner should consist of following size of spanner 10x11, 14x15, 16x17, 18x19, 20x22



4.30.Double ended (Ring) spanners

4.30.1. Made from Chrome Vanadium steel

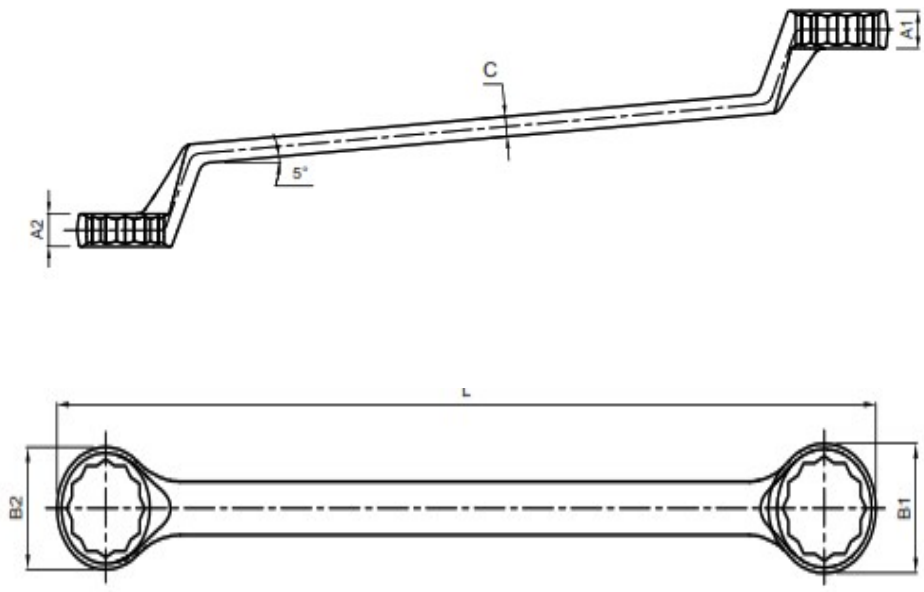
4.30.2. Plated with Nickel chrome

4.30.3. Conforms to DIN ISO 1711 , DIN 3113B

4.30.4. Protected from wear and corrosion

4.30.5. High corrosion and wear protection

4.30.6. Deep offset



4.31. Adjustable spanner

4.31.1. DIN 3117 Form A

4.31.2. Jaw 15° offset

4.31.3. With mm scale

4.31.4. With hanging hole

4.31.5. Two component handle

4.31.6. Phosphate finis

4.31.7. Chrome vanadium

4.32. Mole grips-10"

4.32.1. These Mole grips/locking pliers have curved or rounded jaws and are used to securely grip and hold rounded objects like pipes, as well as nuts and bolts.

4.32.2. Curved Mole grips can also hold hexagonal objects, although there are parrot nose Mole grips/locking pliers which are specifically designed for this purpose.

4.32.3. Drop forged carbon steel

4.32.4. Nickel plated for steel protection

4.32.5. Ridged grabber teeth

4.32.6. Adjustable bolt with spring

4.32.7. Durable release handle

4.32.8. Hardness HRC38-HRC45

4.32.9. Length: 10in or 250mm

4.32.10. Max Opening: 50mm

4.32.11. Weight: 445g

4.33. Hack saw frames

4.33.1. Dimensions:300mm

4.33.2. Material: Aluminium

4.33.3. Made of high quality aluminum alloy and sturdy high carbon steel, which is high hardness, durable and solid.

4.33.4. Allows adjustable blade angles of 45 and 90 degrees, ensuring different angles of cutting as well as meeting your different needs.

4.33.5. The especially hardened teeth of the hacksaw are held in place by a solid bracket and easily handle cuts - large or small - that are precise and fine.

4.34. Electric spary gun (Electric paint sprayer)

4.34.1. Electric spray gun shall be Cordless

4.34.2. Voltage: 20V

4.34.3. Tank Volume/capacity:800ml and above

4.34.4. Spraying pressure:>0.1 bar

4.34.5. Flow:600ml/min and can be regulated by adjusting flow control knob

4.34.6. Battery capacity:2000mAH and above Lithium ion

4.34.7. Air cap: should be rotating to achieve three spray models(horizontal, vertical and circular)

4.34.8. Accessories required

4.34.9. Charger quantity 2

4.34.10. Battery :2

4.34.11. Copper nozzles:5(0.5mm,1mm,1.5mm,2mm,2.5mm)

4.34.12. Paint container:2

4.34.13. Nozzle cleaning needle:2

4.34.14. Viscosity measuring cup:2

4.34.15. Color :any

4.35. Allen Keys

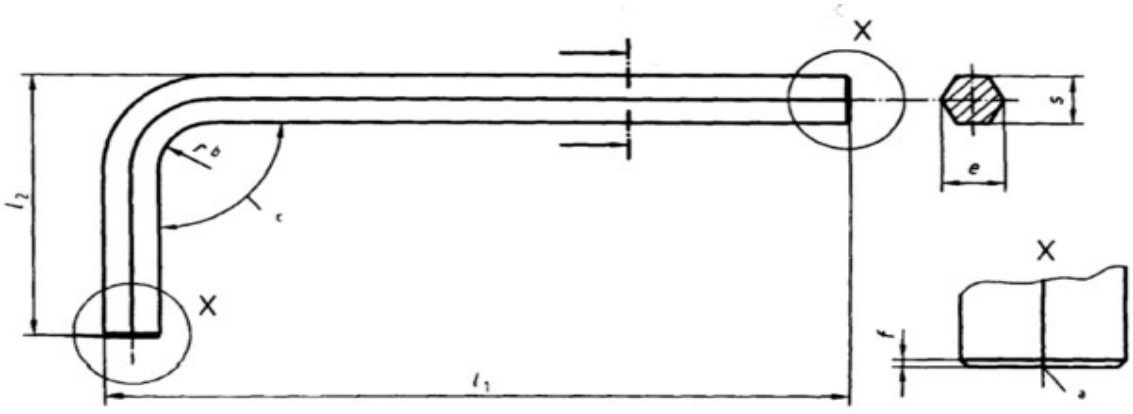
4.35.1. Hex-Plus L-keys for hexagon socket screws shall provide more contact surface inside the screw, which prevents rounding. L-keys shall transfer high torque but they must not twist to any great extent, or shear off, to minimize the risk of injuries

4.35.2. A hex key shall be a six-sided shaped bar bent at a 90° angle at one end.

4.35.3. A hex bit shall be an unbent piece of such a bar

4.35.4. Alloy steel shall contain at least two of the following elements: chromium, nickel, molybdenum or vanadium

4.35.5. Hex key set, shall be nine-piece, includes metric sizes 1.5, 2, 2.5, 3, 4, 5, 6, 8 and 10 mm



4.36. Electrical Screw driver Flat

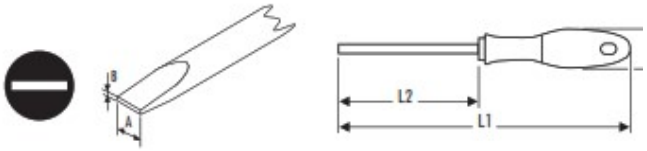
4.36.1. Screwdriver Type : Insulated

4.36.2. Number of Pieces: 7

4.36.3. Tip Type: Slotted head screws in accordance with ISO 2380- 2:2004

4.36.4. Blade Material :Chrome Steel

4.36.5. Handle Material :Thermoplastic Elastomer Blade Finish :Matt Chrome Plate



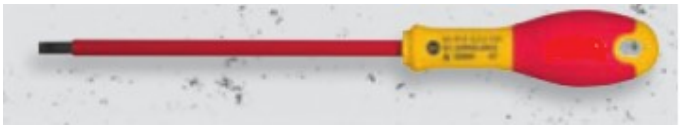
4.36.6. Tip Size (A) : 3mm, 4mm, 5.5mm, 6.5mm and 8.0mm

4.36.7. Blade Length L2 :100mm, 125mm, 150mm, 175mm

4.36.8. Screw driver size 3 x 100mm; 4 x 100mm; 4 x 125mm ; 5.5 x 100mm; 6.5 x 125mm 6.5 x 150mm and 8.0 x 175mm

Table 4.39

	A x L2 x B (mm)	L1 (mm)
1	3 x 100 x 0.5	198
2	4 x 100 x 0.5	202
3	4 x 125 x 0.8	227
4	5.5 x 100 x 1.0	205
5	6.5 x 125 x 1.2	241
6	6.5 x 150 x 1.2	266
7	8.0 x 175x1.6	291



4.36.9. The blades shall be free from seams, burrs, cracks or other manufacturing defects and shall be finished smooth all over

4.36.10. The handles shall be provided with proper serrations so that the handles do not slip during usage.

4.36.11. The handles shall be finished smooth and shall be convenient for holding

4.36.12. The screwdriver points shall be ground blunt and shall be in the same plane as the axis of the blade.

4.36.13. The blades of the screwdrivers shall be protected against rust by plating with nickel cadmium or chromium or by any other suitable process.

4.36.14. Handles – The handle shall be made of a solid plastic manufactured from cellulose acetate as per BS 1524:1993 or equivalent

4.36.15. The blades of the screwdrivers shall be provided with an insulating sleeve

4.37. Electrical Screw driver star

4.37.1. Screwdriver Type : Insulated

4.37.2. Number of Pieces: 7

4.37.3. Tip Type:Philip head

4.37.4. Blade Material :Chrome Steel

4.37.5. Handle Material :Thermoplastic Elastomer Blade Finish :Matt Chrome Plate

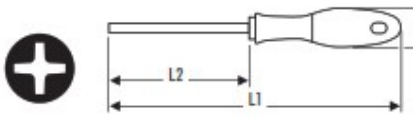


Table 4.40

	N°	L1 (mm)	L2 (mm)
1	PH 00	149	50
2	PH 0	177	75
6	PH 1	205	100
3	PH 2	230	125
4	PH 2	355	250
5	PH 3	266	125
7	PH 4	316	200

4.37.6. Tip Size: ; PH 00 , PH 0,PH 1, PH 2, PH 3 and PH 4

4.37.7. Blade Length :50mm,75mm,100mm, 125mm, 200 and 250mm

4.38. Mechanical Screw driver Flat

4.38.1. Screwdriver Type : **Not** Insulated

4.38.2. Number of Pieces: 7

4.38.3. Tip Type: Slotted head screws in accordance with ISO 2380- 2:2004

4.38.4. Blade Material : Chrome Steel

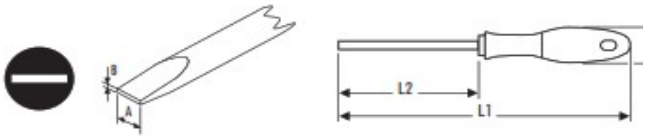
4.38.5. The handles shall be convenient for holding

4.38.6. The handles shall be provided with proper serrations so that the handles do not slip during usage

4.38.7. The blades shall be free from seams, burrs, cracks or other manufacturing defects and shall be finished smooth all over

4.38.8. The screwdriver points shall be ground blunt and shall be in the same plane as the axis of the blade.

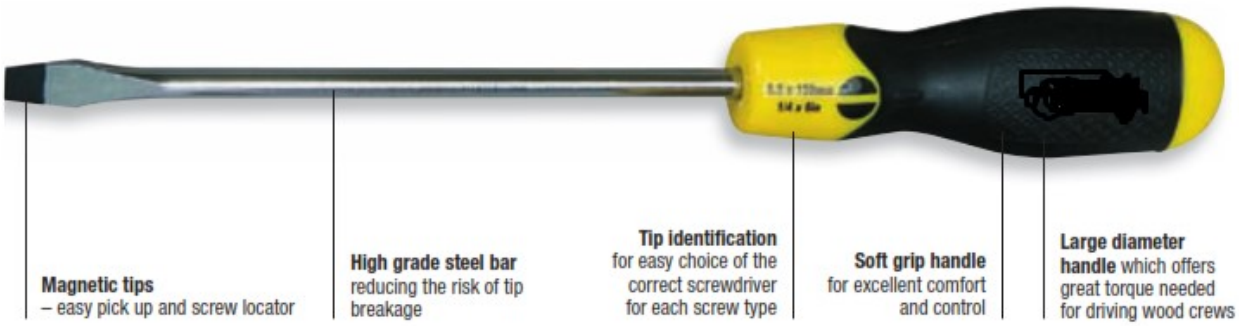
4.38.9. The blades of the screwdrivers shall be protected against rust by plating with nickel cadmium or chromium or by any other suitable process.



4.38.10. Tip Size (A) : 3mm, 4mm, 5.5mm, 6.5mm and 8.0mm
4.38.11. Blade Length L2(mm) :100mm, 125mm, 150mm, 175mm
4.38.12. 3 x 100mm; 4 x 100mm; 4 x 125mm ; 5.5 x 100mm; 6.5 x 125mm 6.5 x 150mm and 8.0 x 175mm

Table 4.41

	A x L2 x B (mm)	**L1 (mm)**
1	3 x 100 x 0.5	198
2	4 x 100 x 0.5	202
3	4 x 125 x 0.8	227
4	5.5 x 100 x 1.0	205
5	6.5 x 125 x 1.2	241
6	6.5 x 150 x 1.2	266
7	8.0 x 175x1.6	291



4.39. Soldering iron

4.39.1. Nominal Power (W) :15-80

4.39.2. Standard Voltage (V) :220 - 250

4.39.3. Nominal Tip Temp (°C): 250-480

4.39.4. Fitted Bit 820 :(2.3mm)

4.39.5. Cable Length (M) : 1.5

4.39.6. Cable Type: Pvc With British Plug

4.39.7. Leakage Current (µA): < 200

4.39.8. Length Tip/Handle (mm): 147

4.40. Combined pliers

4.40.1. Should be sleek design with side cutting and crushing facility for burnt PVC insulated wires,

4.40.2. Induction hardened edges,

4.40.3. Injection molded insulated sleeves to with stand upto 1000 volts.

4.40.4. Material: forged chrome vanadium steel

4.40.5. Finish: Black finish

4.40.6. Size: 210mm

4.41. Cutter

4.41.1. Material: High carbon steel with heat-treated handles

4.41.2. Handles: Protective PVC grip

4.41.3. Induction-hardened precision cutting edges

4.41.4. Cutting edge hardness approximately 62 HRC

4.41.5. Clean cutting of thin copper wires

4.41.6. Narrow head style for use in confined areas

4.41.7. Vanadium electric steel; oil-hardened and tempered

4.42. Long nose Pliers

4.42.1. Narrow, finely serrated tips.

4.42.2. Handles are highly resistant to common corrosive elements, such as petrol, acetone, chlorothene & Skydrol

4.42.3. Injection moulded sleeves.

4.42.4. Material : forged chrome vanadium steel

4.42.5. Length - 160 mm

4.42.6. Finish - Black finish

4.43. Pipe Wrench -12"

4.43.1. Should be made of drop forged chrome vanadium steel.

4.43.2. Double spring system for ratchet action, which facilitates the locking and the immediate releasing of the wrench and a quick continuation of the operation.

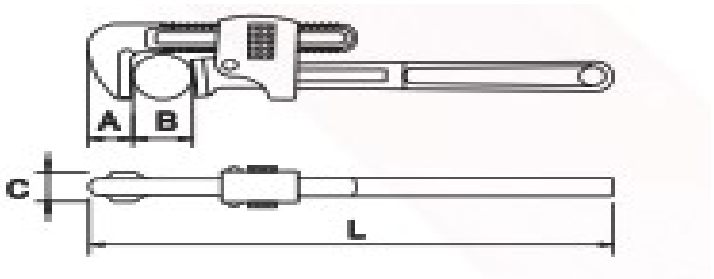
4.43.3. The teeth, heat treated, provide adequate wear resistance and a firm grip on all surfaces

4.43.4. Material for jaw and Handle:Ductile cast iron

4.43.5. Material for Nut:special steel

4.43.6. Pipe capacity:50mm

4.43.7. Knurled adjustment nut for easy one-handed operation.



L=12 inch or 300mm ,A=24 ,B=1 ¼" ,C=16

4.44. Ratchet Socket spanners 1/2 Inch

4.44.1. Quick release mechanism to lock sockets onto the drive during operation and allow easy changeover.

4.44.2. Chrome Vanadium Steel

4.44.3. Nickel Chrome plated for long lasting protection

4.44.4. Reversible mechanism for easy one-hand direction change

4.44.5. Drive Size (in) : ½

4.44.6. Overall Length (in): 9-7/8

4.44.7. 1/2" Drive 6 Point Standard: 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 mm

4.44.8. Accessories:

4.44.8.1. 1/2" Drive 10" Extension Bar

4.44.8.2. 1/2" Pear Head Ratchet

4.44.8.3. 1/2" Drive 15" Flex Handle

4.44.8.4. Blow-Molded Case

4.45. Digital Vernier caliper

4.45.1. Display : LCD Type

4.45.2. Measuring Speed : ≤1.5 m / seconds or 60 inches / seconds

4.45.3. Measuring Range : 0 to 150 mm / 0 to 6 inches

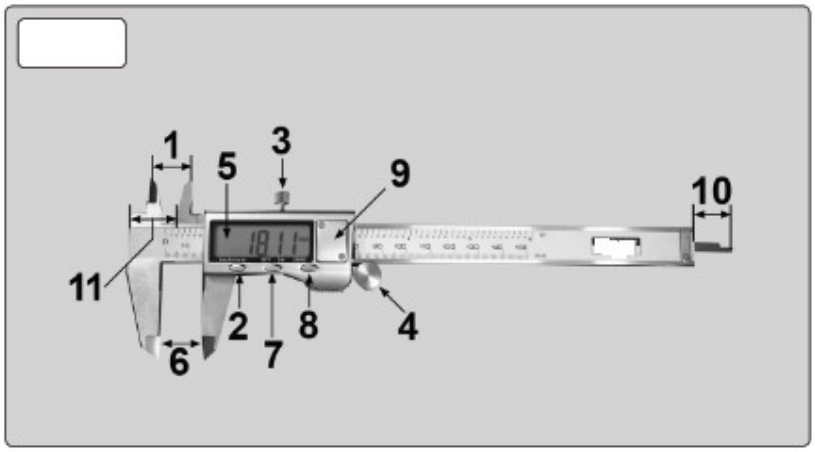
4.45.4. Power : One 1.5 V button cell (Type Sr44)

4.45.5. Storage Temperature : 0°C to 50°C / 32°F to 122°F

4.45.6. Working Environment : 5°C to 40°C / 41°F to 104°F (less than 80% Relative Humidity)

4.45.7. Resolution : 0.01 mm / 0.0005 inches

4.45.8. Accuracy : +0.02 mm / ±0.001 inches



1 Internal Measure
2 mm\inch Button
3 Locking Screw
4 Fine Adjust Wheel
5 LCD Display
6 External Measure
7 On/Off Button
8 Zero Button
9 Battery Cover
10 Depth Measure
11 Step Measure

4.46. Digital adjustable preset Torque Wrench 1/2 Inch

4.46.1. Adjustable Digital Torque Wrench captures and displays torque measurement in real time mode, providing users with unprecedented levels of control and accuracy.

4.46.2. Square Drive, inches:1/2

4.46.3. Head Type: Flex-Rachet

4.46.4. Gear Teeth:36

4.46.5. Gear Action:10

4.46.6. Range N-m: 34-339

4.46.7. Head Depth: 19.1mm

4.46.8. Head Width: 41.3mm

4.46.9. Length, inches: 660mm

4.46.10. Torque Setting Resolution: 0.1N-M

4.46.11. Power: All models - 3 AA batteries (included)

4.47. Digital Micrometre screw gauge

4.47.1. Measurement range:0-25mm

4.47.2. Accuracy: ±2µm

4.47.3. Resolution: 0.001mm or .00005"/0.001mm Flatness: 0.3µm / .000012Measuring faces: Carbide tipped

4.47.4. Display: LCD

4.47.5. Battery: SR44 (1 pc.), 938882

4.47.6. Battery life: Approx. 1-3 years under normal use

5.0 TESTS & INSPECTION

The spares shall be inspected and tested in accordance with the requirements and relevant standards.it shall be the responsibility of the supplier to perform or to have performed all relevant tests.

6 MARKING AND PACKING

b. Marking and Packaging

i. Packaging shall be designed to protect against ingress of moisture and mechanical damage.

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

a) Manufacturer's name
b) Operating voltage
c) Operating frequency
d) Power in wattage
e) Gross weight in kilograms (pounds)
f) Length and other relevant dimensions
g) Temperature tolerance
h) Size in mm^2

7 DOCUMENTATION

a. Bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for tender evaluation:

b) Guaranteed Technical Particulars,

c) Manufacturer's drawings showing outline together with all pertinent dimensions. Any variation in these dimensions due to manufacturing tolerances shall be indicated.

d) Catalog for all the components. Catalog numbers for the offered items shall be high-lighted.

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 number	**Bidder's offer** (indicate full details of the offered item for each requirement of the tender & specification)
Bidder's Name	
4.1 General requirements for Oxygen Regulator	
4.1.1. The oxygen regulators shall be suitable for oxy-fuel cutting	
4.1.2. Shall be suitable for flame brazing	
4.1.3. Safe operation with up to 230bars cylinder pressure.	
4.1.4.Offer oxygen adiabatic shock safety	
4.1.3. The single stage oxygen regulator shall be suitable for oxy-fuel cutting and flame brazing	
4.1.5. Shall be compatible to existing BOC cylinders	
4.1.6. Ergonomic hose coupling ready for installation of flashback arrestor.	
4.1.7. Excellent constant flow and pressure regulation.	
4.1.8. Designed for gas welding & cutting operations	
Table 4.1: Technical particulars for oxygen regulators	
Gas	
Maximal Gas pressure	
Outlet Pressure range	
Body	
Bonnet	
Stem-Nuts & fittings	
Diaphram	

Seat Sealing	
Weight (approximately)	
Standard to Comply	
Pressure Gauges Calibration	
4.2 General requirements Acetylene regulators	
4.2.1. For gas welding and cutting operations.	
4.2.2. Shall be compatible to existing BOC cylinders	
4.2.3. Ergonomic hose coupling ready for installation of flashback arrestor	
4.2.4. Excellent constant flow and pressure regulation.	
Table 4.2: Technical Parameters for Acetylene Regulators	
Gas	
Maximal Inlet Pressure	
Outlet Pressure range	
Body	
Bonnet	
Stem-Nuts& fittings	
Diaphram	
Seat Sealing	
Weight (approximately)	
Standard to comply	
Pressure Gauges calibration	
4.3. General requirements for Earth clamp	
4.3.1. Heavy duty direct fits style.	
4.3.2. Heavy duty frame & strong spring.	
4.3.3. One piece solid brass terminal & jaw.	
4.3.4. Direct cable connection, no lug required.	
Table 4.3: Technical Particulars for Earth Clamp	
Jaws	
Current	
Handle	
Construction	
4.4. General requirement for Electrode Holder	
4.4.1. For stick welding.	
4.4.2. Powerful grip & multi position head.	
4.4.3. Cooling ribs in the handle	
4.4.4. Isolation head between the head, spring and body	

Table 4.4: Technical particulars for Electrode Welder	
4.2.5. Bench Grinder	
Compliance standard	
Electrode diameter	
Cable connection	
Cable diameter	
Current	
Construction	
Handle	
Compatibility	
4.5. General requirements for Bench Grinder	
4.5.1. Bust proof guard ensures maximum user safety.	
4.5.2. On or off slide switch for one hand control and user safety	
4.5.3. Spindle lock for quick and easy change of accessories	
4.1.4. Compact housing shape design	
Table 4.5. Technical particulars for Bench Grinder	
Power output	
Voltage	
No of phases	
Power input	
Disc size	
4.6. General requirements for Angle Grinder	
4.6.1. Shall be used for metal surfaces cutting and grinding applications	
4.6.2. Externally accessible carbon brushes for ease of serviceability.	
4.6.3. Wheel guard for operators protection.	
4.6.4. Shaft lock for easy wheel changing.	
4.6.5. Specialized construction to protect the motor, bearings &gears from damage.	
4.6.6. Shall have corded power type.	
4.6.7. Shall have rear trigger switch with lock on.	
4.6.8. Shall have spiral bevel gears for smooth rotation and more efficient transfer of power.	
4.6.9. Side handle for ease of use and safety	
4.6.10. Lock nut for securing disc	

Table 4.6. Technical particulars for Angle Grinder	
No load speed	
Wheel diameter	
Rated power	
Dimensions	
Alternating voltage	
Frequency	
4.7. General requirements for MIG Welder	
4.7.1. Flexibility of use with a wide range of materials e.g steel,stainless steel,high tensile steel,and aluminum.	
4.7.2. Shall be robust and reliable brand	
4.7.3. Numerous steps for regulation of arc voltage	
4.7.4. Regulation of spot welding time	
4.7.5. Two positions for reactance	
4.7.6. Thermostatic protection	
4.7.7. MIF-MAG/FLUX/BRAZING	
4.7.8. Offer training for safety and use of the machine	
4.7.9. Accessories Argon Gas IT adaptor; Torch hook; cable 25mmq,3M work clamp-Atlas 50mmq; MT25 MIG Torch 3M; Feed roll 4R 1,0FE-!,2FE "P-K"; Feed Roll 4R).6FE-0.8/0.9FE "P-K"; Gas Regulator 2 Manometer 12L/min	
Table 4.7. Technical particulars for Mig Welder	
Current range	
Voltage	
No of phases	
DC current	
Power factor	
Adjustments Positions	
Steel welding wire diameter	
Inox wire welding diameter	
Aluminium welding wire diameter	
Flux cored welding wire diameter	
Brazing wire diameter	
Protection degree	
Approximate weight	
Maximum absorbed power	
Maximum no load voltage	

4.8. General requirements for Plasma Cutter	
4.8.1. Dross free and taper-free cu high efficiency & power factor reduces power consumption.	
4.8.2. Pilot arc facility to enhances consumable durability	
4.8.3. Easy and clean cut in a fast & higher cutting productivity.	
4.8.4. Suitable for cutting stainless steel, copper, carbon steel, aluminium and other metals	
4.8.5. Minimum change in metallurgical properties of the metal under cut.	
4.8.6. Improved cooling of the torch	
4.8.7. Quality cutting thickness with fast cutting speeds, smooth cutting, minimal deformation and less hang slag.	
4.8.8. Basic training for safe and optimal use of the equipment	
4.8.9. Provide standard accessories required for machine operation.	
Table 4.8. Technical particulars for Plasma Cutter	
Required air pressure(kg/cm2)	
Cutting Thickness	
Efficiency (%)	
Power (KVA)	
No-Load voltage	
Input voltage	
Frequency	
Duty cycle (%)	
Rated input current (A)	
Housing Protection Grade	
Approximately Net weight	
Arcing way	
4.9. General Requirements for Oil-Motor Pump	
4.9.1. Shall be thermally protected.	
4.9.2. For continuous duty rated	
Table 4.9: Technical Particulars for Oil-Motor pump	
Voltage	
C	

KW/HP	
RPM	
HZ	
P	
H (max)	
H (min)	
IP	
Ins Cl	
4.10. General requirements for G-Clamps.	
4.10.1. Shall be dropped forged steel frame.	
4.10.2. Shall have swivel shoe design for clamping on uneven surfaces.	
4.10.3. Twin-startacme cold rolled thread for faster and smoother operation.	
4.10.4. Fused steel handle that will bend before clamp can be overstressed	
Table.4.10 Technical particulars for G-Clamps	
Size (Jaw opening)	
Throat depth	
4.11. General requirements for Spray painting Gun	
4.11.1. Ergonomic lighter body.	
4.11.2. Softer trigger pull to reduce fatigue.	
4.11.3. Polished surface to allow for easier cleanup.	
Table 4.11 . Technical particulars for Spray Painting Gun	
Body material	
Air pressure (psi)	
Cup capacity(ml)	
Nozzle size(mm)	
Type of feed	
Operating pressure	
Air consumption	
4.12. General requirements for Cleaning Gun	
4.12.1. For cleaning transformer surfaces with compressed air jet and a cleansing agent	

4.12.2. Shall have a tank below the long nozzle**.**	
4.12.3. Shall have a long nozzle to enable cleaning even in hardly accessible places	
4.12.4. Provide standard air supply connection	
4.12.5. Outlet nozzle and check out nut be of robust construction	
Table 4. 12.Technical particulars for Cleaning Gun	
Tank capacity	
Operating pressure (Mpa)	
Maximum air pressure (Mpa)	
4.13. General requirements for Impact Wrench	
4.13.1. Cordless	
4.13.2. Brushless motor	
4.13.3. High torque-Nut busting torque (1,700Nm)	
4.13.4. Powered by 18V LI-ion battery	
4.13.5. Twin LED job light	
4.13.6. Electronic 3 stage impact power selection (hard/medium/soft)	
4.13.7. Compact and lightweight design	
4.13.8. Ergonomic soft grip	
4.13.9. Orovide appropriate carrying case	
4.13.10. Electric brake	
4.13.11. Forward/reverse rotation	
4.13.12. Provide all related accessories	
Table 4.13 Technical Particulars for Impact wrench	
Voltage	
Driving shank	
Standard bolt	
High tensile bolt	
Noise sound power	
No load speed(hard/med/soft)	
Max fastening torque	
Approximate weight	
Battery type	
4.14. General requirements for Workshop Compressor	
4.14.1. Quiet and compact	

4.14.2. Rotary screw air compressor	
4.14.3. 100% duty cycle	
4.14.4. Tank capacity 200litres	
4.14.5. Fitted with controller for real time monitoring and controls option-display to include run hours and service warnings	
4.14.6. Receiver mounted air compressor	
Table 4.14. Technical particulars for Workshop Compressor	
Capacity	
Min working pressure	
Noise level	
Motor rating	
Electrical supply	
Compressed air connection	
Approximate weight	
4.15. General requirements for Portable Compressor	
4.15.1. Pressure switch with "off" and "Automatic operation" buttons	
4.15.2. Cable and power plug for single phase models	
4.15.3. Safety valve	
4.15.4. Adjustable pressure regulators(receiver pressure and regulated outlet pressure)	
4.15.5. Quick coupling for ease of use	
Table 4.15. Technical particulars for Workshop Compressor	
Capacity	
RPM	
Noise level	
Receiver	
Electrical supply	
Free air delivery (l/s; cfm)	
Approximate weight	
Max working pressure (bar.g/psi.g)	
4.16. General requirements for Electric motor (Rewinding Machine)	
4.16.1. Ac induction motor	
4.16.2. Shall have appropriate pulley for power transmission	

Table 4.16. Technical particulars for Electric Motor (Rewinding Machine)	
Rating	
Coupling	
speed	
Electrical supply	
Operating temperature	
Approximate weight	
4.17. General requirements for Variable Frequency Drive	
4.17.1. For control of ac motor	
4.17.2. Plc integrated	
4.17.3. Easy macros	
4.1.17.4. Automatic restart	
4.17.5. Multiple parameter settings via parameter set switching	
Table 4.17. Technical particulars for Variable frequency drive	
Input Voltage- 200/240 Frequency-50/60Hz Current- 22.1/18.6A	
Output Voltage 400-3phase Frequency-0.5/500 Current -11ampere	
4.18. General requirements for foot switch	
4.18.1. Rugged cast metal enclosure to keep switch from sliding when operated	
4.18.2. The latch for switch activation to be placed under full shield to prevent accidental switching by a falling object	
4.18.3. Holes provision for either floor/equipment mounting.	
Table 4.18. Technical particulars for foot switch	
Contact resistance	
Insulation resistance	
Withstand voltage	
Operating temperature	
Operating humidity	
Material	

Inner switch rating load	
Cable length	
4.19. General requirements for heaters element 3850	
4.19.1. The heaters shall be suitable for continuous operation at temperatures 0 to 400 degrees C.	
4.19.2. High humidity	
4.19.3. The air heaters should be highly non-corrosive, lightweight and durable.	
4.19.4. They shall have thicker sheath wall, silicone seals to ensure moisture resistance in humid environments	
4.19.5. They shall incorporate design features for mounting and termination.	
4.19.6. The termination provisions shall be able to accommodate 2.5/4mm2 single core/stranded cable.	
Table 4.19: Technical Particulars for heater element 3850w	
Operating Voltage	
Frequency	
Rating Range	
Table 22: Dimensions of the heater element	
A	
B	
C	
D	
4.20. General requirements for electromagnetic contactors 80A	
4.20.1. The electromagnetic contactors shall have side mounted auxiliary contacts having 2NO and 2NC contacts.	
Table 24. Technical particulars for electromagnetic contactors 80A	
Load Current rating	
voltage	
No of phases	
No of poles	
Auxiliary contacts	

Overload relays	
Coil voltage	
Degree of protection	
Wire terminals	
Mounting	
Operating temperature	
4.21. General requirements for three phase motor (Oven)	
4.21.1. The motor housing shall be suitable for high temperatures, severely corrosive environment and oil resistant,	
Table 27. Technical particulars for three phase motor (Oven)	
Rated power (Hp)	
Rated voltage	
Duty	
Speed (rpm)	
Housing	
Cooling method	
Housing Protection Grade	
Model of connection	
Ambient temp (◦C)	
Approximate weight	
Terminal box	
4.22. General requirements for 2 legged sling (3.2 tons)	
4.22.1. The transformers lifting sling shall be appropriate to lift transformers and other heavy loads	
4.22.2. Shall have a shortening clutch on both sides of the chain, permanently fitted	
4.22.3. The shortening clutch, sling hooks and mater links shall be properly painted signal red color and fitted on the two legged sling	
4.22.4. Shall have a robust latch to prevent accidental detachment of the load.	
Table 28 . Technical particulars for two legged sling	
Max lifting load	
Dimensions (R:D:S) mm	
T (No Latch: Width latch)	

Length (two lengths 1.4m+1.4m	
High tensile chain	
Sling hook with latch	
Masterlink	
Kupler	
4.23. General requirements for ¼ inch Socket Set	
4.23.1. Chrome vanadium alloy steel construction	
4.23.2. The rachet shall have quick release mechanism	
4.23.3. Rachet handle shall have cushion thermos rubber grip	
Table 30 . Technical particulars for ¼ inch Socket Set	
Standards (DIN)	
Sockets	
4.24 2000 PSI electric (240 Volts) Pressure machine washer	
4.24.1. Pressure: 2000psi and above	
4.24.2. Main voltage: 220-250V	
4.24.3. Main frequency: 50 Hz	
4.24.4. Min. operating pressure: 2000PSI	
4.24.5. Water consumption: 6 litres per minute	
4.24.6. Max.pressure water supply: 40-80PSI	
4.24.7. Water temperature: 5-60°C	
4.25. 100L Electric 3hp, Belt Driven compressor	
4.25.1. Start :Direct	
4.25.2. Drive :V-belt driven	
4.25.3. Cylinders :3	
4.25.4. Voltage (V): 220-250 V / 50 Hz / 1 Ph	
4.25.5. Air receiver: Yes	
4.25.6. Capacity air receiver (l) :100	
4.25.7. Galvanized tank: No	
4.25.8. Intake capacity (l/min) :400	
4.25.9. Free air delivery (l/min): 320	

4.25.10. Free air delivery (m3/h) :19.2	
4.25.11. Cut-in pressure (bar): 8	
4.25.12. Maximum pressure (bar) :10	
4.25.13. Noise level dB(A) (0 m): 92	
4.25.14. Noise level dB(A) (4 m) :72	
4.25.15. Noise level dB(A) (7 m) :67	
4.25.16. Sound volume reduction :No	
4.25.17. Air connection ("): 1/2	
4.25.18. Stages :1	
4.25.19. Oilfree: No	
4.25.20. Filter with reducer :No	
4.25.21. Pump speed (RPM) :1000	
4.25.22. Motor power :(hp / kW) 3.0 HP / 2.2 kW	
4.26. Digital Laser Tachometer (Handheld RPM Meter)	
4.26.1. Measuring min 2.5 RPM (Need to cooperate with reflective strip measurement)	
4.26.2. Measuring above 5000RPM	
4.26.3. Resolution:0.1RPM,at 2.5~999.9RPM;1RPM,at 1000~99,999 RPM	
4.26.4. Measure RPMs of motors, machinery such as circular saws, speed of a lathes and other rotating devices	
4.26.5. Accurate to +/- 0.02 percent	
4.26.6. capable of measuring at a distance from 50mm and above	
4.26.7. RPMs measured over 0.5 second sampling time	
4.26.8. Readings are displayed on a large, easy-to-read LCD screen;	
4.26.9. stores last, minimum, and maximum reading; features auto-zero adjustment	
4.26.10. Detection: Laser diode / contact	
4.26.11. Update Time: 1 second (typical)	
4.26.12. List of components Includes:	
4.26.12.1. 1 x Digital Tachometer	
4.26.12.2. 1 x English Operation Manual	
4.26.12.3. 1 x Carry Pouch	
4.26.12.4. 2 x Battery	
4.26.12.5. 1 x 20cm Reflective Tape	

4.26.12.6. 1 x Standard Packaging Box	
4.27. Heavy duty electric Drilling Machine(1050W)	
4.27.1. No load speed : two speed (RPM)-1200 and 300	
4.27.2. Power Rating: 1050W(continuous)	
4.27.3. Net weight-less than 6kg	
4.27.4. Max Capacity in steel- 13 mm (1/2")	
4.27.5. Max drilling capacity in wood: 38mm auger bit, 118mm self-feed bit,152mm hole saw	
4.27.6. Voltage: AC 220 - 250V	
4.27.7. Motor current: 10Amps	
4.27.8. Overall length: greater than 460mm	
4.27.9. Power cord length: not less than 2m	
4.27.10. Motor provides 145Nm of max. torque in low speed	
4.27.11. Torque limiter automatically disengages gears should the bit jam	
4.27.12. Forward/Reverse trigger with 2 speed change lever	
4.27.13. Built-in clutch to reduce gear damage by automatically disengaging gears if the bit binds	
4.27.14. Accessories	
4.27.14.1. Drill bits	
4.27.14.2. Chuck key	
4.27.14.3. Hex wrench	
4.27.14.4. Plastic carrying case	
4.28. Power extension Cable-extension cord reel cable25meter power cable	
4.28.1. Amps: 13Amps	
4.28.2. Voltage: AC 220 - 240V	
4.28.3. Cable Rating: 2.5mm 3 Core	
4.28.4. Cable Length: 25 Meters	
4.28.5. Load Rotating: 3600 Watts	
4.28.6. Material: PVC	
4.28.7. Additional Features: 4x13A Sockets	
4.29. **Open-end spanners**	
4.29.1. Manufactured from Drop Forged, chrome vanadium steel with each head set at a 15 angle.	
4.29.2. Conforms to DIN ISO 1711 , DIN 3113B	
4.29.3. Top-grade industrial quality for the hardest of	

continuous use	
4.29.4. Protected from wear and corrosion	
4.29.5. High corrosion and wear protection	
4.29.6. Finish - CS (Chrome plated)	
4.29.7. Double open end spanner should consist of following size of spanner 10x11, 14x15, 16x17, 18x19, 20x22	
4.30. Double ended (Ring) spanners	
4.30.1. Made from Chrome Vanadium steel	
4.30.2. Plated with Nickel chrome	
4.30.3. Conforms to DIN ISO 1711 , DIN 3113B	
4.30.4. Protected from wear and corrosion	
4.30.5. High corrosion and wear protection	
4.30.6. Deep offset	
4.31. Adjustable spanner	
4.31.1. DIN 3117 Form A	
4.31.2. Jaw 15° offset	
4.31.3. With mm scale	
4.31.4. With hanging hole	
4.31.5. Two component handle	
4.31.6. Phosphate finis	
4.31.7. Chrome vanadium	
4.32. Mole grips-10"	
4.32.1. These Mole grips/locking pliers have curved or rounded jaws and are used to securely grip and hold rounded objects like pipes, as well as nuts and bolts.	
4.32.2. Curved Mole grips can also hold hexagonal objects, although there are parrot nose Mole grips/locking pliers which are specifically designed for this purpose.	
4.32.3. Drop forged carbon steel	
4.32.4. Nickel plated for steel protection	
4.32.5. Ridged grabber teeth	
4.32.6. Adjustable bolt with spring	
4.32.7. Durable release handle	
4.32.8. Hardness HRC38-HRC45	
4.32.9. Length: 10in or 250mm	
4.32.10. Max Opening: 50mm	
4.32.11. Weight: 445g	

4.33. Hack saw frames	
4.33.1. Dimensions:300mm	
4.33.2. Material: Aluminium	
4.33.3. Made of high quality aluminum alloy and sturdy high carbon steel, which is high hardness, durable and solid.	
4.33.4. Allows adjustable blade angles of 45 and 90 degrees, ensuring different angles of cutting as well as meeting your different needs.	
4.33.5. The especially hardened teeth of the hacksaw are held in place by a solid bracket and easily handle cuts - large or small - that are precise and fine.	
4.34 Electric spary gun (Electric paint sprayer)	
4.34.1. Electric spray gun shall be Cordless	
4.34.2. Voltage: 20V	
4.34.3. Tank Volume/capacity:800ml and above	
4.34.4. Spraying pressure:>0.1 bar	
4.34.5. Flow:600ml/min and can be regulated by adjusting flow control knob	
4.34.6. Battery capacity:2000mAH and above Lithium ion	
4.34.7. Air cap: should be rotating to achieve three spray models(horizontal, vertical and circular)	
4.34.8. Accessories required	
4.34.9. Charger quantity 2	
4.34.10. Battery :2	
4.34.11. Copper nozzles:5(0.5mm,1mm,1.5mm,2mm,2.5mm)	
4.34.12. Paint container:2	
4.34.13. Nozzle cleaning needle:2	
4.34.14. Viscosity measuring cup:2	
4.34.15. Color :any	
Allen Keys	
4.35.1. Hex-Plus L-keys for hexagon socket screws shall provide more contact surface inside the screw, which prevents rounding. L-keys shall transfer high torque but they must not twist to any great extent, or shear off, to minimize the risk of injuries	
4.35.2. A hex key shall be a six-sided shaped bar bent at	

a 90° angle at one end.	
4.35.3. A hex bit shall be an unbent piece of such a bar	
4.35.4. Alloy steel shall contain at least two of the following elements: chromium, nickel, molybdenum or vanadium	
4.35.5. Hex key set, shall be nine-piece, includes metric sizes 1.5, 2, 2.5, 3, 4, 5, 6, 8 and 10 mm	
4.36. Electrical Screw driver Flat	
4.36.1. Screwdriver Type : Insulated	
4.36.2. Number of Pieces: 7	
4.36.3. Tip Type: Slotted head screws in accordance with ISO 2380- 2:2004	
4.36.4. Blade Material :Chrome Steel	
4.36.5. Handle Material :Thermoplastic Elastomer Blade Finish :Matt Chrome Plate	
4.36.6. Tip Size (A) : 3mm, 4mm, 5.5mm, 6.5mm and 8.0mm	
4.36.7. Blade Length L2 :100mm, 125mm, 150mm, 175mm	
4.36.8. Screw driver size 3 x 100mm; 4 x 100mm; 4 x 125mm ; 5.5 x 100mm; 6.5 x 125mm 6.5 x 150mm and 8.0 x 175mm	
4.36.9. The blades shall be free from seams, burrs, cracks or other manufacturing defects and shall be finished smooth all over	
4.36.10. The handles shall be provided with proper serrations so that the handles do not slip during usage.	
4.36.11. The handles shall be finished smooth and shall be convenient for holding	
4.36.12. The screwdriver points shall be ground blunt and shall be in the same plane as the axis of the blade.	
4.36.13. The blades of the screwdrivers shall be protected against rust by plating with nickel cadmium or chromium or by any other suitable process.	
4.36.14. Handles – The handle shall be made of a solid plastic manufactured from cellulose acetate as per BS 1524:1993 or equivalent	
4.36.15. The blades of the screwdrivers shall be provided with an insulating sleeve	
4.37. Electrical Screw driver star	

4.37.1. Screwdriver Type : Insulated	
4.37.2. Number of Pieces: 7	
4.37.3. Tip Type:Philip head	
4.37.4. Blade Material :Chrome Steel	
4.37.5. Handle Material :Thermoplastic Elastomer Blade Finish :Matt Chrome Plate	
4.37.6. Tip Size: ; PH 00 , PH 0,PH 1, PH 2, PH 3 and PH 4	
4.37.7. Blade Length :50mm,75mm,100mm, 125mm, 200 and 250mm	
4.38. Mechanical Screw driver Flat	
4.38.1. Screwdriver Type : Not Insulated	
4.38.2. Number of Pieces: 7	
4.38.3. Tip Type: Slotted head screws in accordance with ISO 2380- 2:2004	
4.38.4. Blade Material : Chrome Steel	
4.38.5. The handles shall be convenient for holding	
4.38.6. The handles shall be provided with proper serrations so that the handles do not slip during usage	
4.38.7. The blades shall be free from seams, burrs, cracks or other manufacturing defects and shall be finished smooth all over	
4.38.8. The screwdriver points shall be ground blunt and shall be in the same plane as the axis of the blade.	
4.38.9. The blades of the screwdrivers shall be protected against rust by plating with nickel cadmium or chromium or by any other suitable process.	
4.38.10. Tip Size (A) : 3mm, 4mm, 5.5mm, 6.5mm and 8.0mm	
4.38.11. Blade Length L2(mm) :100mm, 125mm, 150mm, 175mm	
4.38.12. 3 x 100mm; 4 x 100mm; 4 x 125mm ; 5.5 x 100mm; 6.5 x 125mm 6.5 x 150mm and 8.0 x 175mm	
4.39. Soldering iron	
4.39.1. Nominal Power (W) :15-80	
4.39.2. Standard Voltage (V) :220 - 250	
4.39.3. Nominal Tip Temp (°C): 250-480	
4.39.4. Fitted Bit 820 :(2.3mm)	
4.39.5. Cable Length (M) : 1.5	
4.39.6. Cable Type: Pvc With British Plug	

4.39.7. Leakage Current (µA): < 200	
4.39.8. Length Tip/Handle (mm): 147	
4.40. Combined pliers	
4.40.1. Should be sleek design with side cutting and crushing facility for burnt PVC insulated wires,	
4.40.2. Induction hardened edges,	
4.40.3. Injection molded insulated sleeves to with stand upto 1000 volts.	
4.40.4. Material: forged chrome vanadium steel	
4.40.5. Finish: Black finish	
4.40.6. Size: 210mm	
4.41. Cutter	
4.41.1. Material: High carbon steel with heat-treated handles	
4.41.2. Handles: Protective PVC grip	
4.41.3. Induction-hardened precision cutting edges	
4.41.4. Cutting edge hardness approximately 62 HRC	
4.41.5. Clean cutting of thin copper wires	
4.41.6. Narrow head style for use in confined areas	
4.41.7. Vanadium electric steel; oil-hardened and tempered	
4.42. Long nose Pliers	
4.42.1. Narrow, finely serrated tips.	
4.42.2. Handles are highly resistant to common corrosive elements, such as petrol, acetone, chlorothene & Skydrol	
4.42.3. Injection moulded sleeves.	
4.42.4. Material : forged chrome vanadium steel	
4.42.5. Length - 160 mm	
4.42.6. Finish - Black finish	
4.43. Pipe Wrench -12"	
4.43.1. Should be made of drop forged chrome vanadium steel.	
4.43.2. Double spring system for ratchet action, which facilitates the locking and the immediate releasing of the wrench and a quick continuation of the operation.	
4.43.3. The teeth, heat treated, provide adequate wear resistance and a firm grip on all surfaces	
4.43.4. Material for jaw and Handle:Ductile cast iron	

4.43.5. Material for Nut:special steel	
4.43.6. Pipe capacity:50mm	
4.43.7. Knurled adjustment nut for easy one-handed operation.	
4.44. Ratchet Socket spanners 1/2 Inch	
4.44.1. Quick release mechanism to lock sockets onto the drive during operation and allow easy changeover.	
4.44.2. Chrome Vanadium Steel	
4.44.3. Nickel Chrome plated for long lasting protection	
4.44.4. Reversible mechanism for easy one-hand direction change	
4.44.5. Drive Size (in) : ½	
4.44.6. Overall Length (in): 9-7/8	
4.44.7. 1/2" Drive 6 Point Standard: 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 mm	
4.44.8. Accessories:	
4.44.8.1. 1/2" Drive 10" Extension Bar	
4.44.8.2. 1/2" Pear Head Ratchet	
4.44.8.3. 1/2" Drive 15" Flex Handle	
4.44.8.4. Blow-Molded Case	
4.45. Digital Vernier caliper	
4.45.1. Display : LCD Type	
4.45.2. Measuring Speed : ≤1.5 m / seconds or 60 inches / seconds	
4.45.3. Measuring Range : 0 to 150 mm / 0 to 6 inches	
4.45.4. Power : One 1.5 V button cell (Type Sr44)	
4.45.5. Storage Temperature : 0°C to 50°C / 32°F to 122°F	
4.45.6. Working Environment : 5°C to 40°C / 41°F to 104°F (less than 80% Relative Humidity)	
4.45.7. Resolution : 0.01 mm / 0.0005 inches	
4.45.8. Accuracy : +0.02 mm / ±0.001 inches	
4.46. Digital adjustable preset Torque Wrench 1/2 Inch	
4.46.1. Adjustable Digital Torque Wrench captures and displays torque measurement in real time mode, providing users with unprecedented levels of control and accuracy.	
4.46.2. Square Drive, inches:1/2	
4.46.3. Head Type: Flex-Rachet	

4.46.4. Gear Teeth:36	
4.46.5. Gear Action:10	
4.46.6. Range N-m: 34-339	
4.46.7. Head Depth: 19.1mm	
4.46.8. Head Width: 41.3mm	
4.46.9. Length, inches: 660mm	
4.46.10. Torque Setting Resolution: 0.1N-M	
4.46.11. Power: All models - 3 AA batteries (included)	
4.47. Digital Micrometre screw gauge	
4.47.1. Measurement range:0-25mm	
4.47.2. Accuracy: ±2µm	
4.47.3. Resolution: 0.001mm or .00005"/0.001mm Flatness: 0.3µm / .000012Measuring faces: Carbide tipped	
4.47.4. Display: LCD	
4.47.5. Battery: SR44 (1 pc.), 938882	
4.47.6. Battery life: Approx. 1-3 years under normal use	

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Supplier's Name, Signature, Stamp and Date

ANNEX B: PART NUMBERS OF SPARES

Item	Product	Part Number
1	H Extension Cable [25' (7.62m)]	Vanguard Instruments 8000-0010
2	H 3-Phase Cable [15' (4.57m)]	Vanguard Instruments 8000-0013
3	3-Phase H Cable [30' (9.14m)]	Vanguard Instruments 8000-0186
4	X Extension Cable [25' (7.62m)]	Vanguard Instruments 8000-0012
5	X 3-Phase Cable [15' (4.57m)]	Vanguard Instruments 8000-0014
6	3-Phase X Cable [30' (9.14m)]	Vanguard Instruments 8000-0187
7	TTS AC Cable,7500V,3000A,35Ft	Phenix Technologies 7021116990
8	PLC Analog Input Module	Allen-Bradley / Rockwell Automation 1001920 1746-NI4
9	DC Current Cable 50-foot (15.24m) test cables for WRM-10P S2-8000-0084	Vanguard Instruments Vanguard 8000-0084
10	Circuit Breaker ABB//TS3N125TW,W/2 //k4TC LUGS-1601070	ABB//TS3N125TW,W/2 //k4TC LUGS-1601070
11	Foot switch-(FTSWITCH). 9002CG3 FOOT SWITCH	Phenix Technologies 9002CG3 FOOT SWITCH

ANNEX C: SAMPLES TO BE VIEWED AND DIMENSIONS TAKEN AT ISIOLO RD. WSHOP NAIROBI

Item	Product
1	Brake Module Unit-91178A1(Broomfield machine)
2	Motor, Servo 4 Pin -90820A(Broomfield machine)
3	