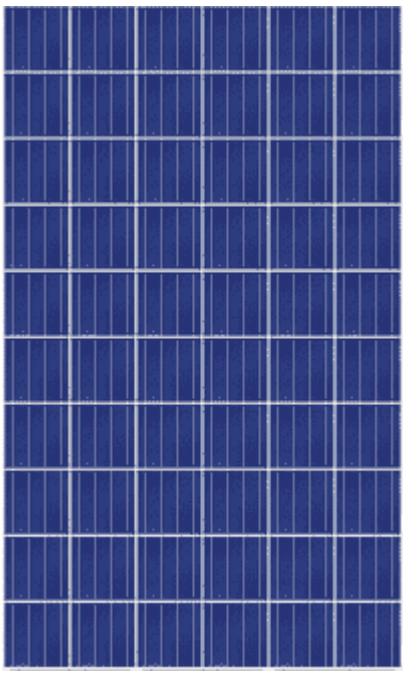
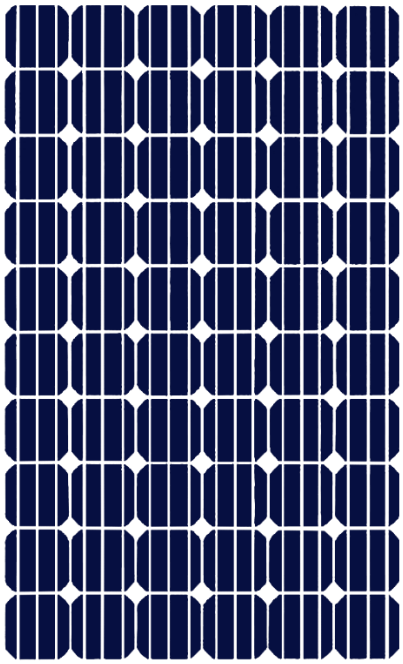
SPECIFICATION FOR SOLAR TECHNICIAN (ELECTRICAL) TOOLS AND EQUIPMENTS GROUP ITEMS

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1. Measuring Steel Tape.

1.1 Basic Indicative Diagram

1.2 Tape length: 5 meters

1.3 Tape width: 13 mm

1.4 Tapes coated with Epoxy based scratch guard material to ensure longer life

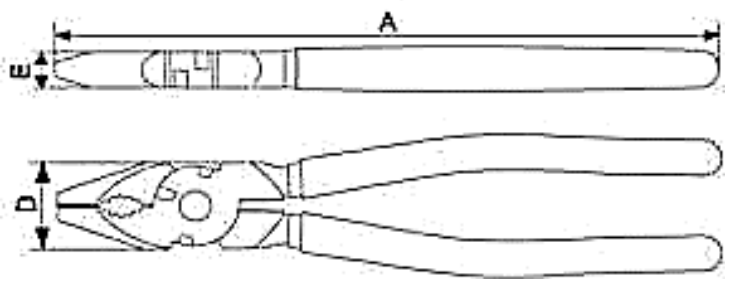
1.5 Bold & Easy to read printing

1.6 Ensures Class II Accuracy at 20 Degrees when subjected to tension of 50 Newton

1.7 Strong Copper Rivet to ensure stronger end hook

2. Combination Plier Insulated.

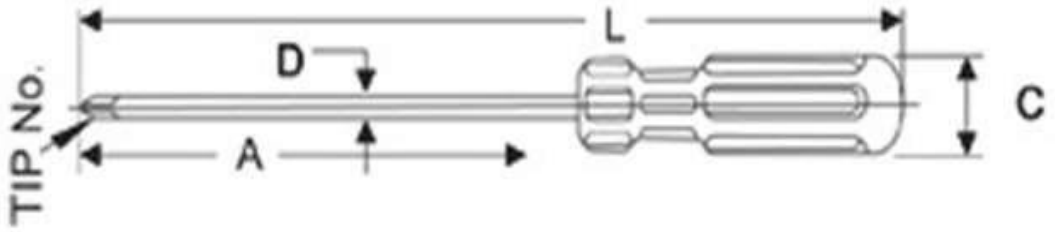
2.1 Basic Indicative Diagram.



2.2 Generally, conform to IS 3650 – 1981.
2.3 Material: C – 70
2.4 Finish: Polished / Chrome plated / Satin finish
2.5 Length (A): 200 mm
2.6 Drop forged, hardened tempered
2.7 Differential hardening
2.8 Radius Gap from front side: Up to 0.2 mm
2.9 Play between shanks: Up to 0.3 mm
2.10 Shank Material: C70 / EN9
2.11 Rivet material: SAE 1541 / 40Cr4
2.12 Cutting Edge Hardness: 60 - 62 HRC
2.13 Shank Hardness: 40 - 48 HRC
2.14 Rivet Hardness: 38 - 42 HRC
2.15 High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
2.16 Insulation Sleeves made from High Quality CA Plastic.
2.17 Thicker Sleeves for comfortable Grip.
2.18 Special thumb protector for sleeves to minimize the risk of electric shock n case plier slips while in use.
2.19 Should be able to cut soft (74 to 84 Kg/mm^2) & Hard (140 Kg/mm^2) ires
Should be able to cut 2 mm of hardwire Diameter & 1 mm of soft wire Diameter.

3. Screw Driver Insulated 4mm X 150 mm, Diamond Head .

3.1 Basic Diagram.



3.2 Generally, conform to IS 844 – 1979.

3.3 **Insulated Blade.**

3.4 Blade made of High-Grade Silicon - Manganese Steel.

3.5 Blade should be differentially hardened & tempered to resist wear, bending & meet high torque requirement.

3.6 **Size A: 150 mm D: 4 mm TIP – Diamond Head**

3.7 The Blade tip should be magnetized to lift small screw from confined places or to hold the screw in position.

3.8 Hardness onTip: 55-58HRC

3.9 Bright and Smooth Nickel Chrome plating finish to effectively protecting blade against corrosion.

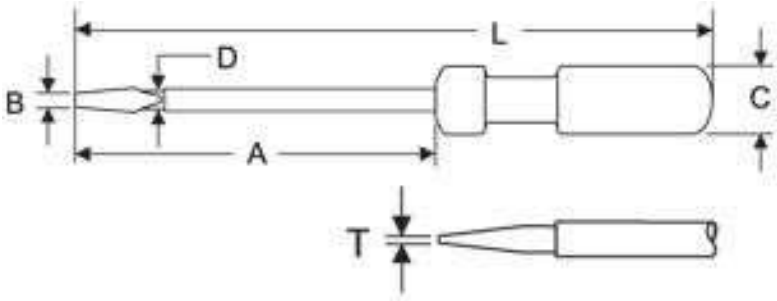
3.10 Handle should be made of high-grade CA Plastic, which is non-flammable & unaffected by oil, petrol, grease, water- practically anything.

3.11 Handle should withstand rough use including hammering.

3.12 Handle design should be such that it gives comfortable grip even at higher torques.

4. Screw Driver - Insulated - 6 X 150 mm

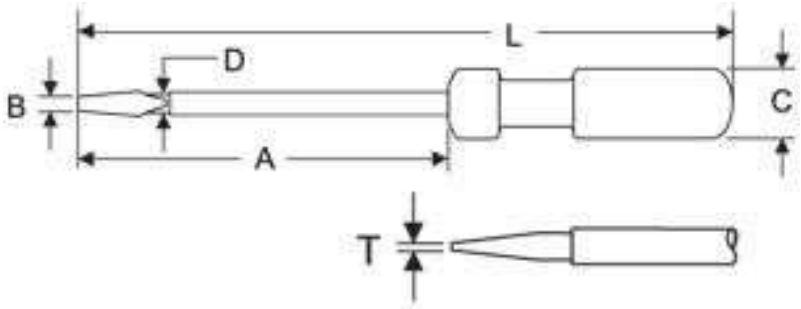
4.1 Basic Indicative Diagram.



4.2 Generally, conform to IS 844 – 1979.
4.3 Insulated Blade
4.4 Dimensions:
4.5 Size: 6 mm X 150 mm (A - 150 mm, D - 6 mm)
4.6 Tip Bit Size: B X T: 6 X 0.8 mm
4.7 Blade:
4.8 Blade made of high-grade Silicon - Manganese Steel (EN 45 A)
4.9 Blade should be differentially hardened & tempered to resist wear, bending & meet high torque requirement
4.10 Hardness on Tip: 55 - 58 HRC
4.11 Minimum Torque Value: 0.39 Kg.m
4.12 Bright and Smooth Nickel Chrome plating finish to effectively protect blade against corrosion
4.13 Handle: Material of Handle: Cellulose Acetate
4.14 Handle should be made of high-grade CA Plastic, which is non - flammable & unaffected by oil, petrol, grease, water - practically anything
4.15 Handle should withstand rough use including hammering
4.16 Handle design should be such that it gives comfortable grip even at higher torques Handle & blade assembly should be insert molded
4.17 Tip:
- 4.17.1 Tip should be formed by Forging & Trimming
- 4.17.2 Tip should be precision - ground to 10-degree angle to ensure firm grip in the screw slot.
- 4.17.3 The Blade tip should be magnetized to lift small screw from confined places or to hold the screw in position
- 4.17.4 Tip sides & faces should be well ground with good finish
- 4.17.5 Double ear coining should be provided for the blade

5. Electrician screw driver thin stem insulated handle 4mm X 100 mm

5.1 Basic Diagram



5.2 Generally, conform to IS 844 – 1979

5.3 Insulated Blade

5.4 Dimensions:

5.4.1 Size: 4 mm X 100 mm (A - 100 mm, D - 4 mm)

5.4.2 5.4.2 Tip Bit Size: B X T: 4 mm X 0.6 mm

5.5 Blade:

5.5.1 Blade made of high-grade Silicon - Manganese Steel (EN 45 A).

5.5.2 Blade should be differentially hardened & tempered to resist wear, bending & meet high torque requirement

5.5.3 Hardness on Tip: 55 - 58 HRC

5.5.4 Minimum Torque Value: 0.15 Kg.m

5.5.5 Bright and Smooth Nickel Chrome plating finish to effectively protect bladeagainst corrosion

5.6 Handle:

5.6.1 Material of Handle: Cellulose Acetate.

5.6.2 Handle should be made of high-grade CA Plastic, which is non - flammable & unaffected by oil, petrol, grease, water - practically anything.

5.6.3 Handle should withstand rough use including hammering

5.6.4 Handle design should be such that it gives comfortable grip even at higher torques

5.6.5 Handle & blade assembly should be insert molded

5.7 Tip:

5.7.1 Tip should be formed by Forging & Trimming

5.7.2 Tip should be precision - ground to 10-degree angle to ensure firm grip in thescrew slot.

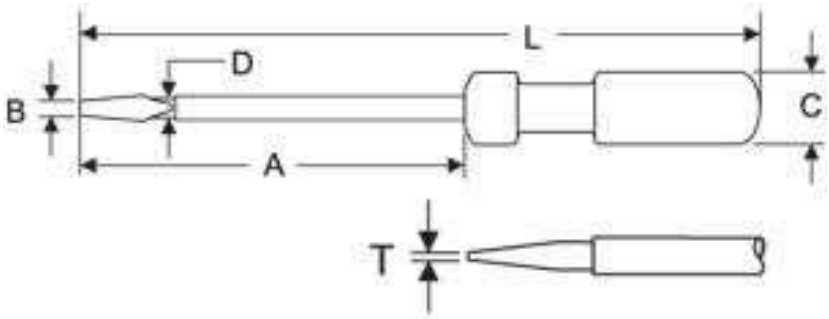
5.7.3 The Blade tip should be magnetized to lift small screw from confined placesor to hold the screw in position

5.7.4 Tip sides & faces should be well ground with good finish

5.7.5 Double ear coining should be provided for the blade.

6. Heavy Duty Screw Driver insulated 5mm X 200 mm

6.1 Basic Indicative Diagram.



6.2 Generally, conform to IS 844 – 1979.

6.3 Insulated Blade.

6.4 **Dimensions**:

6.4.1 Size: 5 mm X 200 mm (A - 200 mm, D - 5 mm)

6.4.2 Tip Bit Size: B X T: 5.0 mm X 1 mm

6.5 Blade:

6.5.1 Blade made of high-grade Silicon - Manganese Steel (EN 45 A)

6.5.2 Blade should be differentially hardened & tempered to resist wear, bending& meet high torque requirement

6.5.3 Hardness on Tip: 55 - 58 HRC

6.5.4 Minimum Torque Value: 1.17 Kg.m

6.5.5 Bright and Smooth Nickel Chrome plating finish to effectively protect bladeagainst corrosion

6.6 Handle:

6.6.1 Material of Handle: Cellulose Acetate.

6.6.2 Handle should be made of high-grade CA Plastic, which is non - flammable &unaffected by oil, petrol, grease, water - practically anything.

6.6.3 Handle should withstand rough use including hammering

6.6.4 Handle design should be such that it gives comfortable grip even at highertorques

6.6.5 Handle & blade assembly should be insert molded

6.7 Tip:

6.7.1 Tip should be formed by Forging & Trimming

6.7.2 Tip should be precision - ground to 10-degree angle to ensure firm grip in the screw slot.

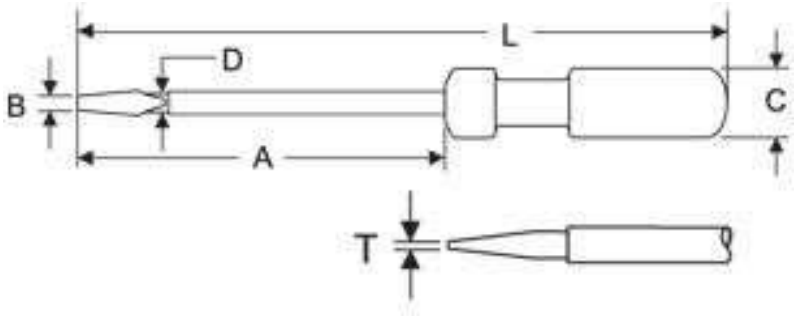
6.7.3 The Blade tip should be magnetized to lift small screw from confined placesor to hold the screw in position

6.7.4 Tip sides & faces should be well ground with good finish

6.7.5 Double ear coining should be provided for the blade.

7. Electrician Screw Driver thin stem insulated handle 4mm X 250 mm

7.1 Basic Diagram



7.2 Generally, conform to IS 844 – 1979.

7.3 Insulated Blade.

7.4 **Dimensions**:

7.4.1 Size: 4 mm X 250 mm (A - 250 mm, D - 4 mm)

7.4.2 Tip Bit Size: B X T: 4 mm X 0.8 mm

7.5 Blade:

7.5.1 Blade made of high-grade Silicon - Manganese Steel (EN 45 A)

7.5.2 Blade should be differentially hardened & tempered to resist wear, bending& meet high torque requirement

7.5.3 Hardness on Tip: 55 - 58 HRC

7.5.4 Minimum Torque Value: 0.50 Kg.m

7.5.5 Bright and Smooth Nickel Chrome plating finish to effectively protect bladeagainst corrosion

7.6 **Handle:**

7.6.1 Material of Handle: Cellulose Acetate

7.6.2 Handle should be made of high-grade CA Plastic, which is non - flammable &unaffected by oil, petrol, grease, water - practically anything.

7.6.3 Handle should withstand rough use including hammering

7.6.4 Handle design should be such that it gives comfortable grip even at highertorques

7.6.5 Handle & blade assembly should be inserting molded.

7.7 **Tip:**

7.7.1 Tip should be formed by Forging & Trimming.

7.7.2 Tip should be precision - ground to 10-degree angle to ensure firm grip in thescrew slot.

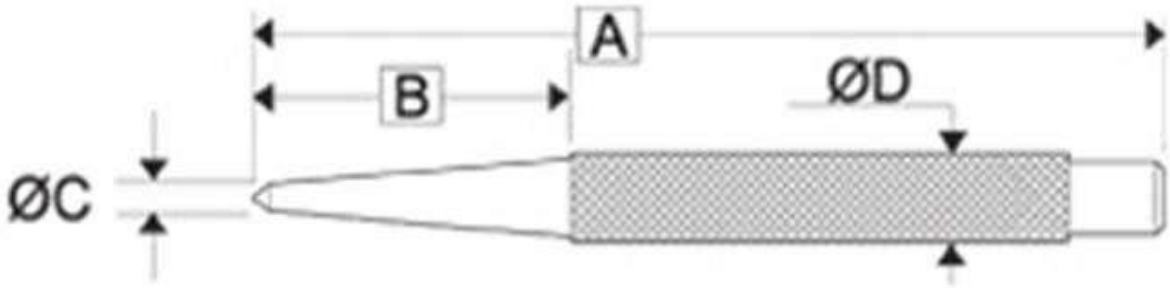
7.7.3 The Blade tip should be magnetized to lift small screw from confined placesor to hold the screw in position

7.7.4 Tip sides & faces should be well ground with good finish

7.7.5 Double ear coining should be provided for the blade

8. Punch Centre 9mm X 150 mm

8.1 Basic Diagram.



8.2 Generally, conform to I.S. 7177 – 1974.
8.3 Dimensions (in mm): A - 150, B - 33, Ø C - 4, Ø D – 09.
8.4 Made from high grade chrome Steel.
8.5 Hardness.
8.6 Working surface: 55 - 57 HRC.
8.7 Body: 35 - 45 HRC.
8.8 Overall Length: 150mm.
8.9 Black phosphate finish, Hardened & tempered.
8.10 Deep knurling on body for firm grip.

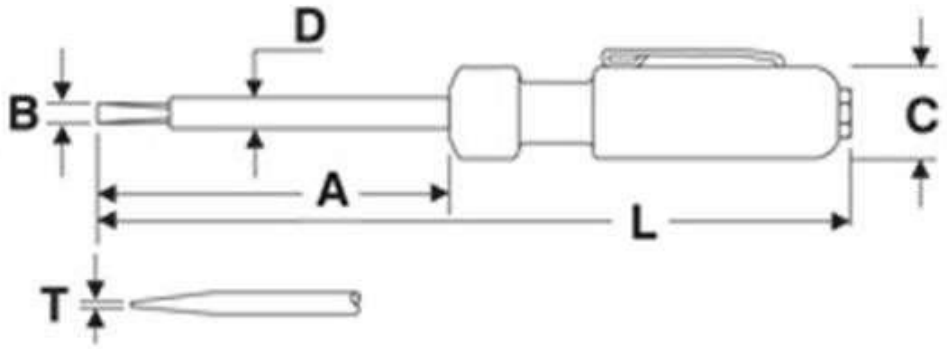
9. Knife Double Bladed Electrician 100 mm

9.1 Basic Diagram

9.2 Blade should be made of high-grade Steel for sharp and long cutting.
9.3 Hardness: 62 - 64 HRC
9.4 ABS Plastic Body for higher strength & soft material for comfort in use
9.5 Slider locking system for enhanced safety
9.6 Blade Width: 18 mm

10. Neon Tester 500 V

10.1 Basic Diagram.



10.2 Generally conforming to IS 5579 – 1985

10.3 Dimension

10.3.1 A: 60 mm

10.3.2 D: 6 mm

10.3.3 Tip Size: B X T = 3.5 mm X 0.5 mm

10.3 Minimum Torque Value: 0.09 Kg.m

10.4 Generally, conform to IS 5579 – 1985

10.5 Blade made of high-grade Silicon - Manganese Steel (EN - 45A)

10.6 Blade should be differentially hardened & tempered to resist wear, bending & meethigh torque requirement

10.7 Hardness on Tip: 55 - 57 HRC

10.8 Bright and Smooth Nickel Chrome plating finish to effectively protect blade againstcorrosion

10.9 Handle should be made of high-grade CA Plastic, which is non - flammable & unaffectedby oil, petrol, grease, water - practically anything

10.10 Suitable for checking at minimum 90 V DC and 60 AC voltage and maximum upto 500V AC

10.11 Blade is provided with PVC insulation sleeve & resistance having 1 mega ohm forpreventing the electric shock

10.12 NEON filled glow lamp should give a visible glow in normal day light

10.13 Maximum leakage current of 0.12 microampere ensures safe & shock free in use.

10.14 Tip should be precision - ground to 5-degree angle to ensure firm grip in the screwslot.

11. Steel Rule Graduated both in Metric and English Unit 300 mm with precision of 1/4th mm.

11.1 Basic Diagram

11.2 Material: Stainless Steel.

11.3 Thickness: 0.5 mm

11.4 Hardness: 30 - 35 HRC (Specially Hardened)

11.5 Finish: Polished 2B / Anti-Glare Satin Chrome

11.6 Surface roughness: 0.6 Microns max

11.7 Range: 300 mm

11.8 Measuring least count: Metric Graduation +0.5 mm and English graduation 1 /64 inch

11.9 Accuracy: Metrology Standard EEC Class

12. Hammer Cross peen with handle 250 grams

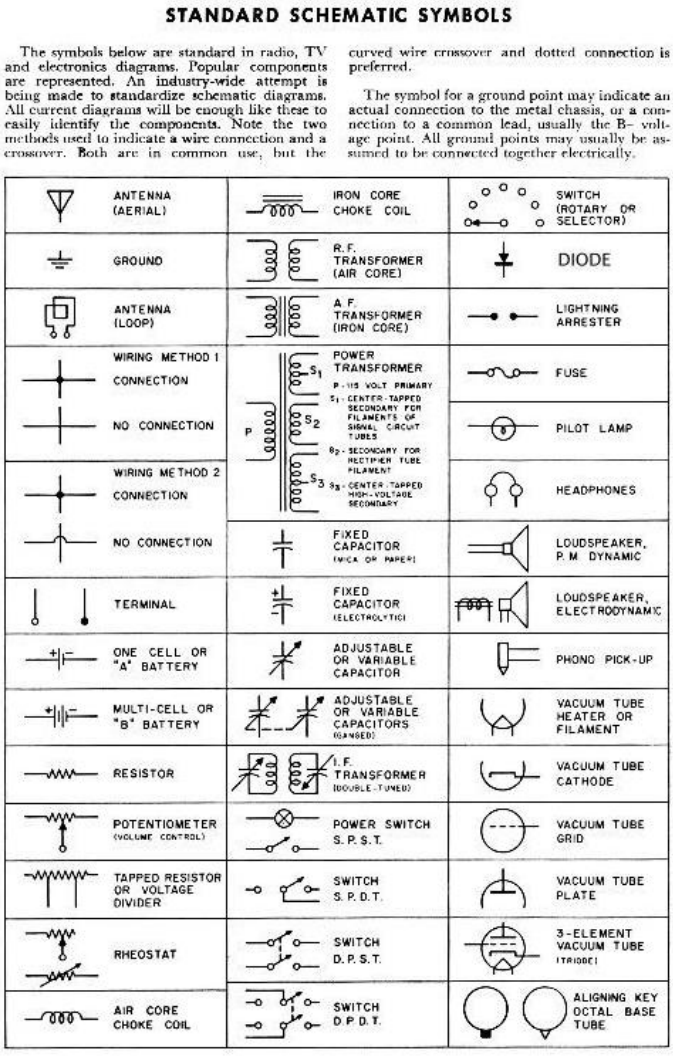
12.1 Basic Diagram.

12.2 Generally, conform to I.S. 841 - 1983 12.3 Cross Peen.
12.3 Weight: 250 grams.
12.4 Drop forged from high grade carbon Steel.
12.5 Partially hardened up to 46 - 56 HRC on striking surface.
12.6 Depth of Hardness: 6.0 mm.
12.7 Phosphate and painted 12.9 Handle.
12.8 Material: Hickory Wood/ Red Wood/ Babul Wood / Indestructible Handle.
12.9 Handle fixed firmly to hammer head so that it does not come out after long use.

13. Electrical Symbol and Accessories Chart.

Accessories Item

13.1 Basic Diagram.



STANDARD SCHEMATIC SYMBOLS

The symbols below are standard in radio, TV and electronics diagrams. Popular components are represented. An industry-wide attempt is being made to standardize schematic diagrams. All current diagrams will be enough like these to easily identify the components. Note the two methods used to indicate a wire connection and a crossover. Both are in common use, but the curved wire crossover and dotted connection is preferred.

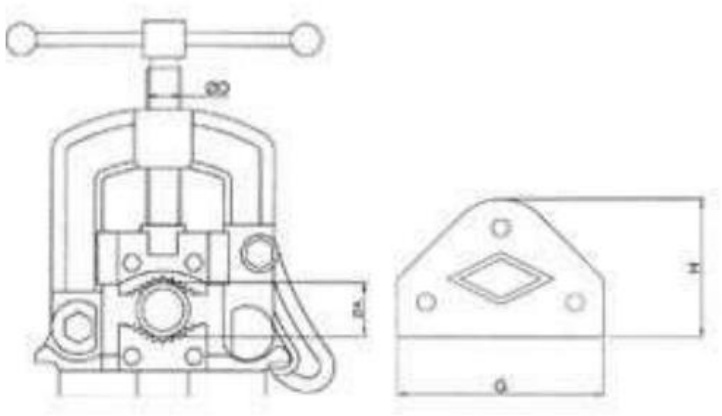
The symbol for a ground point may indicate an actual connection to the metal chassis, or a connection to a common lead, usually the B– voltage point. All ground points may usually be assumed to be connected together electrically.

ANTENNA (AERIAL)
GROUND
ANTENNA (LOOP)
WIRING METHOD 1
CONNECTION
NO CONNECTION
WIRING METHOD 2
CONNECTION
NO CONNECTION
TERMINAL
ONE CELL OR "A" BATTERY
MULTI-CELL OR "B" BATTERY
RESISTOR
POTENTIOMETER (VOLUME CONTROL)
TAPPED RESISTOR OR VOLTAGE DIVIDER
RHEOSTAT
AIR CORE CHOKE COIL
IRON CORE CHOKE COIL
R.F. TRANSFORMER (AIR CORE)
A.F. TRANSFORMER (IRON CORE)
POWER TRANSFORMER
P - 115 VOLT PRIMARY
S_1 - CENTER-TAPPED SECONDARY FOR FILAMENTS OF SIGNAL CIRCUIT TUBES
S_2 - SECONDARY FOR RECTIFIER TUBE FILAMENT
S_3 - CENTER-TAPPED HIGH-VOLTAGE SECONDARY
FIXED CAPACITOR (MICA OR PAPER)
FIXED CAPACITOR (ELECTROLYTIC)
ADJUSTABLE OR VARIABLE CAPACITOR
ADJUSTABLE OR VARIABLE CAPACITORS (GANGED)
I.F. TRANSFORMER (DOUBLE-TUNED)
POWER SWITCH S.P.S.T.
SWITCH S.P.D.T.
SWITCH D.P.S.T.
SWITCH D.P.D.T.
SWITCH (ROTARY OR SELECTOR)
DIODE
LIGHTNING ARRESTER
FUSE
PILOT LAMP
HEADPHONES
LOUDSPEAKER, P.M. DYNAMIC
LOUDSPEAKER, ELECTRODYNAMIC
PHONO PICK-UP
VACUUM TUBE HEATER OR FILAMENT
VACUUM TUBE CATHODE
VACUUM TUBE GRID
VACUUM TUBE PLATE
3-ELEMENT VACUUM TUBE (TRIODE)
ALIGNING KEY OCTAL BASE TUBE

13.2 With the help of Electrical Symbol and Accessories Chart easy to find Location of Instruments.

14. Pipe vice Cast Iron with hardened jaw open type.

Pipe Vice - 50 mm



Basic Indicative Diagram

- Generally, Conform to 6007 - 1971 221.3 Nominal Pipe size (L): 50 mm
- Body should be made of Malleable Cast Iron
- Jaws should be drop forged & differentially hardened 221.6 Hardness 221.6.1 Body of the Jaw: 40 - 45 HRC
- Teeth of the Jaw: Above 50 HRC
- Vertical Upright section of the base is provided with holes for mounting of frame
- Body of Pipe Vice Painted & Jaw Black anodized to guard against rusting

15. Hand Vice.

Hand Vice - 50 mm

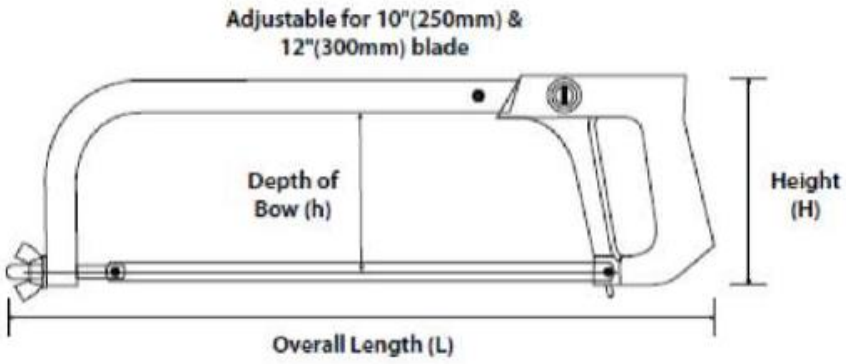
- Basic Indicative Diagram
- Total Length: 153 mm ± 2 mm
- Jaw Width: 50 mm ± 2mm
- Total Height: 80 ± 2mm
- Body material: Ductile Cast Iron
- Spring should easily go up & down
- Should be used during grinding, hammering etc

16. Table Vice.-100 mm

- Basic Indicative Diagram
- Total Length: 330 mm ± 2 mm
- Height: 130 mm ± 2 mm
- Jaw Width: 100 mm ± 2 mm
- Jaw depth: 55 mm ± 2mm
- Jaw opening: 130 mm + 2mm
- Body should be made from shock resistant Cast Iron & should be free from sand holes.
- Malleable Steel nuts for extra tuff grip.
- Jaw made of special carbon Steel (properly heat treated grinded).
- Clamping force: 2200 Kgf

17. Hacksaw Frame (With Blade).

Hacksaw Frame - Adjustable - 250 To 300 mm

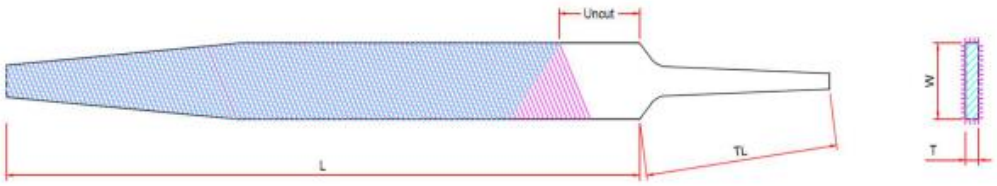


- Basic Indicative Diagram

- Adjustable for 10-inch (250mm) & 12-inch (300mm) blades
- The blade can additionally be set for sawing at 90°
- Storage compartment in the tubular bow should allow for storing spare blades
- Should be Fitted with a 12” (300 mm) Steel hacksaw blade
- Overall Length(L): 430mm + 10%
- Height(H): 150 mm + 10% 131.8 Depth of Bow(H): 106mm + 10%
- Strong Frame 131.10 Should have adjustable tension lever
- Should be able to build 30000 PSI in 12 turns

18. File Flat.

File - Flat - Second Cut - 250 mm with Handle
Basic Indicative Diagram

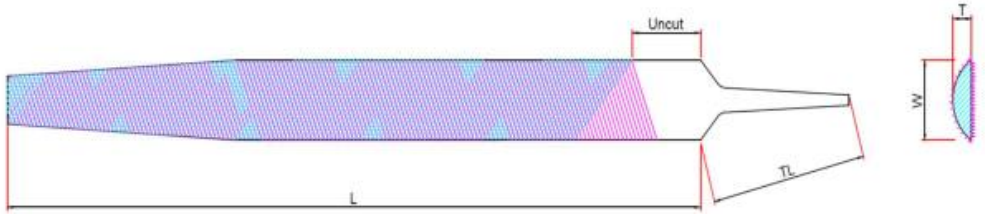


	Range (In MM)	
	From	To
• Generally conforming to IS 1931-2000		
• Body Length (L)	248	252
• Tang Length (TL)	59	61
• Width (W)	23.9	24.9
• Thickness (T)	5.05	5.75
• No. of Upcut / Inch	29	30
• Upcut inclination	640	660
• No. of Overcut / Inch	23	24
• Overcut Inclination	440	460
• No. of Edge cut / Inch	31	32
• Edge cut Inclination	890	910
• Hardness	60 HRC	64 HRC
• Rake Angle	-7^0	-12^0

19. File half Round.

File - Half Round - Second Cut - 250 mm with Handle

13.1 Basic Indicative Diagram

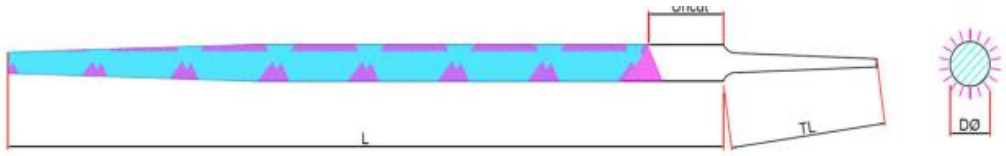


Range (In MM)	From	To
▪ Generally conforming to IS 1931-2000		
▪ Body Length (L)	250	252
▪ Tang Length (TL)	60	61
▪ Width (W)	23.70	24.7
▪ Thickness (T)	6.55	7.25
▪ No. of Upcut / Inch	(29-30F/S)	(28-29R/S)
▪ Upcut inclination	650	650
▪ No. of Overcut / Inch	(24-25 F/S)	(24-25R/S)
▪ Overcut Inclination	500	500
▪ No. of Edge cut / Inch	28	29
▪ Edge cut Inclination	650	650
▪ Hardness	60 HRC	64 HRC
▪ Rake Angle	-7^0	-12^0

20. File Round.

File - Round - Second Cut - 200 mm with Handle

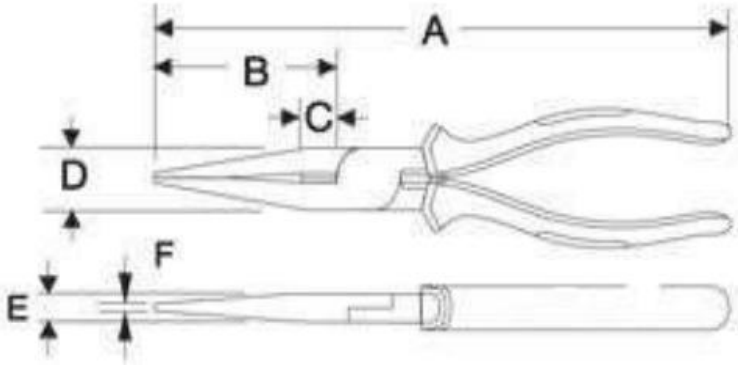
18.1 Basic Indicative Diagram



Range (In MM)	From	To
• Generally conforming to IS 1931-2000		
• Body Length (L)	198	202
• Tang Length (TL)	55	55
• Diameter (Ø)	6.35	7.25
• No. of Upcut / Inch	31	32
• Upcut inclination	640	660
• No. of Overcut / Inch	31	32
• Overcut Inclination	490	510
• Hardness	60 HRC	64 HRC
• Rake Angle	-7^0	-12^0

21. Pliers Long nose Insulated.

Plier - Long Nose - 200 mm
Basic Indicative Diagram

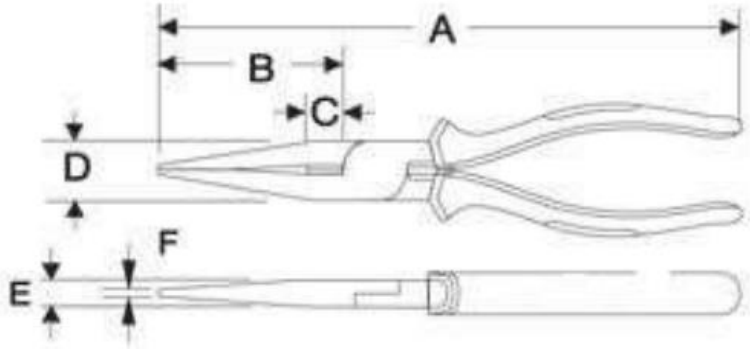


- Generally, conform to IS 3552 - 1989
- Length: 200 mm
- Drop Forged from High Carbon Steel & scientifically treated to give tough body (45 - 48HRC)
- Cutting edges should be induction hardened. Cutting edge Hardness 55 - 60 HRC.
- Rivet should be hardened and made of carbon Steel
- High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
- Minimum load value: 13.80 Kg
- Insulation Sleeves made from High Quality CA Plastic which are long lasting and will not break or crack even if it falls from Height and ensures safe electrical working.
- Thicker Sleeves for comfortable Grip
- Special thumb protector for sleeves to minimize the risk of electric shock in case plier slips while in use.
- Should be able to cut soft (74 to 84 Kg/ mm^2) & Hard (140 mm^2) wires
- Should be able to cut Hard wire of Diameter: 1.60 mm & Soft wire of Diameter: 1.0 mm
- Cutting edges should be sharp and precision machined to appropriate angle to cut thick and thin wires with ease

22. Pliers Flat Nose Insulated.

Plier - Flat Nose - 150 mm

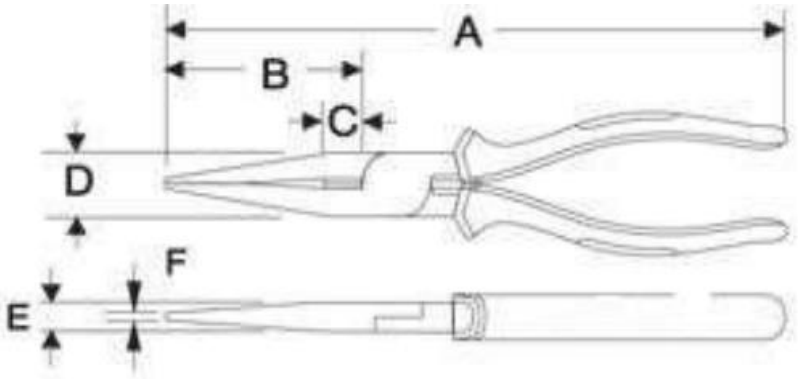
Basic Indicative Diagram



- Generally, conform to IS 3552 - 1989
- Length: 150 mm
- Drop Forged from High Carbon Steel & scientifically treated to give tough body (45 - 48HRC)
- Cutting edges should be induction hardened. Cutting edge Hardness 55 - 60 HRC.
- Rivet should be hardened and made of carbon Steel
- High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
- Minimum load value: 9.58 Kg
- Insulation Sleeves made from High Quality CA Plastic which are long lasting and will not break or crack even if it falls from Height and ensures safe electrical working.
- Thicker Sleeves for comfortable Grip
- Special thumb protector for sleeves to minimize the risk of electric shock in case plier slips while in use.
- Should be able to cut soft (74 to 84 Kg/ mm^2) & Hard (140 mm^2) wires
- Should be able to cut Hard wire of Diameter: 1.60 mm & Soft wire of Diameter: 1.0 mm
- Cutting edges should be sharp and precision machined to appropriate angle to cut thick and thin wires with ease

23. Pliers Round Nose Insulated.

Plier - Round Nose - 150 mm
Basic Indicative Diagram



- Generally, conform to IS 3552 - 1989
- Length: 150 mm
- Drop Forged from High Carbon Steel & scientifically treated to give tough body (45 - 48HRC)
- Cutting edges should be induction hardened. Cutting edge Hardness 55 - 60 HRC.
- Rivet should be hardened and made of carbon Steel
- High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
- Insulation Sleeves made from High Quality CA Plastic which are long lasting and will not break or crack even if it falls from Height and ensures safe electrical working.
- Thicker Sleeves for comfortable Grip
- Special thumb protector for sleeves to minimize the risk of electric shock in case plier slips while in use. 97.11 Should be able to cut soft (74 to 84 Kg/ mm^2) & Hard (140 Kg/ mm^2) wires
- Should be able to cut Hard wire of Diameter: 1.60 mm & Soft wire of Diameter: 1.0 mm
- Cutting edges should be sharp and precision machined to appropriate angle to cut thick and thin wires with ease.

24. D. E. metric Spanner Double Ended.

24.1 Basic Diagram.

24.2 Generally,Conform to IS2028–1998

24.3 Sizes:6X7,8X9,10X11,12X13,14X15,16X17,18X19,20X22,21X23,24X27,25X28, 30X32mm

24.4 Slightly Rounded handles-Sand Blasted

24.5 Non-Damaging Grip on nut due to close wrench opening tolerances

24.6 I-section design of handle and heads to combine strength and low weight

24.7 Salt Spray Test should be conducted

24.8 Should not have Sharp Cuts, Pit Marks, Cutting Burs

24.9 Should have Anti –Slip design Feature

24.10 Thoroughly corrosion protected with Nickel chrome finish

24.11 Deep forged from Chrome vanadium Steel(31CrV3)

24.12 Hardness:42-45HRC

24.13 Head at each end are of different sizes and set at an angle of 15 degrees

24.14 Web should be provided in forging

24.15 Minimum Torque Values in Kg.m

24.15.1 Nominal Width A/F6-0.6,7-0.9,8-1.3,9-1.9,10-2.5,11-3.3,12-4.2

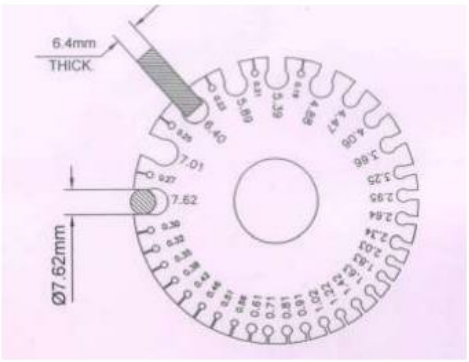
24.15.2 Nominal Width A/F13-5.3,14-6.5,15-7.8,16-9.4,17-10.9,18-13.0

24.15.3 Nominal Width A/F19-15.2,20-17.50,21-20.20,22-22.9,23-26.0,24-29.3

24.15.4 Nominal Width A/F25-32.8,26-36.6,27-40.7,28-45.0,30-54.6,32-65.50

25. Gauge, Wire imperial stainless steel marked in SWG & mm.

Standard Wire Gauge - Metric
Basic Indicative Diagram

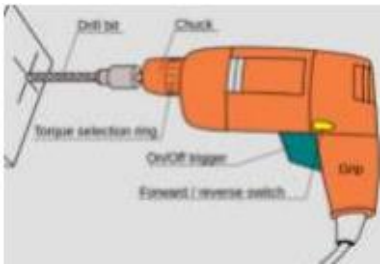


- Material: Stainless - X12CrMnNiN18-9-5
- Thickness: 1.0 mm
- Hardness: 30-35 HRC (Specially Hardened)
- Finish: Polished 2B / Antiglare Satin Chrome
- Surface roughness: 0.6 microns max
- Range: 0-36 SWG (incremental of 1 gauge)
- Measuring least count: 36 SWG - Standard Wire Gauge (0.19 mm)
- Accuracy: +0.05 mm
- Should be supplied in Wooden / Plastic Box with proper cushioning

26. Portable Electric Drill Machine.

Portable Electric Impact Drill Machine

Basic Indicative Diagram:



- Drilling machine should generally conform to IS 36501 - 1981.
- Power input: 600 Watt (Min.)
- Drilling diameter:
  - Concrete: 13 mm
  - Steel: 10 mm
  - Wood: 25 mm
- No load speed: 0 – 2800 rpm
- Impact rate: 25000 bpm
- Should have soft in line grip for a secure hold
- Should have Rotating brush plate for constant power in reverse and forward rotation
- Should have Forward / Reverse rotation for inserting and removing screws
- Should be able to have Easy and precise control of the RPM - variable speed
- Should have double insulation – shock proof fiber body
- Dimensions:
  - Overall Length in mm (± 10 %): 275 mm
  - Overall Height in mm (± 10 %): 180 mm
  - Net Weight (without cable & blade) (± 10%.): 1.7 kg
- Protection Class: Double Insulation
- Standard Accessories
  - Auxiliary handle = 01 no
  - Blow molded plastic case to securely fit all pieces for easy organization and convenient portability = 01 no
  - Depth gauge = 01 no 2.14.4 Spirit level (225 mm) with 3 spirit bulbs (for horizontal, vertical & angular level testing) = 01 no
  - Knife (Length - 150 mm, Blade width 15 mm) = 01 no
  - Claw Hammer (Weight 340 grams) = 01 no
  - Adjustable Wrench (Length 150 mm, Maximum jaw opening 19 mm) = 01 no
  - Combination Plier (Length 160 mm, Maximum jaw opening 25 mm) = 01 no
  - Measuring tape (Length 3 meter, 11 mm tape width) = 01 no
- Drill bits
  - Masonry: 05 no

- Wood: 04 no
- HSS: 05 no
- CRV Bit: 10 no
- Magnetic Bit Holder: 01 no
- Socket: 7 no
- Socket Adaptor: 1 no
- Assorted Screws: 30 no
- Assorted Plastic Plugs: 30 no

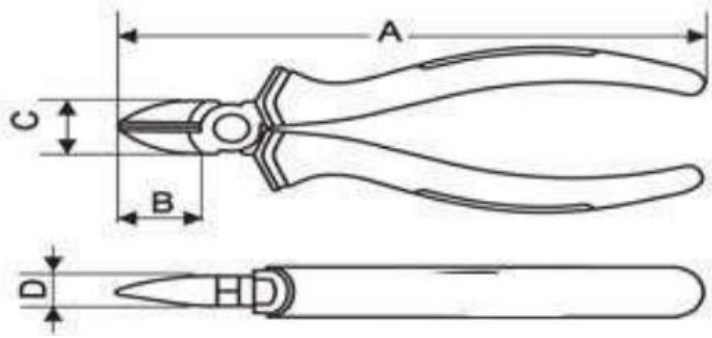
27. Crimping Tool.

Crimping Tool - 5 in 1
Basic Indicative Diagram

- Should have the following 5 functions
  - Wire cutter 87.2.2 Wire stripper
  - Bolt cutter 87.2.4 Insulation crimping
  - Non insulation Crimping
  - Size: 225 mm
  - Induction hardened cutting edges
  - Finger Guard for Better Control & Added Safety
  - Bi - material Grip for comfort

28. Pliers Side Cutting.

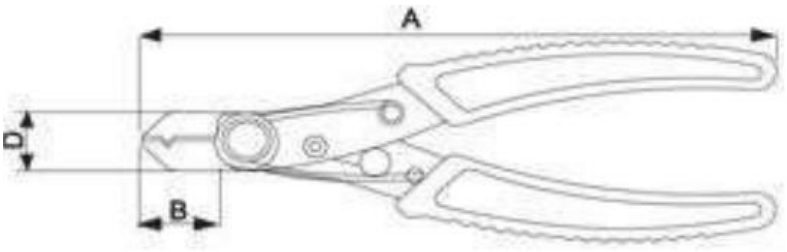
Plier - Side Cutting - 200 mm
Basic Indicative Diagram



- Generally, conform to IS 4378 - 1990
- Drop Forged from High Carbon Steel & scientifically treated to give tough body (45 - 48HRC)
- Cutting edges should be induction hardened. Cutting edge Hardness 55 - 60 HRC.
- Rivet should be hardened and made of carbon Steel
- Length: 200 mm
- High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
- Insulation Sleeves made from High Quality CA Plastic
- Thicker Sleeves for comfortable Grip
- Special thumb protector for sleeves to minimize the risk of electric shock in case plier slips while in use.
- Should be able to cut soft (74 to 84 Kg/ mm^2) & Hard (140 Kg/ mm^2)wires
- Should be able to cut 2.0 mm of hard wire Diameter & 1.5 mm of soft wire Diameter
- Cutting edges should be sharp and precision machined to appropriate angle to cut thick and thin wires with ease

29. Wire Stripper adjustable Length.

Wire Cutter and Stripper - 150 mm
Basic Indicative Diagram

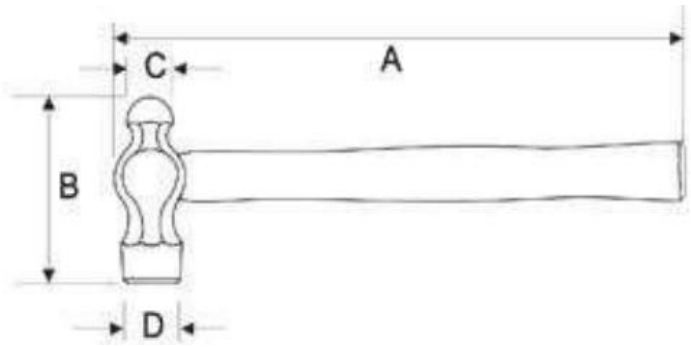


- Generally conform to I.S. 5995 – 1971
- Dimensions (in mm): A - 150, B - 18, D - 15
- Sleeve should be made of Cellulose Acetate
- Should withstand 400 V AC
- Drop forged from high grade carbon Steel (EN 9)
- Accurate machined and Heat treated

30. Hammer, ball peen with Handle.

Hammer - Ball Peen - 200 grams with Handle

55.1 Basic Indicative Diagram



- Generally conform to I.S. 841 - 1983
- Ball Peen Hammer
- Length: 300 mm + 10%
- Weight: 200 grams
- Drop forged from high grade carbon Steel
- Material: EN - 9
- Partially hardened upto 46 - 56 HRC on striking surface
- Depth of Hardness: 6 mm
- Phosphate and painted 55.11 Handle
    - Material: Hickory Wood/ Red Wood/ Babul Wood/ Indestructible Handle
    - Handle fixed firmly to hammer head so that it does not come out after long use

31. Scriber (Knurled Centre Position).

Scriber - Bend and Straight - 150 mm

Basic Indicative Diagram

- Scriber with Min. Length 150
- 90 ° Bend and Straight
- Both Point end Hardness 55 - 60 HRC
- Should be of material EN - 9

32. Tool Kit Box / Bag Portable.

5 Tray Cantilever Tool Box - W:D:H = 450:200:200, ± 20 mm

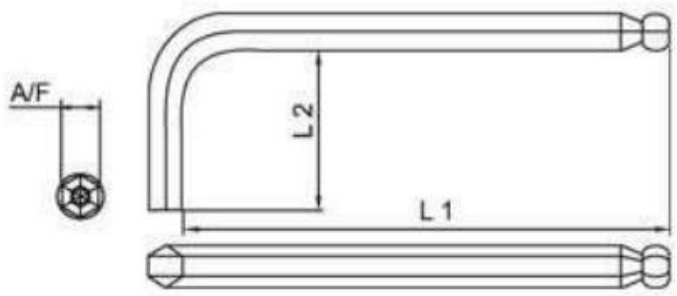
1.1 Basic Indicative Diagram:

- Tray Cantilever box with overall Dimensions:
- Width : Depth: Height = 450 mm : 200 mm : 200 mm
- Variation: ± 20 mm
- Corrosion resistant powder coated finish
- Riveting should be of Stainless Steel
- Minimum Load Capacity: 33 kg
- Construction in CRC Sheet with thickness:
    - Base and Side: 0.65 mm
    - Partition: 1.0 mm
- Joining Clips should be of CRC Sheet with
- 5 mm thickness
- Handle should be of ERW MS Pipe ø 12.7 mm X 1.0 mm thick
- Provision of Padlock in lid
- Color: Blue, Yellow, Red, Orange or Black

33. Allen Key.

Allen Key Set - Hexagonal - 1.5 - 10 mm, set of 9 Keys

Basic Indicative Diagram



- Generally conform to I.S 3082 - 1988 pipe 117.3 Sizes in mm: 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10
- Made from high grade alloy Steel - Chrome Vanadium Molybdenum (S2) which enables 30% higher torque as compared to Allen keys made from Cr - V Steel
- Higher Hardness 57 - 62 HRC
- Ball Head on one side to facilitate tightening & loosening of screws at 15 degree
- Precision drawn and machined 186.7 Specially coated and Oiled for rust prevention

34. Scissor's blade.

34.1 Basic Diagram.

34.2 Material: Stainless Steel.

34.3 Should be suitable for right hand use

34.4 Should be suitable for Electrical work Purpose

34.5 Size: 150 mm (± 10%)

34.6 Handle should be covered with a layer of insulated material

34.7 Working Part Hardened to 52-56 HRC

35. Electrical Loads: set of Incandescent Lamp, Tube light, CFL, LED Light, Heater, Geyser.

35.1 Basic Diagram.






35.2 Input Supply for all Equipment – Single Phase.

35.3 Input Voltage Supply – 230 V.

35.4 Home Appliances.

35.5 Geyser

35.5.1	Wattage: 750 W
35.5.2	Input: 240V/50hzAc
35.5.3	Wire Length: 1.4meters/3core
35.5.4	Capacity -10 Ltr

35.6 Heater.

35.6.1	Wattage: 1500 W
35.6.2	139d.3 Input: 240V/50hzAc
35.6.3	139d.4 Wire Length: 1.4meters/3core
35.6.4	Type of Product: Immersion Rods

36. Torque Wrench.

Torque Wrenches - Set of 3 Range 5 To 200 Nm
Basic Indicative Diagram

- 48 teeth ratchet to allow engagement angle of 7 - 1/2 ° (which is ideal) for precise adjustment & non slip use
- Chrome - Molybdenum Steel Square Drive
- Fully secure locking mechanism to avoid forced adjustment
- Lens (Screen) for clear reading of torque value
- Ratcheting Kind, click sound after achieving the torque
- Each unit should be individually serial numbered & includes calibration certificate traceable to international standards
- Accuracy: +/ - 4%
- Torque Range 5 - 25 Nm
    - Fine scale 0.1 Nm
    - Length 325 mm
    - 3/8 inch square drive
- Torque Range 20 - 100 Nm
    - Fine scale 0.5Nm
    - Length 400 mm
    - 1/2 inch square drive
- Torque Range 40 - 200 Nm
    - Fine scale 0.5Nm
    - Length 515 mm
    - 1/2 inch square drive

37. Pipe Cutter to cut pipes.

Pipe Cutter - For Copper Tube, 3 mm to 16 mm

- Basic Indicative Diagram

- Body material: Cast Iron
- Holding capacity: 3 mm to 16 mm
- Fast and superior cutting
- Should be provided with long shank

38. Pipe Cutter to cut pipes.

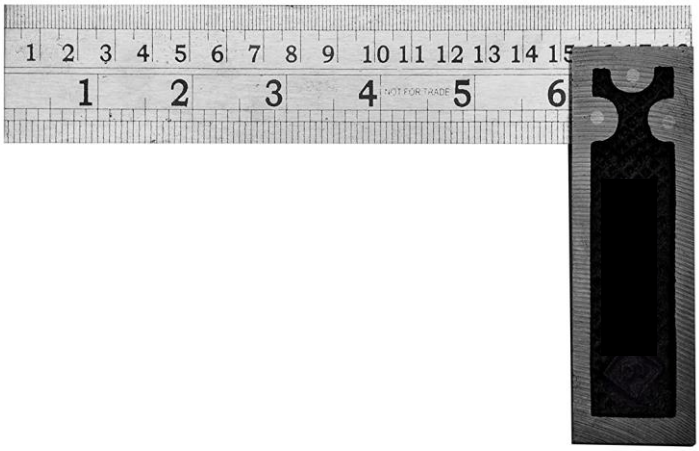
Pipe Cutter - Wheel Type, 3mm to 30 mm

- Basic Indicative Diagram

- Body material: Cast Iron
- Fast and superior cutting
- Should be provided with long shank

39. Try Square 150 mm Blade.

39.1 Basic Diagram.

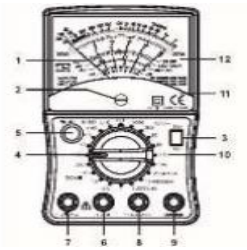


39.2	Blade length(L1):	150mm
39.3	Stock length(L2):	100mm
39.4	Squareness:	16microns
39.5	Material for Blade:	Spring Steel
39.6	Stock:	MS
39.7	Hardness of Blade:	40-50 HRC
39.8	Groove on the inner corner of the stock	

40. Multi Meter (analog).

Multimeter – Analog

Basic Indicative Diagram



- DC Voltage Ranges: 0.25/1/2.5/10/50/250/1000V
- Accuracy: ±2% F.S.
- Sensitivity: 50kohm /V
- AC Voltage: Ranges: 2.5/10/50/250/1000V
- Accuracy: ±3% F.S.
- Sensitivity: 10kohm /V Decibel
- Meter: -20 to 62dB (0dB=1mW/600Ω)
- Direct Scale: -20 to + 10dB
- DC Current Ranges: 25uA/1mA/25mA/500mA
- 10A (on separate input):
- Accuracy: ±2% F.S.
- Sensitivity: 250mV
- AC Current Ranges: 10A
- Accuracy: ±3% F.S.
- Resistance Ranges: Rx1 (0.2 to 20kΩ), Rx10(2Ω to 200kΩ), Rx100 (20Ω to 2MΩ), Rx1K(200Ω to 20MΩ) Zero Corrector: Required
- Polarity Reversal Switch: Required
- Range Selector: Required
- FEATURES:
    - EN 61010-1 CAT III 600V
    - EN 61326 -1
    - High quality Taut Band movement. Easy to read 3-color scale for mistake Proof reading
    - Mirror scale to make reading pointer easy
    - Safety features: safety fused (10A, 1A, 0.5A)
    - Safety "OFF" position, dB measurement.
    - Stand to make reading and measuring easy Accessories
- Test leads 64.21.2 Batteries in built
- User Manual Power Supply: 1.5V(AA) x 2 Dimensions in mm: 160(L) x 100 (W) x 45(D) (+ /- 10%) Net Weight: 375 Grams (battery included) (±10%

41. Load Bank (Variable).

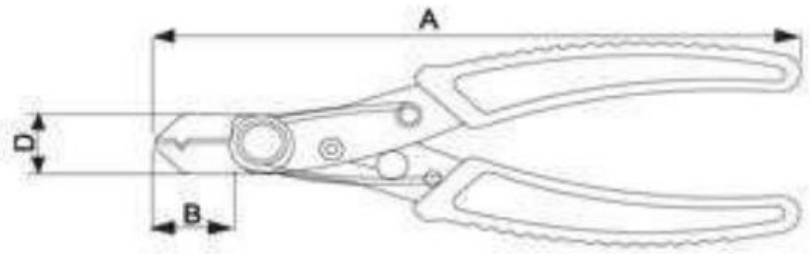
41.1 Basic Diagram.

41.2 Capacity-**1.2 KW**
41.3 Product Type :**Lamp / heater Type**
41.4 Voltage (V): -240V AC 1 Phase
41.5 Frequency: - 50Hz
41.6 Output Watt Capacity (Watts) :- 1200
~~41.7~~ Power Factor more than 0.9
41.8 Frequency Compatibility 50 / 60 Hz

42. Wire Cutter and Stripper.

Wire Cutter and Stripper - 150 mm

Basic Indicative Diagram



- Generally conform to I.S. 5995 - 1971
- Dimensions (in mm): A - 150, B - 18, D - 15
- Sleeve should be made of Cellulose Acetate
- Should withstand 400 V AC
- Drop forged from high grade carbon Steel (EN 9)
- Accurate machined and Heat treated

43. Earth Plate.

Accessories Item

43.1 Copper Plate.

43. G.I. Plate.

43.2 Material – Copper. Material – Galvanize.

43.3 Dimension – 60cm x 60cm x 3.15mm. Dimension – 60cm x 60cm x 3.15mm.

43.4 Used – Electrical Earthing. Used – Electrical Earthing.

44. Earth Electrode.

Accessories Item

44.1 Basic Diagram.

Primary electrode 2100x28x3.25 mm, secondary – cu strip 20x5 mm

44.2 Material – Copper, Aluminum and Galvanized iron.

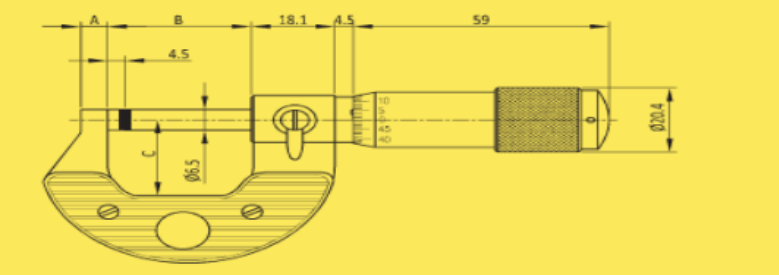
44.3 Length – 1 Meter to 3 Meter

44.4 Dimension – 32 to 80 mm.

44.5 Maintenance free earth electrode.

45. Out Side Micrometer.

- Micrometer - Outside - 0 - 25 mm, LC = 0.01 mm
- Basic Indicative Diagram:



- Compliance: Generally Compliant to IS 2967 / 1938
- Range: 0 mm -25 mm
- Reading: 0.01 mm
- Accuracy: 4 µm
- Spindle Material: Stainless Steel / Alloy steel
- Standard Accessories:
    - Suitable spanner,
    - Wooden / Plastic Box with proper cushioning
    - Operating Manual

46. Tap Set.

Tap and Die Set

Basic Indicative Diagram

- Tap and Die Set - M3 to M18 Taps Set and Die Sets, Die Stock and Tap Wrench
- Made of High Speed Steel
- HRC 56 - 60
- Hand Tap Set consisting of 3 Hand Taps viz. First, Second and Third of sizes specified below
- Round Dies of sizes specified below
- Hand Tap and Round Dies Sizes:
    - 3.00 - 0.50 mm
    - 4.00 - 0.70 mm
    - 5.00 - 0.80 mm
    - 6.00 - 1.00 mm
    - 7.00 - 1.00 mm
    - 8.00 - 1.00 mm
    - 9.00 - 1.25 mm
    - 80.00 - 1.50 mm
    - 12.00 - 1.75 mm
    - 14.00 - 2.00 mm
    - 16.00 - 2.00 mm
    - 18.00 - 2.50 mm
    - 1/8 inch - 28 BSP
- T Handle Tap Wrench M2 - M6, M6 - M10
- Adjustable Bar Type Tap wrench M1 - M12, M4 - M20(forged body)
- Die Stock Holder for Round Dies 13/16 inch, 1 inch & 1.1/2 inch
- Thread Pitch Gauge - 16 leaves 0.35mm - 3mm
- 60 Pieces Set
- Provided with suitable Wooden/ Plastic/ Metal Box

47. Trolley for transportation of Batteries.

47.1 Basic Diagram.

47.2 Material – Iron.
47.3 Length – 1120 mm.
47.4 Width – 609 mm.
47.5 Height – 990 mm.
47.6 Platform – 1000 x 600 mm.
47.7 Roller – 200 mm.
47.8 Load Capacity – 600 Kg.
47.9 Weight – 27 Kg.

Should be suitable for keeping/Transporting 4 Batteries of 100Ah at a time

48. Die for Threading.

- Tap and Die Set
- Basic Indicative Diagram
- Tap and Die Set - M3 to M18 Taps Set and Die Sets, Die Stock and Tap Wrench
- Made of High Speed Steel
- HRC 56 - 60
- Hand Tap Set consisting of 3 Hand Taps viz. First, Second and Third of sizes specified below
- Round Dies of sizes specified below
- Hand Tap and Round Dies Sizes:
    - 3.00 - 0.50 mm
    - 4.00 - 0.70 mm
    - 5.00 - 0.80 mm
    - 6.00 - 1.00 mm
    - 7.00 - 1.00 mm
    - 8.00 - 1.00 mm
    - 9.00 - 1.25 mm
    - 10.00 - 1.50 mm
    - 12.00 - 1.75 mm
    - 14.00 - 2.00 mm
    - 16.00 - 2.00 mm
    - 18.00 - 2.50 mm
    - 1/8 inch - 28 BSP
- T Handle Tap Wrench M2 - M6, M6 - M10
- Adjustable Bar Type Tap wrench M1 - M12, M4 - M20(forged body)
- Die Stock Holder for Round Dies 13/16 inch, 1 inch & 1.1/2 inch
- Thread Pitch Gauge - 16 leaves 0.35mm - 3mm
- 60 Pieces Set 187.13 Provided with suitable Wooden/ Plastic/ Metal Box

49. Rooftop Mounting Structure.

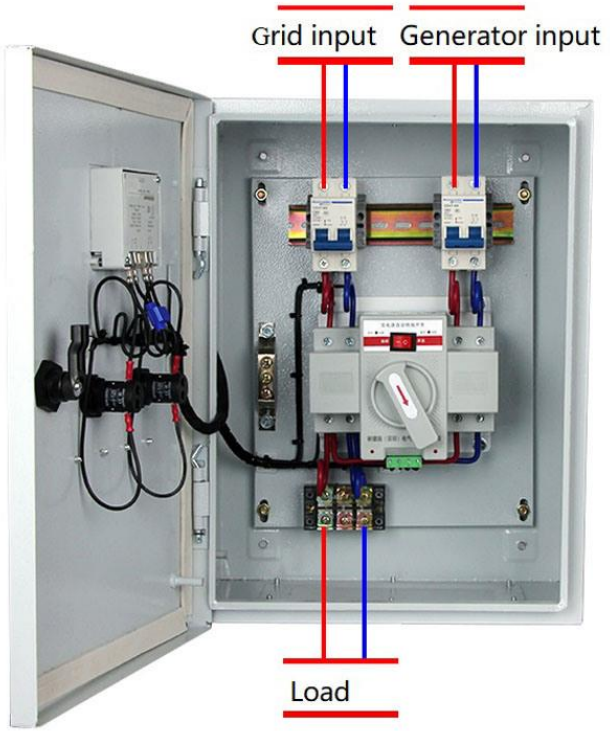
49.1 Basic Diagram.

49.2 Material – Galvanized Iron.
49.3 Angle – 15 Degree and 25 Degree.
49.4 Dimension – Front Leg Height – 50 cm.
49.5 Dimension – Back Leg Height – 83 cm.
49.6 Dimension – Channel Length – 202 cm.
49.7 Dimension – Rafter Length – 135 cm.
(Dimensions are for reference only, Structure should be able to mount the 1000Watt solar Panels)

49.9 Solar Plates – Total capacity 1Kwatt with Tilt Adjustment
Full Set For Roof Top Solar Panel Installation
Proper Size Solar Panels Can Be Mounted Roof Top
Most Professional way High Quality Material Used
49.10 Maximum Output Power – 1000Watt in total

50. Electrical Wiring and Switch gear rack.

50.1 Basic Diagram.



Home Electrical Wiring Training System should with multifunction meters with kWh display:1600 impulses /kWh Meter constant, 100 impulses / kWh. 6A single phase MCB. Should provide with house hold load like 20W Tube light and 50W Celling fan. Maximum load current should be 4A, Test point should be provided should be provide to measure voltage a different point.

51. Protective relays and contactors rack

51.1 Basic Diagram.

51.2 2 x 3 pole contactors.
51.3 Voltage monitoring failure relay.
51.4 Led indicator lamps.
51.5 Auto / Generator test switch.
51.6 16 amp auxiliary output.
51.7 Robust mild steel enclosure.
51.8 400 x 300 x 200mm (HWD).

Under voltage, Over Voltage, Neutral failure protection relay 1 – Phase Function: Detection & Tripping for Under voltage / Overvoltage / Neutral fail / Reverse Phase, Trip Levels: Under Volt-170V and Over Volt-270V, Over current relay: 1-63 A(adjustable), Default- 40A, RCCB, Current: 25 AMP, Pole: 2, Earth leakage sensitivity: 30 mA

52. MCCB (Molded Case Circuit Breaker).

52.1 Basic Diagram.

52.2 Name of Model – 100 amp MCCB.

52.3 Number of poles – 3 Pole.

52.4 Mounting Type – Vertical.

52.5 Current Rating – 100amp.

53. ELCB (Electric Leakage Circuit Breaker) and RCCB (Residual Current Circuit Breaker).

53.1 Basic Diagram.

53.2 ELCB (Electric Leakage Circuit Breaker).

53.2.1 Current Rating – 25amp.
53.2.2 Color – White.
53.2.3 Material – PVC Plastic.
53.2.4 Dimension – 445mm x 408mm x 240mm.
53.2.5 Weight – 230 g.
53.2.6 Number of Poles – 2 Poles.

53.3 RCCB (Residual Current Circuit Breaker).

53.3.1 Current Rating – 25amp.
53.3.2 Color – White.
53.3.3 Material – PVC Plastic.
53.3.4 Dimension – 445mm x 408mm x 240mm.
53.3.5 Weight – 270 g.
53.3.6 Number of Poles – 2 Poles.

54. Fusses (HRC, Glass, and Rewire Type).

54.1 Basic Diagram.

54.2 HRC (High Rapturing Capacitor).

54.2.1 Current Rating – 20A.
54.2.2 Color – White.
54.2.3 Material – Ceramic.
54.2.4 Number of Poles – 1 Pole.
54.2.5 Non-Renewable Used.

54.3 Glass.

54.3.1 Current Rating – 15A.
54.3.2 Color – White.
54.3.3 Material – Transparent Glass with Metal.
54.3.4 Weight – 12 g.
54.3.5 Size – 6 x 25mm.
54.3.6 Number of Poles – 1 Pole.

54.4 Rewire Type.

54.4.1 Current Rating – 15A.
54.4.2 Color – White.
54.4.3 Material – Ceramic.
54.4.4 Weight – According to Fuse Rating.
54.4.5 Number of Poles – 1 Pole.

55. Cables (1 Meter each):

55.1 Basic Diagram.

Coaxial Cable

Multicolor Cable

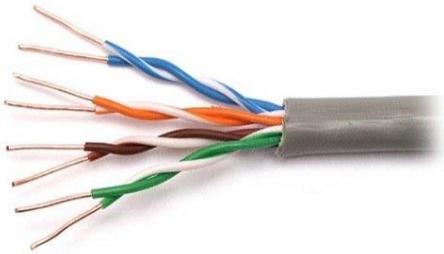
D Link 6 Core Single mode Armored Cable

Modern Cable

Multicore Armored Cable

Speaker Cable

Unshielded Twisted Pair Cable



55.2 Name of Conducting Material – Copper.
55.3 Name of Insulating Material – Silicon or Rubber/plastic
55.4 Each and every cable designed according to application.
55.5 Color – Multi Color.

56. Solar Cable (Red).

56.1 Basic Diagram

56.2 Size of Conductor – 5 sq mm.
56.3 Material – Copper.
56.4 Coating – Insulated (Silicon, Plastic, and Rubber).
56.5 Color – Red.

57. Solar Cable (Black).

57.1 Basic Diagram.

57.2 Size of Conductor – 5 sq mm.

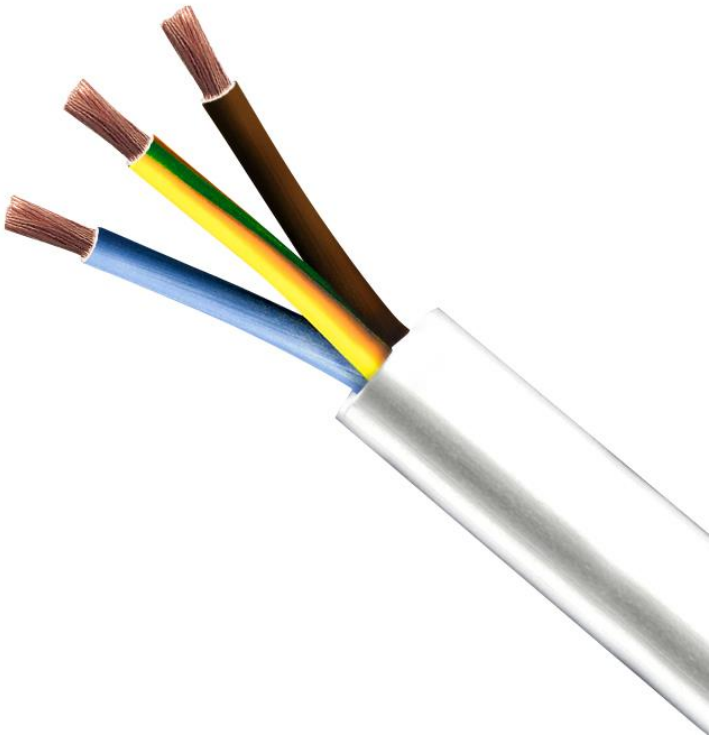
57.3 Material – Copper.

57.4 Coating – Insulated (Silicon, Plastic, and Rubber).

57.5 Color – Black.

58. Three Core Wire.

58.1 Basic Diagram.



58.2 Size – 4 sq mm.
58.3 Current Rating – 15A.
58.4 Material – Copper.
58.5 Coating – Insulated (Silicon, Plastic, and Rubber).
58.6 Color – Multi Color.
58.7 Used for Three Phase (RYB).

59. Battery Cable.

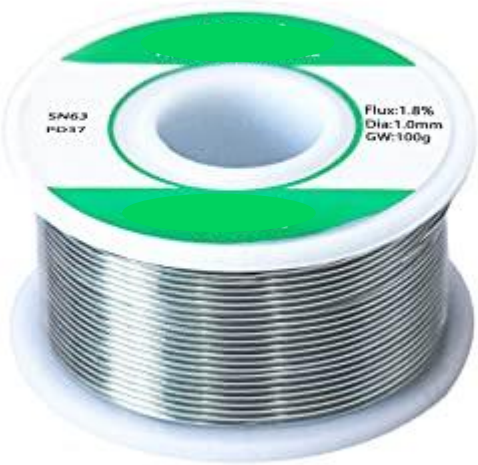
59.1 Basic Diagram.

59.2 Size – 7.5 sq mm.
59.3 Material – Copper.
59.4 Coating - Insulated (Silicon, Plastic, and Rubber).
59.5 Color –Red & Black
59.6 Used for Battery Charge and Discharge.

60. Resin Cored Solder.

Accessories Item

60.1 Basic Diagram.



60.2 Material – Tin Lead.
60.3 Maximum Temperature – 187 Degree C.
60.4 Minimum Temperature – 183 Degree C.
60.5 Weight – 250 g.

61. Solder Wax.

Accessories Item

61.1 Basic Diagram.

61.2 Soldering Paste – Flux.

61.3 Weight – 300 g.

62. MC – 4 Connector.

Accessories Item

62.1 Basic Diagram.

62.2 Current Rating – 30A.
62.3 Maximum Voltage Rating – 1500 V.
62.4 Size – 6 sq mm.
62.5 Color – Black.
62.6 Material – Plastic.

63. Pins.

Accessories Item

63.1 Basic Diagram.

63.2 Size – 5 mm
63.3 Two Plug Pin.
63.4 Body Material – Plastic.
63.5 Terminal Material – Copper.

64. Lugs.

Accessories Item

64.1 Basic Diagram.

64.2 Size – 7.5mm.

64.3 Material – Aluminum.

64.4 Color – Silver.

65. Hacksaw Blade.

Accessories Item

65.1 Basic Diagram

65.2 Size – 200mm & 300mm.
65.3 Material – Stainless Steel/ Mild Steel
65.4 Dimension – 20 x 20 x 5 mm.
65.5 Number of Teeth – 18.
65.6 Weight – 0.45 Kg.
65.7 Color – Multi Color.

66. Bolts, Nuts, Anchor bolts, Washers, Screws, Other Pins, Lugs etc.

Accessories Item

66.1 Basic Diagram.

66.2 As per the Requirement Size and Shape.

67. Civil Work utensils.

Accessories Item

67.1 Basic Diagram.

67.2 As per the requirement Items- Spades, Mixing Spoon, Levelling plates

68. Plumbing Tools.

Accessories Item

68.1 Basic Diagram.

68.2 As per the requirement Items.

69. Plumbing Raw Material.

Accessories Item

69.1 Basic Diagram.

69.2 As per the requirement Items.

70. Civil Work Raw Material

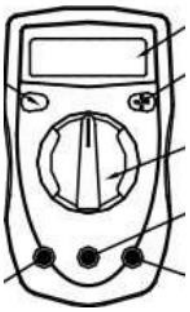
Accessories Item

70.1 Basic Diagram.

70.2 Asper the requirement Items.

71. Digital Multimeter.

Multimeter - Digital - 3 ½ Digit
Basic Indicative Diagram



- Display Count: 4000 DC
- Voltage: 400mV-500V (Accuracy ±0.8% +1)
- AC Voltage: 400mV-500V (Accuracy ±1.2% +3)
- AC Current: 400µA -10A (Accuracy ±1% +2)
- DC Current: 400µA- 10A (Accuracy ±1.5% +5)
- Resistance: 400Ω to 40MΩ (Accuracy ±1% +2)
- Capacitance 4nF to 100uF (Accuracy ±4% +3)
- Auto Range: Should be available Diode
- Measurement: Should be available Continuity
- Buzzer: Should be available
- Low Battery Indication: Should be available
- Input impedance for DCV should be available
- Protection: Dual Fuse Protection
- 13.15 Size: 130 mm X 75 mm X 35mm (±10%)
- Compliance: CE Certificate, CAT II, ETL Certified Accessories
    - Test Lead
    - Manual
    - Required Batteries
    - Calibration Certificate
    - Plastic or Wooden Carrying Case with required cushionin

72. Megger (Analog).

72.1 Basic Diagram.

72.2	Resistance
72.3	100 Mega ohms
72.4	Body Material Metal Body
72.5	Voltage 500V
72.6	Standard IS 2992-1980
72.7	Rotation Speed 160 R.P.M.

73. Hydrometer.

73.1 Basic Diagram.

73.2 Suitable for 100Ah batteries

73.3 Color Coded Road out.

73.4 Color – Black.

73.5 Battery Hydrometer.

74. Solar Insulation meter.

74.1 Basic Diagram.

74.2 1000V – 200Mohm Digital Insulation Tester

74.3 Type – Digital.

74.4 Body Material – Plastic.

74.5 Operating Temperature – 0 degree C to 50 degree C.

74.6 Body Color – Yellow.

74.7 Battery Type – 9 V.

75. Pyranometer.

75.1 Basic Diagram.

- Microcontroller based measurement.
- Detection range 0 to 2000W/m2 Operating voltage: +5V
- 16x2 LCD display
- Sensor connector -DIN type Cable length:1meter

76. Pyrheliometer.

76.1 Basic Diagram.

- Spectral range (50% points) 200 to 4000 nm
- Sensitivity 7 to 14 µV/W/m²
- Response time < 5 s
- Zero offset B < 1 W/m²
- Temperature dependence of sensitivity (-20 ºC to +50 ºC) < 0.5%
- Field of view 5 ±0.2 °
- Operational temperature range -40 to +80 °C
- Non-linearity < 0.2 %
- Maximum solar irradiance 4000 W/m²
- International standards (ISO) First Class

77. Lux Meter.

LUX Meter - Upto 1 Lakh LUX

Basic Indicative Diagram

- Luminance Range: 0～9999 Lux
- Resolution: 1 LUX Accuracy: ±4% rdg + 5 dgts
- Luminance: Range: ≥10000
- Lux Resolution: 10 LUX
- Accuracy: ±5% rdg + 8 dgts
- Luminance Range: 0～9999 Fc
- Resolution: 1Fc
- Accuracy: Bit conversion FC=LUX/10.76
- Luminance Range: ≥10000Fc
- Resolution: 1Fc
- Measurement Range: 0～200000
- Resolution: 1LUX
- Sample Rate: 0～9999Fc
- Resolution: 1Fc
- Accuracy: 0.5s
- Overload Indication: Should Be Available
- MAX/MIN Indication Should Be Available
- Data Hold Indication Should Be Available
- Auto Power Off: Should Be Available
- LCD Backlight: Should Be Available
- Low Battery Indication: Should Be Available
- Drop Test: 1m Height
- Sensor Type: Silicon Photocell
- Battery: 4.5 V
- Safety Compliance: EN 61326 – 1
- Pollution Level: 2
- Current Consumption: Working: ≤30mA

- Power off: ≤10uA
- Working Environment: Temperature: 0～40˚C
- Humidity: ≤80%RH
- Accessories
    - Operating Manual
    - Calibration Certificate
    - Required Batteries
    - Plastic or Wooden Carrying Case with required cushioning

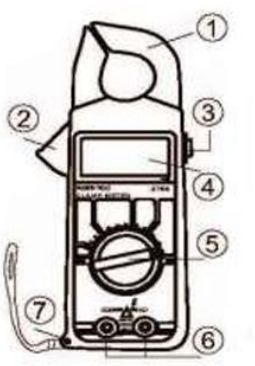
78. Magnetic Flux Meter.

78.1 Basic Diagram.

- Microcontroller based Instrument
- LCD Display 16x2
- Indicates the direction of magnetic field
  - Range : 0.2-2 Tesla with Accuracy of +/-3%
    - Zeroing Adjustment : By potentiometer

79. Tong Tester/Clamp Meter.

Tong Tester - 0 - 300 A Digital Type



- Basic Indicative Diagram
- Display: 3½ digit 1999 counts LCD display with automatic sign & functions.
- Jaw opening size: 32 mm
- Sensing: Average sensing.
- DC Voltage: 2V / 200V / 1000V.
- AC Voltage: 200V / 750V.
- AC Current: 20A / 200A / 300A.
- Resistance: 200 Ω / 200k Ω.
- Diode & Continuity Test: Required
- Over range indication: OL /(1) or (-1) should be displayed.
- Low battery indication: Low Battery Symbol should be displayed when the battery voltage drop below the operating Voltage.
- Measurement rate (internal design): 3 measurements per second nominal
- Operating Temperature & Humidity: 0°C to 50°C; < 70% R.H.
- Storage Temperature & Humidity: -20°C to 60°C; < 80% R.H. With battery removed.
- Features
    - 78.15.1 Overload protection on all ranges
    - 78.15.2 Recessed safety designed input jacks
    - 78.15.3 Data Hold switch to freeze reading
    - 78.15.4 Tough ABS plastic housing
- Power Supply: Single standard 9V battery.
- Dimensions: 190 mm (L) x 80mm (W) x 35mm (H) (±10%)
- Net Weight: 220 Grams (Excluding battery) (±10%)
- Accessories
    - 78.19.1 Test leads (Pair)
    - 78.19.2 Battery 78.19.3 Carrying Case
    - 78.19.4 Drop Proof Wrist Strap

80. Solder Iron.

Soldering Iron - 25 Watt, 240 Volt

Basic Indicative Diagram

- Should have Specially coated Copper bits (High Quality) for Longer Life.
- Should have Special double layered cartridge type element transfer heat very efficiently directly to the bits.
- Should have Iron reach soldering temperature within few seconds
- Should have Prolonged Life of heating Elements and Soldering Bits.
- Should have Extremely low leakage current.
- Should have Very light and heat resistant handles for comfortable use.
- Tip replacement should be Easy and speedy
- 25 Watts/ 240 Volts Soldering Iron
- Should have Maximum Temperature: 3800C

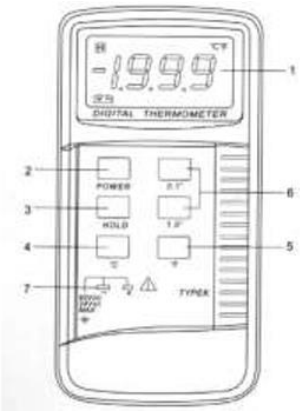
81. Temperature Control Solder.

81.1 Basic Diagram.

- Power consumption : 60Watt
- Input voltage : 170 to 270 V
- Temperature range : 180 to 270 V Desoldering :
- Input : 170 to 270 V (190 to 290 Volt
- Temp range : 180 to 480°C
- Pump : diaphragm type For SMD Rework
- Power consumption : 270 W
- Air pump : diaphragm pump
- Hot air temperature : 200 to 550°C

82. Thermometer Digital.

Thermometer - Digital - 0 to 150 Degree Celsius



Basic Indicative Diagram

- Display: 3½ digit liquid crystal display (LCD) with maximum reading of 1999.
- Battery: Standard 9V battery (NEDA 1604, IEC 6F22)
- Power Consumption: Approx. DC 3.8mA (typical)
- Dimension: Weight: 150 (H) x 70 (W) x 40 (D) mm (±10%)
- 200 Grams (including battery) (±10%)
- Supplied probe: 1 No. type “K” thermocouple bead probe (Teflon tape insulated) 4 feet long
- Maximum Insulation temperature 260°C (500°F).
- Probe accuracy ±2.2°C or ±0.75 % of 0.75% of reading (whichever is greater) from 0°C to 800°C Input Protection: 60VDC or 24V AC max input.
- Accessories
    - 9V battery (installed)
    - Instruction Manual
    - Holster and “K” thermocouple bead probe 1 No.

83. Sun Shine Recorder.

83.1 Basic Diagram.

Sun Shine Recorder with leveling Base and one year chart complete It should have following Technical Specifications

- Glass Ball
- Record Cards for one year
- Should come with 3 different types of cards corresponding to behavior of sun at different seasons

84. Weather Monitoring Station.

84.1 Basic Diagram.

84.2 Specifications :-

Weather Monitoring System should monitor and record sunshine, wind velocity, temperature and rain fall with software

It should have following features:

- High Accuracy and Reliability
- Battery Charging from Solar Panel
- Real time Data Access on Web
- Low Maintenance
- Data Storage Memory

It should have following Technical Specifications:

Sensors Specifications

Air Temperature

Operating Range : 0°C to100°C

Resolution : 1°C

Relative Humidity

Operating Range : 5% to 95%RH
Resolution : 1%

Solar Radiation sensor

Output : 0-2VDC
Range : 0 to 2000W/m2
Spectral Response : 400 to 1100 nm

Atmospheric Pressure Sensor

Detection Range : 15- 115kPa
Response time : 5 Sec.

Air Quality Sensor (PM2.5)

Detection Range : 10 - 500 ppm
Response time : 5 Sec.

Wind Speed Sensor

Speed : 0 to 20m/S
Resolution : 1m/S

Wind Direction Sensor : North, East, West, South,
North-East, East-South,
North-West, South-West

Rainfall : Tipping bucket in mm

UV Index Sensor

Response wavelength : 200nm-370nm
Response time : 5 seconds

Power Supply

Battery : 12V/40AH
Solar Panel : 75W

Wireless Transmission : GPRS Based
Cloud Services : 1 Year

The system should support to perform following experiments:

System should have Interactive SMART Dashboard software for display information(remote monitoring)

85. Solar Cell Based Sunlight Radiation Meter

85.1 Basic Diagram.

It should have following Technical Specifications:

- Microcontroller based measurement
- Low power consumption and 5V operating voltage
- Water and dust proof sensor casing
- Detection Range 0 to 1000/2000 w/m2
- Operating voltage: 5V
- 16x2 LCD output

Sensor connector -DIN type

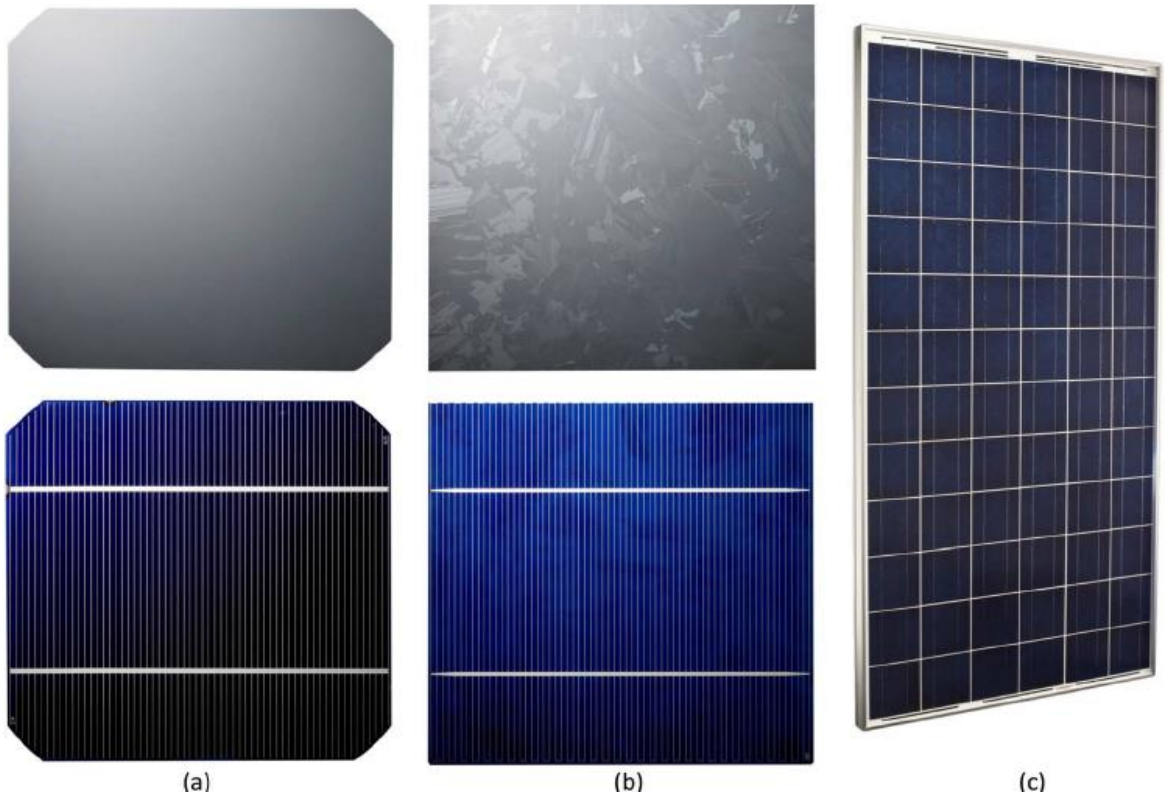
86. Magnetic Compass.

86.1 Basic Diagram.

86.2 Material – Plastic / Stainless Steel.
86.3 Type – Analog.
86.4 Color- multi-Color.
86.5 Weight – 100 to 150 g.
86.6 Shape – Round.

87. Cut Models of photo voltaic Cell Assembly.

87.1 Basic Diagram.



87.2 Material –Polycrystalline Cell – To demonstrate the open layer PV Cell internal parts

87.3 Bus Bar - 2.

87.4 Color- Blue.

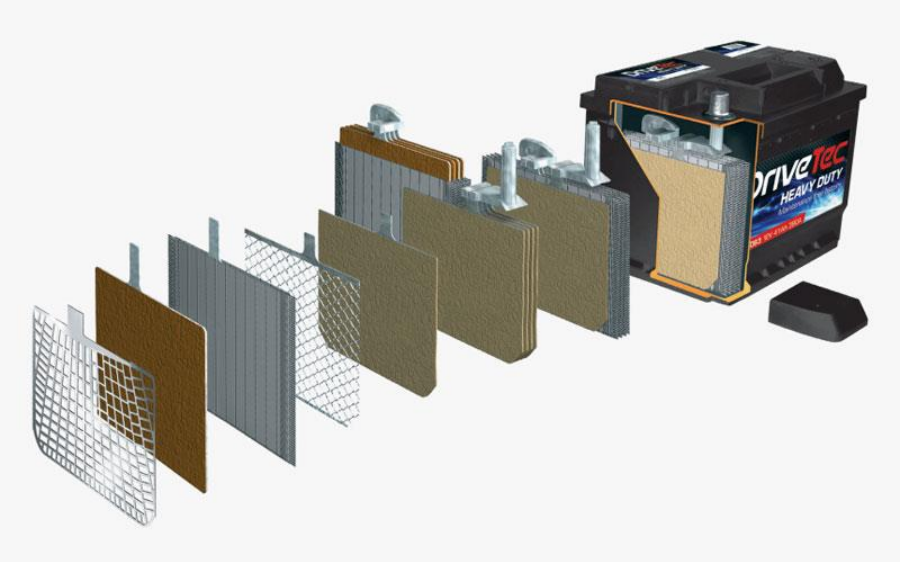
87.5 Grade - A.

87.6 Shape – Square.

87.7 Maximum Power Rating – 4.68 W.

88. Cut Model of lead Acid Battery.

88.1 Basic Diagram.



88.2 Lead acid battery container.
88.3 Planet plates or formed lead acid battery plates.
88.4 Faure plates or pasted lead acid battery plates.
88.5 Shape – Rectangle.
88.6 Maximum Power Rating – According to size of battery.

89. Lead Acid Battery.

89.1 Basic Diagram.

89.2 Type leads acid battery.
89.3 Color- Black Color Battery.
89.4 Voltage Rating - 12 Volt.
89.5 Power Rating – 40Ah, 75Ah.
89.6 Shape – Rectangle.
89.7 Maximum Power Rating – According to size of battery.

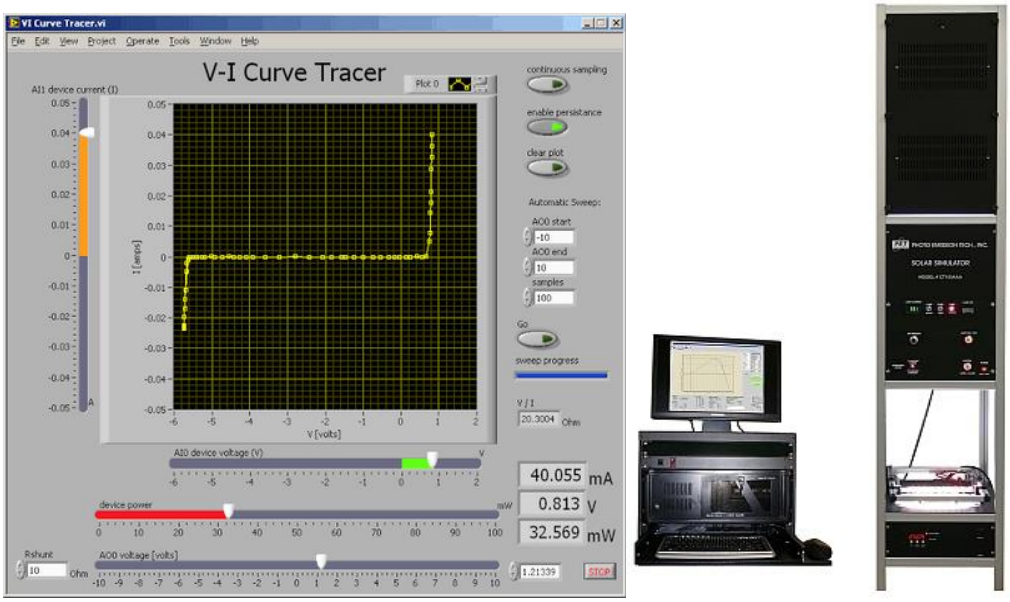
90. Lead Acid Battery.

90.1 Basic Diagram.

90.2 Type leads acid battery.
90.3 Color- Black Color Battery.
90.4 Voltage Rating - 12 Volt.
90.5 Power Rating – 100Ah.
90.6 Shape – Rectangle.
90.7 Maximum Power Rating – According to size of battery.

91. Solar Simulator for solar cell characteristic study.

91.1 Basic Diagram.



To study IV Curve of a solar cell of minimum 2 watt under variable illumination, temperature, and suitable load

91.2 Minimum power – 2Watt.

91.3 Simulation V-I Curve.

91.4 Simulation Output characteristic of Solar Cell.

91.5 I- V Curve under Different Temperature.

91.6 I- V Curve under Different Illumination.

- Digital Display for voltage and current measurement
- Quartz Halogen Lamp as a Light source, and a variable intensity Heater of 25 watt with Programmable temperature controller
- Solar Cell - Open Circuit Voltage (Voc) : 2V DC(approx)
- Short Circuit Current (Isc) : 180mA (approx)
- Quartz Halogen lamp: 220V, 50Watt (2 Nos.)
- Intensity Control: Variable (In five steps)

92. VI Curve Tester.

92.1 Basic Diagram.

It should have following key features:

- Micro-controller based display of 16X2 LCD
- PC Interface with Mains & battery operated
- Should have to measure Open Circuit Voltage and Short Circuit Current
- Should have to measure Maximum Voltage and Current

It should have following specifications:

Power Supply : +5V DC

DC Voltage Range : 0-50V

DC Current Range : 10A

93. Sun Path Finder.

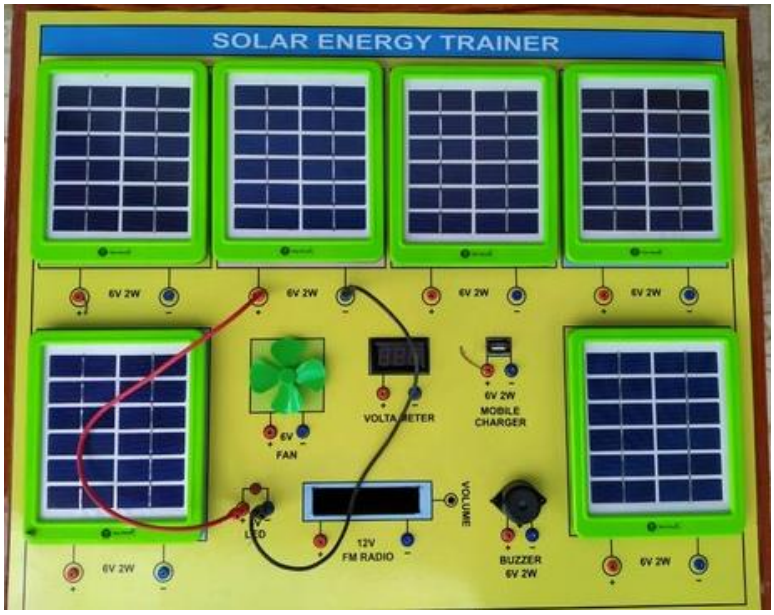
93.1 Basic Diagram.

Instrument have

- Dome section
- Instrument Section
- Base Section
- Sun path Diagrams (Northern Hemisphere/Southern Hemisphere)
  - Magnetic Declination Tab

94.Solar Energy trainer With Grouping of solar cells.

93.2 Basic Diagram.



To group (Series or parallel) at least 6 solar cells each with min. 2 Watt with suitable load
LCD – Voltmeter – 40volt , Ammeter – 3 A, Battery 12 volt, 4ah
Open Circuit Voltage (Voc) : 10V Short Circuit Current (Isc) : 0.60A, with sensing dusk to dawn
Maximum Power Voltage (Vmp) : 8.80V Maximum Power Current (Imp) : 0.57A Converter : Buck & Boost

94. Solar tracker Demonstrator kit.

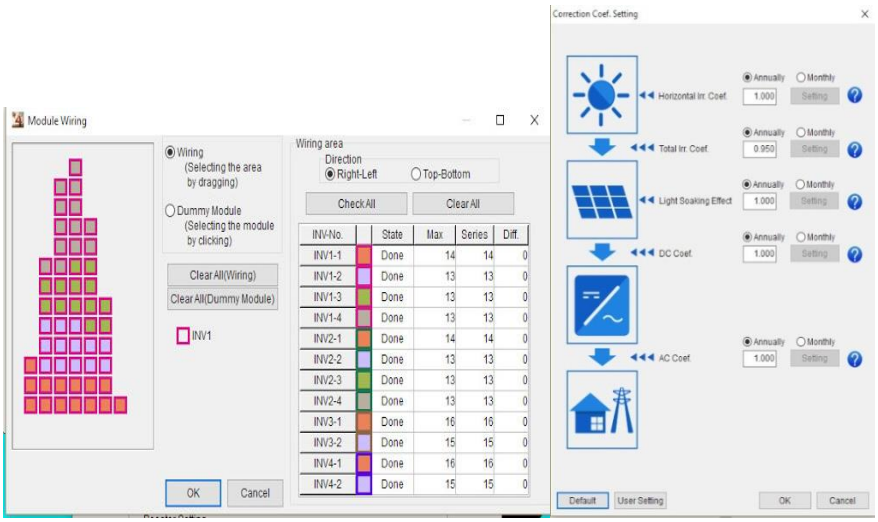
94.1 Basic Diagram.

To study manual and automatic control of 10W Solar panel in east west and north south and back

- Supply Voltage : 12V DC
- Solar Panel
- Maximum Output : 18W Power (Pm), Rechargeable Battery : 12V, 7Ah, Display : 20 x 4 LCD
- Light Sensor : Phototransistor Acceleration/Vibration : +5V @ 1ma current /Tilt Sensor – 3 Axis
- Complete training system to study the fundamentals of Solar Tracking based Tracking System
- Single-axis and Dual-axis Tracking
- Manual, Time and Auto Modes of operation in Single Axis Solar Tracking
- Emergency Motor Stop Switches
- Tilt Sensors for sensing angle of panel with respect to horizontal plane

95. Solar PV e-learning software using animation for training.

95.1 Basic Diagram.



Solar PV learning Software using animations for training (10 User)

The content should design by using platforms like Visual Basic, Dot Net, Flash etc. The module should comprise simulations, animations, videos, graphs, charts, along with mandatory rich content and theory to understand fundamental concepts, interactive learning objects, FAQ, MCQ, notes and questions bank etc. of Solar Technology. Renewable Energy topic should cover, Solar Energy, Solar Thermal Energy, Solar Photovoltaic Energy, Solar Radiation, Solar Spectrum at the Earth's Surface, The Sun and Earth Movement, Angle of Sunrays on Solar Collector, Sun Tracking. Measurement of Solar Radiation, Photovoltaic Design of Solar Cells, Solar PV Modules from Solar Cells, Mismatch in Series Connection, Mismatching in parallel Connection Design and Structure of PV Modules, PV Module Power Output, Solar PV System, Batteries for PV System, DC to DC Converters,, Charge Controllers, DC to AC Converters (Inverter), Maximum Power Point Tracking (MPPT)PV System Design, Introduction to Solar PV Systems, Stand- alone PV System Configurations, Design Methodology of PV Systems, Solar PV Application, Hybrid PV System, Grid- Connected PV System, Life Cycle Costing (LCC).

96. Halogen Lamp with stand for illumination of solar panels in lab.

96.1 Basic Diagram.

- Halogen lamp with stand for illumination of solar panels in lab
- Voltage rating: 0- 230 Volt AC Variable
- Power adjustment: 0- 1000W
- Watt Height : 6 feet maximum (adjustable)

97. Motorized Bench Grinder.

97.1 Basic Diagram.

AC Mains Operated

- Powerful, 600 W maintenance-free induction motor for superior grinding, deburring and sharpening jobs
- Robust, die-cast aluminium housing with encapsulated ball bearings keeps the motor dust free for durable performance
- Solid base ensures safe, stable working conditions
  Includes tool-free, adjustable workpiece supports, steel protective guards, and spark protective covers.
- Rated input power: 600 W
- Grinding wheel diameter: 200 mm
- Grinding wheel widths: 25 mm
- No-load speed: 3,600 rpm
- Grinding wheel bore: 32 mm

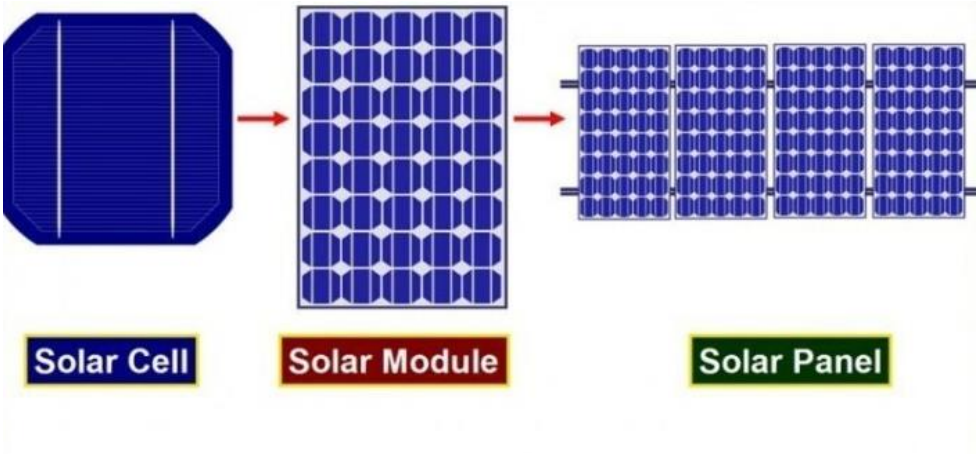
98. Battery Charger.

Battery Charger

- Basic Indicative Diagram
- Input: 230 V AC / 50 HZ
- Charging Mode: : Manual
- Output: 6/12 V
- Charging current: 2/10/40 A
- Boost/Start: 200 A
- Meter Display should be available
- Adapter battery capacity range: 4-400 AH
- Adapter battery: GEL/AGM/STD lead battery
- 12V FUL detection
- GEL Model: Voltage >13.8 ±0.2V & Current <0.8±0.5A, FUL
- AGM Model: Voltage >14.8 ±0.2V & Current <0.8±0.5A, FUL
- STD Model: Voltage >14.5 ±0.2V & Current <0.8±0.5A, FUL
- 6V FUL detection
- GEL Model: Voltage > 6.9 ±0.3V & Current <0.8±0.5A, FUL
- AGM Model: Voltage > 7.4 ±0.3V & Current<0.8±0.5A, FUL
- STD Model: Voltage > 7.2 ±0.3V & Current<0.8±0.5A, FUL

99. Solar Photovoltaic module.

99.1 Basic Diagram.



- Solar photovoltaic module
- 75 W mono crystalline module and
- 5W, 10W, 40W poly crystalline module

100. Solar Panels.

100.1 Basic Diagram.

Output Power: 225 Watts
Space Requirement: 10 sq. feet
Operating Voltage: 12 Volt
Panel Technology: Mono Perc (latest)
A+ Grade, anti PID Mono cells
Cell Conversion efficiency > 20%
1.4 meter wire for connection with MC4 connectors Inside

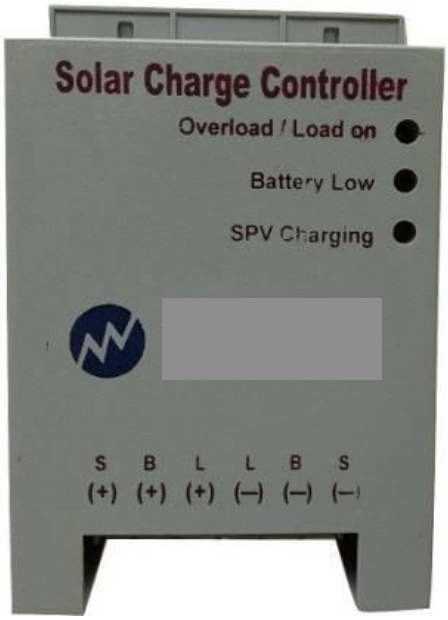
101. Solar Charge controller with Dusk to Dawn automatic switching.

101.1 Basic Diagram

- Solar Charge controller with Dusk to Dawn automatic switching
- 10 Amp 12V Solar Charge Controller,
- D2D, Auto ON/OFF at Night/Day PWM,
- Microcontroller based design.
- Battery monitoring for long battery Life.

102. Solar charge controller with manual switches (Day lighting).

102.1 Basic Diagram



Solar charge controller with manual switch (Day lighting)-12V, 10A

Solar controller should be specifically designed to meet the needs of the rural electrification market. It resulted from using the electronic technology and manufacturing. Product should be designed for reliability. The controller should have low failure rate and durable

The solar controllers should be protected with moisture-tight coating, minimizing damage from humidity and from nesting insects

102.2 Nominal Battery Voltage – 12V Auto.
102.3 Type – PWM.
102.4 Maximum Output Current – 10A
102.5 Maximum Input Power – 250 W.

103. Array junction box.

103.1 Basic Diagram

- for connecting min 250W x 4 Nos. solar panel with DC fuse,
- DC MCB, and surge suppressor protection
- Transparent type front lid

104. Solar lantern LED Type.

104.1 Basic Diagram.

Technical Specification:

- SOLAR LANTERN TRAINER
- SCOPE OF LEARNING:
- Study of Working Model of Street Lantern Operated by Solar Cell
- TECHNICAL SPECIFICATIONS:
- Power Supplies:
- Operated on Solar Power 12VDC, 50Hz +10%
- Digital/Analog Meters:
- Voltmeter
- Ammeter
- Components are mounted on the panels are:
- Solar Panels With Stand 60W
- PWM Controller
- LED Light as Load Switched Control.
- SALIENT FEATURES:
- Front panel built with high class insulated Bakelite sheet with Sticker well printed circuits and symbols.
- The trainer is housed in Metal cabinet.
- Instruction manual.
- Patch Cords 4mm (Heavy Duty)
- High Voltage Test Points are Provided With 4mm BTI-30 Terminals
- SCOPE OF SUPPLY:
- Solar Street Trainer
- Solar Cell Panels
- Stand For Holding the Solar Panels
- Battery
- Lantern With Stand
- Patch Cords 4mm Suitable

105. Solar lantern CFL Type.

105.1 Basic Diagram.

CFL Type
Type of Load : CFL, 1W Battery : Li- Ion battery Solar Panel – 5 Watt
Charging time: 7-8 hours with Solar Panel Operation : 2-3 hours at medium intensity
1 hour at high intensity
Intensity control (dimming)

106. Solar lantern assembly sets.

106.1 Basic Diagram.

A kit to be provided with all raw materials to assemble a LED Lantern.

107. Home light system.

107.1 Basic Diagram.

Home light system

- Lighting LEDs
- Backup time(approx.) :- Fan only 6+ hours after fully charged.
- Highly energy efficient.
- Low running cost.
- Multiple Mobile Charging facility.
- 12V, DC Fan.
- SOLAR CHARGER CONTROLLER
- FM RADIO
- 18W SOLAR PANEL
- WOODEN BOX

108. Solar cell kit.

108.1 Basic Diagram.

- Solar cell kit
- Specification:
- Solar Panel: Consists of 6 solar cells, can be interfaced to trainer board by using 4MM BANANA connector
- Maximum Voltage of each solar cell: 1.5V approx...
- Maximum Current of each solar cell: 150mA approx...
- Voltmeter: 0-10V
- Ammeter: 0-500mA
- Potentiometer: 1 number
- 2 AA Rechargeable NiCd Battery: 1.2V
- Bulb : 1.2V, 270mA
- Fan : 1.5V, 400mA
- FM Band Radio : 12V
- On board voltmeter and ammeter are provided to measure the voltage and current respectively, during various modes of operation Charging the batteries using solar energy

109. Clinometer.

109.1 Basic Diagram.

Clinometer : for Angle measurement

Measures angles accurately and quickly from 0-90 degrees in any quadrant

110. Spirit level.

Spirit Level - 300 mm

Basic Indicative Diagram

- Size: 300 mm
- Accuracy: 0.50 mm/ meter
- Precision milled base for high accuracy
- Have a solid spirit bulb which doesn't break easily.
- The Aluminum frame should be strong and precision extruded which increases accuracy and strength of the Spirit levels.
- Two spirit bulbs to be provided so that it can be used horizontally & vertically
- Rubber molding is provided on the sides of the spirit levels to prevent damage to the body of the spirit levels.
- Magnet should be provided at the base

111. Anemometer.

Anemometer - Digital Type

Basic Indicative Diagram:

- Wind Speed: 0～30m/s
- Resolution: 0.1m/s
- Accuracy: ±5% rdg + 5dgts
- Wind Scale: Level 0~12
- Temperature: -10˚C - 50˚C,
- Accuracy ±1˚C
- Sampling rate: 0.5s
- Overload Protection: >45m/s
- MAX/AVG: Should Be Available
- Data Hold: Should Be Available
- Auto Power Off: Should Be Available
- LCD Backlight: Should Be Available
- Low Battery Indication: Should Be Available
- Drop Test: 1 m Height
- Display Units: Short press switch between m/s, ft/m, mph, Km/h, Knots, ˚C, ˚F
- Battery: 4.5V
- Safety: EN61326-1
- Pollution Level: 2
- Current Consumption:
    - Working: ≤25mA
    - Power off: ≤10uA
- Working Environment:
    - Temperature: 0～40˚C
    - Humidity: ≤80%RH
- Accessories:
    - Operating Manual
    - Calibration Certificate
    - Plastic or Wooden Carrying Case with required cushioning, Required Batteries

112. DC table fan.

112.1 Basic Diagram.

112.2 Type – Table Fan.
112.3 DC Power Supply – 12 V
112.4 Color – Multi Color.

113. A.C. Voltmeter M.I.

Voltmeter - MI - 0 - 300 - 600 V

Basic Indicative Diagram

- Range: 0 - 300 - 600 V
- Type: Moving Iron AC - Analog
- Input: 600 V
- Accuracy: Class 1.5
- Should be moving iron, panel meters
- Should be housed in molded polycarbonate cases
- Should be suitable for the measurement of AC currents and voltages in the usual frequency range of 15...100Hz.
- Front window glass and bezel should be easily replaceable.
- Should have nearly Linear scale Scale should have interchangeability Should be easy installation with swivel screws
- Should have glass filled polycarbonate housing (UL 94-V-0) Knife edge pointer.
- Should have self lifting terminal clamp assembly
- Should have IP 52 protection
- Movement
    - Moving Iron movement should have pivots of very high hardness. Movement should be suspended between spring loaded Sapphire Jewels.
    - Movement should have properly shielded & critically damped by eddy currents induced in coil former.

114. Volt meter (0-30V).

Voltmeter - MC - 0 - 30 V, Analog

Basic Indicative Diagram

- Range: Moving Coil - 0 - 30 V,
- Type: Moving Coil DC - Analog
- Input: 30 V
- Accuracy:, Class 1.5
- Should have linear scale Should be easily replaceable glass and bezel Scale should have interchangeability
- Should be easy installation with swivel screws
- Should have Glass filled polycarbonate housing (UL 94-V-0) Knife edge pointer. Self lifting terminal clamp assembly
- IP 52 protection
- Wide measurement band - 10 to 100% of FSD
- Movement
    - Moving coil movement should have pivots of very high hardness.
    - Movement should have suspended between spring loaded Sapphire Jewels.
    - Movement should have properly shielded & critically damped by eddy currents induced in coil former.

115. Volt meter (0-100V).

Voltmeter - MI - 0 - 150 V

Basic Indicative Diagram

- Range: 0-150 V
- Type: Moving Iron AC - Analog
- Input: 150 V
- Accuracy: Class 1.5
- Should be moving iron, panel meters
- Should be housed in molded polycarbonate cases
- Should be suitable for the measurement of AC currents and voltages in the usual frequency range of 15...100Hz.
- Front window glass and bezel should be easily replaceable.
- Should have nearly Linear scale Scale
- should have interchangeability
- Should be easy installation with swivel screws
- Should have glass filled polycarbonate housing (UL 94-V-0) Knife edge pointer.
- Should have self lifting terminal clamp assembly
- Should have IP 52 protection
- Movement
    - Moving Iron movement should have pivots of very high hardness.
    - Movement should have suspended between spring loaded Sapphire Jewels.
    - Movement should have properly shielded & critically damped by eddy currents induced in coil former.

116. Ammeter MC (0-1A).

Ammeter - MC - 0 - 1 A, Analog

Basic Indicative Diagram

- Range: Moving Coil, 0 - 1 A, Analog
- Type: Moving Coil DC, Analog
- Input: 1 A
- Accuracy: Class 1.5
- Should have linear scale Should be easily replaceable glass and bezel
- Scale should have interchangeability
- Should be easy installation with swivel screws
- Should have Glass filled polycarbonate housing (UL 94-V-0) Knife edge pointer
- Self lifting terminal clamp assembly
- IP 52 protection
- Wide measurement band: 10 to 100% of FSD
- Movement:
    - Moving coil movement should have pivots of very high hardness
    - Movement should have suspended between spring loaded Sapphire Jewels
    - Movement should have properly shielded & critically damped by eddy currents induced in coil former

117. Ammeter MC (0-5A).

Ammeter - MC - 0 - 5 A, Analog

Basic Indicative Diagram

- Range: Moving Coil, 0 - 5 A, Analog
- Type: Moving Coil DC, Analog
- Input: 5 A
- Accuracy: Class 1.5
- Should have linear scale
- Should be easily replaceable glass and bezel
- Scale should have interchangeability
- Should be easy installation with swivel screws
- Should have Glass filled polycarbonate housing (UL 94-V-0) Knife edge pointer.
- Self lifting terminal clamp assembly
- IP 52 protection
- Wide measurement band: 10 to 100% of FSD
- Movement
    - Moving coil movement should have pivots of very high hardness
    - Movement should have suspended between spring loaded Sapphire Jewels
    - Movement should have properly shielded & critically damped by eddy currents induced in coil former

118. Ammeter MC Centre zero (0 – 20A).

118.1 Basic Diagram.

118.2 Measurement Range - 0-20A Analog.
118.3 Type – MC Type.
118.4 Input – 20A.
118.5 Accuracy Level – Class 1.5.
118.6 Protection – IP52.
118.7 Wide Measurement Band – 10 to 100 % of FSD.

119. Ammeter MC Centre zero (0 – 50A).

119.1 Basic Diagram.

119.2 Measurement Range - 0-50A
119.3 Type – MC Type.
119.4 Accuracy Level – Class 2.5

120. Power Factor Meter.

Power Factor Meter - 240 V, 10 A, Single Phase
Basic Indicative Diagram

- Should have On Site Programmable PT/CT Ratios
- Should work on 230 V AC Supply
- Should have User Selectable Power Parameter (Active / Reactive /Apparent)
- True RMS Measurement: The instrument should measure distorted waveform up to 15th harmonic
- LED Display
  - High Brightness
  - Single line four digit
  - Digit heights 20 mm
- Should have very low back depth (behind the panel) of less than 80 mm
- Input Voltage
  - Nominal Input Voltage (AC RMS): Phase-Neutral 57.7 - 277V L-N (Line-Line 100 - 480V L-L)
  - Max Continuous Input Voltage: 120% of rated value
- Input Current
  - Nominal Input Current: 5A AC RMS
  - External CT (10/5) to be connected to meter to stepdown current to 5A
- Operating Range
  - Voltage: 5%....120% rated Value
  - Current: 5%....120% rated Value
  - Frequency: 45.....70Hz
  - P.F: 0.5 Lag...1...0.5 lead for kW, kVAr DPM / 0.1 Lag...1...0.1 lead for PF DPM
- Accuracy-Power Factor: ±2° (0.1 Lag...1...0.1 Lead)
- Environmental
  - Operating Temperature: -10 to + 55°C
  - Storage temperature: -20 to + 65°C
  - Relative humidity: 0...90% non condensing
  - Warm up time: Minimum 3 minute
  - Shock: 15g in 3 planes
  - Vibration: 10...55 Hz, 0.15mm amplitude
  - Enclosure: IP54 (front face only)

121. Rheostat.

Rheostat - 0 - 10 Ohm

Basic Indicative Diagram

- Open type slide wire type
- Suitable to be used as series resistors or potentiometers.
- Oxidized Constantan wire is wound on pipe to give perfect insulation.
- Three 4 mm socket terminals are provided.
- Supports are made of ABS molded.
- Diameter: 43 mm (±10%)
- Length: 300 mm (±10%)
- Resistance: 10 ohms (±10%)
- Current Ratings: 5 Amps (±10%)

122. A.C. Energy Meter (Single Phase).

Energy Meter - Single Phase, 5 - 20 A, 240V

Basic Indicative Diagram

- Type: 96mm X 96mm Panel Mounted Kilowatt Hour Meter
- Should work on 230 V AC Supply
- Accuracy: Class 1.0 accuracy
- Should have auto-resetting 8 digit seven segment LED counter
- Should provide LED indication for healthy phase, load reverse current.
- Applicable to Standards IEC 62053-21 Ø
- True RMS measurement
- Fully programmable CTratios
- Fully programmable PTratios
- Fully isolated current input
- Built in transient protection
  - State of art SMD technology
- Pulse output: one potential free relay contact
- Remote data reading through modbus (RS 485)
  - Programmable Energy format & Energy rollover count
- Input Voltage PT Secondary Settable Range:
  - 110V L-L (63.5V L-N)
  - 100V - 120V L-L (57V - 69V L-N)
  - 230V L-L (133V L-N)
  - 121V - 239V L-L (70V - 139V L-N)
  - 415V L-L (239.6V L-N)
  - 240V - 480V L-L (140V - 277V L-N)
- Input Current
  - Nominal input current: 5A AC RMS
  - External CT (20/5) should be connected to meter to stepdown current to 5A
- Display
  - Counter: 8 digit seven segment LED display
  - Reading resolution: Auto ranging
  - Display Height: 9 mm
- Environmental
  - Operating temperature: : -10 to +55°C
  - Storage temperature: -20 to +65°C
  - Relative humidity: Vibration 0... 90% non condensing

- Warm up time Minimum: 3 minute
- Shock: 15g in 3 planes
- 3 minute 10... 55 Hz,

123. A.C. Energy Meter (3 phase).

Basic Indicative Diagram

- Type: 96mm X 96mm Panel Mounted Kilowatt Hour Meter
- 3 Phase, 4 Wire
- Accuracy: Class 1.0 accuracy
- Should have auto-resetting 8 digit seven segment LED counter
- Should provide LED indication for healthy phase, load reverse current.
- Applicable to Standards IEC 62053-21 Ø
- True RMS measurement
- Fully programmable CT ratios
- Fully programmable PT ratios
- On site programmable 3 phase 4 wire or 3phase 3 wire
- Fully isolated current input
- Built in transient protection
- State of art SMD technology
- Pulse output: one potential free relay contact
- Remote data reading through mod bus (RS 485)
- Programmable Energy format & Energy rollover count
- Input Voltage PT Secondary Settable Range:
    - 110V L-L (63.5V L-N)
    - 100V - 120V L-L (57V - 69V L-N)
    - 230V L-L (133V L-N)
    - 121V - 239V L-L (70V - 139V L-N)
    - 415V L-L (239.6V L-N)
    - 240V - 480V L-L (140V - 277V L-N)
- Nominal input current: 5A AC RMS
    - External CT (30/5) to be connected to meter to stepdown current to 5A
- Display
    - Counter: 8 Digit seven segment LED display
    - Reading resolution: Auto ranging
    - Display Height: 9 mm
- Environmental
    - Operating temperature: -10 to +55°C
    - Storage temperature: -20 to +65°C

124. Kilo Wattmeter Analog.

Basic Indicative Diagram

- Range: Watt Meter - 3 KW, Analog
  - Accuracy: Class 1.5
- Should work with 230 V Single Phase Power Supply
- External CT (15/5) to be connected to meter to stepdown current to 5A
- Should be suitable to indicate forward (export/outgoing) and reverse (import / in coming) power flow. Should be suitable to be used both on sinusoidal and non - sinusoidal current. These meters offer several advantages in Switchboard and Generating Set panels.
- Should have less VA burden
- Should have Linear scale
- Should have glass filled polycarbonate housing (UL 94-V-0)
- Should have knife edge pointer
- Should be easily replaceable glass and bezel
- Movement
  - Moving coil movement should have pivots of very high hardness.
  - Movement should have suspended between spring loaded Sapphire Jewels.
  - Movement should have properly shielded & critically damped by eddy currents induced in coil former.

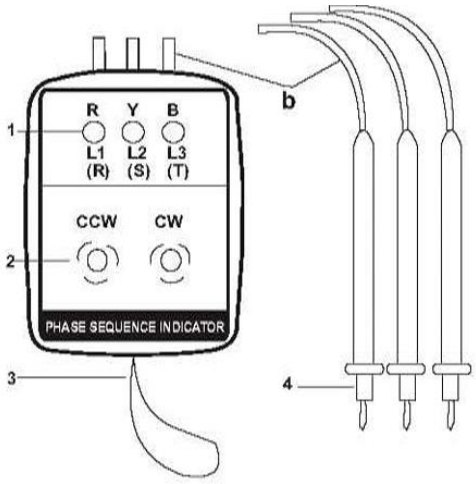
125. Digital Wattmeter.

Basic Indicative Diagram

- Range: Watt Meter - 1 KW, Digital
- 96mm x 96mm panel mounted kilowatt hour meter
- Should work on 230 V AC Supply
- Accuracy: Class 1.0 accuracy
- Should have auto-resetting 8 digit seven segment LED counter
- Should provide LED indication for healthy phase, load reverse current.
- Applicable to Standards IEC 62053-21 Ø
- True RMS measurement
- Fully programmable CTratios
- Fully programmable PTratios
- Fully isolated current input
- Built in transient protection
- State of art SMD technology
- Pulse output: one potential free relay contact
- Remote data reading through modbus (RS 485)
- Programmable Energy format & Energy rollover count
    - Input Voltage PT Secondary Settable Range
    - 110V L-L (63.5V L-N)
    - 100V - 120V L-L (57V - 69V L-N)
    - 230V L-L (133V L-N)
    - 121V - 239V L-L (70V - 139V L-N)
    - 415V L-L (239.6V L-N)
    - 240V - 480V L-L (140V - 277V L-N)
- Input Current:
    - Nomnal input current: 5A AC RMS
    - External CT to be connected to meter to stepdown current to 5A Display
    - Counter: 8 digit seven segment LED display
    - Reading resolution: Auto ranging
    - Display Height: 9 mm

126. Phase Sequence Indicator.

Basic Indicative Diagram



- Should measure the Phase sequence (R, Y, B) & Open phase Condition through LED and Buzzer.
- Operational Voltage: 60 ~ 600V (3 phase AC)
- Dielectric Strength (internal design): 2000V / minute (impulse Voltage 4000V)
- Measuring Frequency Range: 20Hz ~ 400Hz
- Time limit for continuous: 60 min. at 200V AC, 4 min. at 600V AC
- Test Leads: 3 color Test leads for Phase identification
- LED Indications with Buzzer: Correct Phase, Reverse Phase, Open Phase
- Accessories
    - Test leads (fit to meter) with Pin Terminal
    - Separate Insulated Crocodile Clips
    - Carrying Case
    - User Manual
- Dimensions: 85 (L) X 60 (W) X 25 (H) (excluding the test leads) (±10 %)
- Net Weight: Approx. 160 Grams (±10%)

127. Frequency Meter.

Basic Indicative Diagram

- Voltage Rating: 115; 230; 420V (Triple Range)
- Test Voltage: 2000V, AC for 1 minute.
- Insulation Resistance (design): More than 20MΩ at 500V DC.
- Casing: ABS White with narrow black ring.
- Accuracy: ±0.5 Hz as per I.S.S. 1248-84, BSS 89-81
- Ranges: 45-50-55 Hz
- Dimensions in mm (±10%): 95 X 75 X 95

128. DC LED Lamp.

128.1 Basic Diagram.

128.2 DC LED Lamp (3W).

- 128.2.1 Voltage – 12V DC.
- 128.2.2 Light Type – LED.
- 128.2.3 Material – Polycarbonate.
- 128.2.4 Illumination – 300 Lumen.

128.3 DC LED Lamp (5W).

- 128.3.1 Voltage – 12V DC.
- 128.3.2 Light Type – LED.
- 128.3.3 Material – Polycarbonate.
- 128.3.4 Illumination – 500 Lumen.

128.4 DC LED Lamp (10W).

- 128.4.1 Voltage – 12V DC.
- 128.4.2 Light Type – LED.
- 128.4.3 Material – Polycarbonate.
- 128.4.4 Illumination – 1000 Lumen.

129. DC Pump (24 V).

129.1 Basic Diagram.

- 24V 40LPM 150-200W Self Priming 6.5Amps 1" line. Running Time : 20min Rest : 10 min
- 24V 40LPM Self Priming Powered 200W
- Discharge Head 8-10Mtr & Suction 5Mtr

130. PWM Controller.

130.1 Basic Diagram.

- Control Panel: Enclosure consist of high grade FRP material to provide utmost safety to the users
- Solar PV Module: Poly Crystalline Technology Wattage - 40 watt,
- Charge controller: PWM type with reverse polarity protection for battery as well as load
- A embedded DPM to be provided for voltage & Current measurement at Input & output side
- Battery: 12V, 7.5Ah Load: DC lamp

.

131. MPPT Charge Controller.

131.1 Basic Diagram.

Product Features
Performance analysis by comparing the output of the PV module with MPPT Charge Controller
Display units for Voltage and current measurement.
System integrated with MPPT charge controller along with the batteries.
Simple variable load demonstration by varying the rheostate.
Scope of Learning
Find out the efficiency of MPPT based charge
controller at different load conditions
Performance analysis of MPPT type charge
controllers.
Study the effect of change in voltage and current
of solar panels by series and parallel connections.
Technical Specifications
Control Panel :Control board consist of high grade FRP material to provide utmost safety to the users Switches & Connectors: BS10 Safety Terminals
Solar PV Module :40 W Poly Crystalline Technology
Charge Controller :MPPT – Charge Controller with reverse polarity protection for battery as well as load
DC Voltmeters :0-300 VDC
DC Ammeter :0-20 Amp.
Battery :12V, 42Ah
Load :Load Type : Resistive rheostat 110W 8Amp

132. Inverter with Battery (1 KVA).

132.1 Basic Diagram.

132.2 Input Supply – 12 V DC.
132.3 Output Voltage – 220 V AC.
132.4 Battery – 12 V.
132.5 Operating Voltage – 100 – 290V.
132.6 Charge Controller Rating - 40 Amp/12V, with 98% efficiency for fast charging.
132.7 Battery Capacity – 150AH

133. Solar PCU (1 KW).

133.1 Basic Diagram.

- Off grid 1KW MPPT sine wave solar power conditioning unit
- Solar panels: 1000Watt Type - Polycrystalline Battery 100Ah: 4 Nos. Charge Controller: inbuilt Inverter: 1kVA
- Control Panel with Inverter Capacity: 1000VA, Solar Battery Capacity: 12V/100Ah Type: C10, Qty : 4 Nos., Solar PV Module input: 24–50V Current: 40A
- Battery voltage i/p: 24V Technology: PWM based MPPT
- DC Voltmeter: 0-300V (2 number) DC Ammeter: 0-40A (3 numbers)
- Multi-Function Meter: Voltage-10-230V Current-100mA-5A ,Watt-10-1200W
- Energy meter Display Resolution- 0.001kWh Frequency-50Hz
- Solar Panel structure – GI material with C clamps

134. Solar Grid tied inverter Demonstrator kit (300W).

134.1 Basic Diagram.

- Solar Grid tied Inverter Demonstrator Kit(On Grid Solar Power Generation and Training System)
- This training system should have following technical specifications:
- Solar panel
- Power : 1000Wp
- Type - Polycrystalline
- Single phase grid tied inverter - inbuilt
- Rated output power : 1kW
- Max DC input voltage : 450V
- Max DC input current : 10A
- MPPT operation range: 50V-400V

- Rating grid voltage: 230Vac
- Grid voltage range : 180Vac-230Vac
- Grid rating output current : 4.3A
- Rating grid frequency: 50/60Hz
- Topology : Transformer less
- Protection: DC reverse polarity, AC short circuit, etc.
- Digital meters
- DC voltmeter : 300V
- DC ammeter : 20A
- AC voltmeter : 450V
- AC ammeter : 10A
- Bidirectional energy meter: 1no.
- Multifunction meter: 1no.
- Terminals – BS 10 safety type with Patch cords
- Protection devices
- DCDB (DC distribution): 1no.
- ACDB (AC distribution): 1no.
- Structure for Solar Panel
- Material: GI
- Assembly: Detachable and easy to install

The system should support to perform following experiments:

- To study grid tied solar power generation and its application.
- To study site assessment and planning before solar PV installation.
- Understand IV characteristics of solar panel.
- Understand the reverse metering technique.
- Understand the effect of tracking on solar power generation system.
- Understand effect of shadow on solar PV system.

135. Solar Street Light.

135.1 Basic Diagram.

Solar Street Light

Smart Solar Street Lighting Training Platform

The Training Platform should have following key features:

1. Complete training system to enhance skills set required to work in different technology segments of SMART Solar LED Street Light.
2. Real time Remote Monitoring of parameters like – Temperature, humidity, air quality, motion data through sensors
3. On/OFF Status of light pole on console
4. Skilling system should come with preloaded learning software including animations, simulations to understand the Solar PV technology.

It Should have following Technical Specs:

Processor : 64bit cortex A53 ARMv8 Quad core processor 1.4GHz

Connectivity : 802.11 b/g/n Wireless LAN, bluetooth 4.1, zigbee, USB & Ethernet

RAM : 1GB LPDD2

Memory : 32GB

OS : Linux

Ethernet : 10/100 base T Ethernet socket

Video output : HDMI and composite RCA

USB port: 4 nos.

Smart pole and node

Microcontroller : ATMega2560

Sensors and actuator connector: 10 nos.

Digital input/output pins: 34 nos.

Analog input pins: 16 nos.

UART: 2 nos.

I2C: 1 no.

Switch faults: 30 nos.

Test points: 30 nos.

Power Supplies : 5V and 3.3V

Variable potentiometer : 1 no (10K)

Switches: 3 nos.

Digital voltmeter and ammeter : 0 - 25V/10A

Buzzer and LED : 1 no. each

Color LCD : 1.77 inch

USB : 2.0

Wi-Fi module: 1no. (2.4GHz)

Zigbee transceiver: 1no. (2.4GHz/63mW)

Flash memory : 256 kb of which 8 KB used by boot loader

SRAM : 8 KB

EEPROM : 4 KB

Clock speed : 16 MHz

PIR sensor : TTL

Temperature sensor : 0 - 100° C

Humidity sensor : 0 – 100 %RH

Air quality sensor : PM, PM2.5, PM10

Ambient light sensor : Analog output

Solar panel : 40W

Battery : 12V, 26 Ah

Charge controller : 12V, 0.7A

LED light : 10W

Rheostat : 100 Ohm, 3A

MCB : 16A

DC ammeter : 5A

DC voltmeter : 100V

Battery level indicator

display : 8-70V

Power Supply : 110V - 260V AC, 50Hz

136. Solar, Wind and Hybrid Power Plant (1 KW).

136.1 Basic Diagram.

Solar-Wind Hybrid Power Plant

Technical Specifications Solar Panel

Power : 1 kW

Structure – GI material based with C clamps

Solar battery: 4nos.

Capacity : 100Ah

Wind Turbine

Wind Turbine : 300 watt(Design specification)

Charging Current: 0.3 - 0.4A approx.

Generator voltage : 12V

Actual Output Power : 10W - 15W (Maximum power generated at wind speed of 5.5 m/sec while indoor testing)

Blades: 3nos.

Rotor : Three FRP blades along with standard steel nut-bolts

Structure : 5 feet, MS structure with floor stand

Hybrid charge controller Quantity: 1no.

Voltage : 24V Hybrid Inverter Capacity : 1000VA

Input Voltage : 190~260V

Output voltage : 210~245V (inverter mode)

Output frequency : 50Hz (inverter mode)

Output waveform: Modified sine wave (inverter mode)

Protection: Overload & short circuit

Technology: Microcontroller based design Digital meters

AC voltmeter : 450V

AC ammeter : 10A

DC voltmeter : 300V

DC ammeter : 40A

AC multifunction meter

Measurements : AC voltage, AC current, Frequency, Power, kWH

AC/DC Resistive (Lamp Load) Load range: 0 - 1.2 kW, in steps of 100 W, it should have onboard 10A digital ammeter.

Terminals – BS 10 safety type

Rheostat – 50 ohm, 15A Installation and Civil Work should be included

Blower for wind turbine – should be capable to generate the wind speed upto 5.5m/s

It should be able to perform following experiments The Geography behind Solar PV installation

- Site assessment and planning before Solar PV installation
- Understanding the Sun position and tilting of Solar PV module as per location
- Analysis of voltage and current and power generation

- Effect of shadow on Solar PV system
  Measurement and Analysis of Different parameters of Solar PV Module

- Open circuit voltage (Voc) of Solar PV module
- Short circuit current (Isc) of Solar PV module
- Parameters measurement with parallel Solar PV modules
- Parameters measurement with series Solar PV modules
  I-V characteristics of PV Module Estimating Solar PV system

- Load Estimation and calculation
- Basics of MPPT
- Efficiency calculation of Charge Controller
  Inverter & Batteries

  Testing of Inverter

- Analysis of the effect of dust on Solar PV module Analysis of the effect of temperature on Solar PV module
- Safety and Precaution for installation of Solar PV System.

137. Solar Traffic Light.

137.1 Basic Diagram.

Solar Traffic Light

12V, 75Ah battery, 75 Wp solar panel, 12V, 10A dusk to dawn charge controller, 15 W LED lights with suitable colors and 9 m height pole all dismountable

Scope of Learning:

- Study of Working Model of Traffic Light Operated by Solar Cell
- TECHNICAL SPECIFICATIONS:

Power Supplies:

- Operated on Solar Power 12VDC, 50Hz +10%

Digital Meters:

- Voltmeter
- Ammeter

Components are mounted on the panels are:

- Solar Panels With Stand 50W
- PWM Controller
- Traffic Light as Load Switched Control.

SALIENT FEATURES:

- Front panel built with high class insulated Bakelite sheet with Sticker well printed circuits and symbols.
- The trainer is housed in Metal cabinet.
- Instruction manual.
- Patch Cords 4mm (Heavy Duty)
- High Voltage Test Points are Provided With 4mm BTI-30 Terminals

SCOPE OF SUPPLY:

- Solar Traffic Light Trainer
- Solar Cell Panels
- Stand For Holding the Solar Panels
- Battery
- Traffic Light With Pole
- Patch Cords 4 mm Suitable

138. Used water treatment solar plant demonstrator kit

138.1 Basic Diagram.

Waste /Used Water Treatment by Electro Coagulation, 1 litre capacity
Microcontroller based Constant Current Power Supply with LCD ,

- Transparent Tank for better visibility of process,
- Aluminum and Stainless Steel Electrodes for comparative study,
- Filters : Sand and Charcoal Electrodes,
- Solar Panel Power: 75 Watt,
- CC Power supply – 3A ,
- Meters :PH meter , TDS meter (handy to be provided for measurements)

139. Solar DC pump with Solar Panel

139.1 Basic Diagram.

139.2 Solar DC Pump Capacity – 1HP.
139.3 Solar Pump Type – DC Submersible.
139.4 Solar Panel – 990with W.
139.5 Open Circuit Voltage – 90 - 140V DC.
139.6 Maximum Peak Voltage – 110V DC.
139.7 Maximum Input Current – 8.2A.
139.8 Output Voltage – 30 – 85V.
139.9 Input Power – 990W DC.
139.10 Installation with Suitable Panel

140. Demonstration kit for wind generation (Wind turbine with blower).

140.1 Basic Diagram.

WIND BLOWER & WIND TURBINE

Demonstration kit for wind generation (Wind turbine with blower/Fan)

Specifications:

Technical Specifications Wind Turbine

- Power rating : 300Watt(design specification)
- Actual Output Power : 10W - 15W (Maximum power generated at wind speed of 5.5 m/sec while indoor testing)
- Generator output :24V
- Current – Approx. 0.3 to 0.4A
- Blades: 3nos.
- Rotor: Three FRP blades along with standard steel nut-bolts & GI coated turbine
- Structure :5ft, MS structure with floor stand
- Wind charge controller
- Voltage :24V
- Protection: Overload and low-battery protection

- Storage battery (2nos)
- Capacity :26 AH
- Inverter Capacity :750VA
- Input voltage :190~260V
- AC output voltage: Same as input (mains mode)
- Output voltage :210~245V (Inverter Inverter)
- Output frequency :50Hz ±0.1Hz (Inverter mode)
- Output waveform: Modified Sine wave (Inverter mode)
- Technology: Microcontroller based design
- Digital meters
- AC voltmeter :500V
- AC ammeter :10A
- DC voltmeter :300V
- DC ammeter :40A
- AC multifunction meter
- Measurements :AC voltage, AC current, frequency, power, kWH
- Terminals – BS10 type for safety
- Accessories
- AC Load – LED lamp type
- Lamps – 2 no. of 10 watt
- Blower – should generate the wind speed of approx. 5.5 m/s in the lab

141. Dischargeable Battery (12V 100Ah).

141.1 Basic Diagram.

Rechargeable battery 12V,100AH

141.2 Voltage – 12V.

141.3 Capacity – 100Ah.

142. Dischargeable Battery (12V 7Ah).

142.1 Basic Diagram.

Rechargeable battery 12V,7 AH

142.2 Capacity – 7Ah.

143. Rechargeable Battery (6V 5Ah).

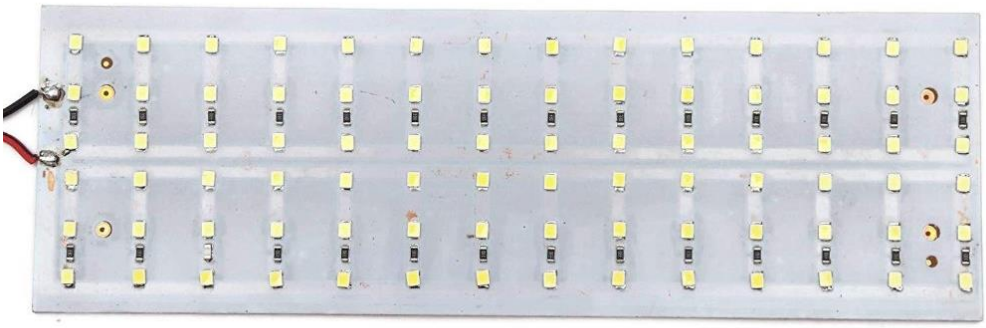
143.1 Basic Diagram.

143.2 Voltage – 6V.

143.3 Capacity – 5Ah.

144. LED Lights (12V DC).

144.1 Basic Diagram.



144.2 Voltage – 12V.
144.3 Light Type – LED.
144.4 Input Supply – DC.

145. LED Lights (6V DC).

145.1 Basic Diagram.

145.2 Voltage – 6V.
145.3 Light Type – LED.
145.4 Input Supply – DC.

146. Rubber Gloves.

Basic Indicative Diagram

- Class 0 electrical rubber gloves
- Made from natural rubber
- Length: 13 to 14 inch long
- Gloves should be flexible
- Thickness of latex should be less than 1 mm.
- Gloves should be ISI certified

147. Cotton gloves.

Basic Indicative Diagram

- Made from cotton fiber
- One side dots printed for better gripping
- Approximate Weight - 90 gms per pair
- Size - 8 inch (Approx.)
- Elastic Length 2 inch

148. Gum Boots.

Basic Indicative Diagram

- Colour: Black
- Material: upper soft PVC and sole hard PVC
- One piece moulded
- Features: Oil, Acid, Alkali resistant
- Flexible gum boot
- Size: 7 and 8 (equal quantity)

149. Safety Goggles.

Basic Indicative Diagram

- Help provide limited impact protection from flying particles
- Hard-coated polycarbonate lens offers 99% UV protection
- Meets ANSI Z 87.1 standards
- Lightweight, contemporary style
- Adjustable temple Eye protection against dust & impact
- Universal size

150. Safety Helmet.

Basic Indicative Diagram

- Made from polypropylene material (PPCT).
- Should be provided with gear system
- Should be provided with foam for absorbing sweat
- Should be provided with ventilation
- Should be provided with nylon strap
- Should be made from all virgin material
- CE approved
- Color: Yellow

151. First Aid kit.

151.1 Basic Diagram.

152.1 Material – Plastic.
152.2 Weight – 500 to 600 g.
152.3 Size – 11*08 cm
152.4 Color- Multi Color.
152.5 Shape - Rectangular.

152. Fire Extinguisher CO2

152.1 Basic Diagram.

153.2	Capacity (In Kg)	02 Kg
153.3	IS Specification	2171
153.4	Jet Range (In Mtrs.)	4-5
153.5	Discharge Time (In secs.)	15-20
153.6	Min. Discharge Quantity	90%
153.7	Seal of Approval	IS

153. Wiring Board.

153.1 Basic Diagram.

Length 3 m x Width 1 m with 0. 5 m projection on the top

1. Single Phase energy meter : 01 no.
2. MCB Box MC 4 Way : 01 no.
3. MCB DP 32A : 02 nos.
4. MCB SP 10A : 02 nos.
5. MCB SP 16A : 02 nos.
6. Wire 1sq. mm Red : 01 no.
7. Wire 1 sq. mm Black : 01 no.
8. Button Holder : 02 nos.
9. Angle Holder : 02 nos.
10. Ceiling Rose : 02 nos.
11. Casing Capping 30X15 : 06 nos.
12. Casing Capping junction box : 06 nos.
13. PVC Complete Box 1 Model : 02 nos.
14. PVC Complete Box 2 Model : 02 nos.
15. PVC Complete Box 8 Model : 01 no.
16. PVC Complete Box 3 Model : 01 no.
17. PVC Pipe 20mm (MMS) : 02 nos.
18. PVC Bend 20mm : 06 nos.
19. PCV Junction Box 20 mm : 06 nos.
20. Two Way Switch : 04 nos.

21. Switch 6A : 04 nos.
22. Socket 6A : 04 nos.
23. Fan Regulator Step Socket Type : 01 no.
24. Switch 16A : 01 no.
25. ½" Screw : 24 nos.
26. 1½" Screw : 24 nos.
27. saddle patti : 24 nos,
28. Tape Roll : 02 nos.
29. Drill Machine : 01 no.
30. Plier 8" : 01 no.
31. Screw Driver set : 01 no.
32. Wire cutter : 01 no

154. Instructor's Table.

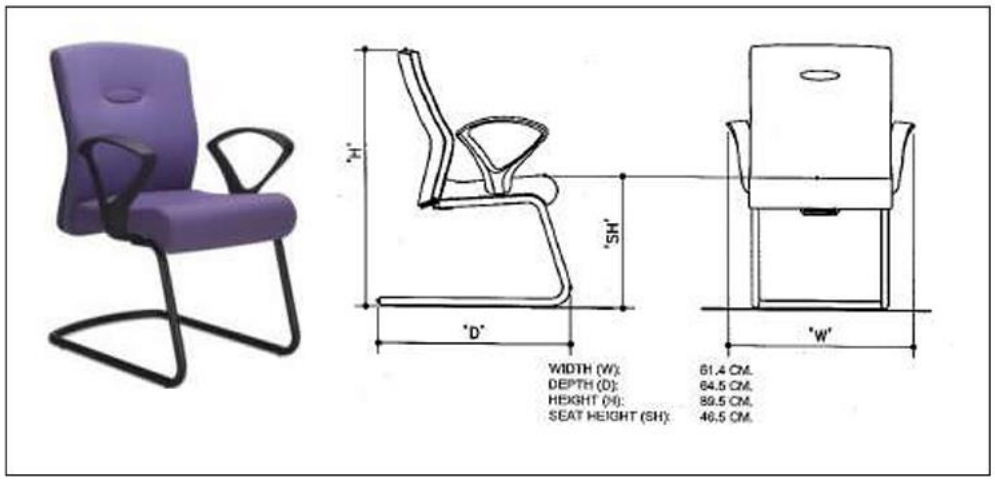
Basic Indicative Diagram

- Manufacturing, Supplying and Installation of Pre-laminated Instructor Table as per the following design, specification, manufacturing process and tests.
- Dimensions: Overall size of 1200mm (W) X 600mm (D) X 735mm (H).

- Construction:
  - Top Work surface:
  - 18mm thick pre-laminated board as per IS:12823 of approved shade with 2mm thick PVC edge banding all over the work surface edges.
- Understructure:
  - Rectangular Frame Fabricated component in 1.2mm thick CRCA (IS: 513).
- Leg:
  - Fabricated component in 38mm x 25mm x 1.2mm thick CRCA ERW Tube (IS: 7138).
  - Plastic Cap for Cable travel- Injection Moulded Polypropylene.
  - Leveler glide for Leg- Nylon 6 and MS Bolt.
- Storage Pedestal:
  - Out of 3 drawers (Box + Box + File), the bottom most will be the file drawer and top drawer shall have a pencil tray. The storage unit shall also have suitable sliding arrangement, handle locking facility, etc.
  - Shell- 0.6mm thick CRCA (IS: 513).
  - Drawer Tray- 0.6mm thick CRCA (IS: 513).
  - Drawer Front- 0.8mm thick CRCA (IS: 513).
  - Frame Assembly- 1.2mm thick CRCA (IS: 513).
  - Lock- 10 Lever Cam Lock central locking mechanism.
  - Handle- Injection Moulded Polypropylene. 7.4.4.8 Leveler- Nylon 6 and MS Bolt.

155. Instructor's Chair.

Basic Indicative Diagram:



- Manufacturing, Supplying and Installation of Mid-back Tubular framed Chair for Instructor in the Classroom as per the following design, specification, manufacturing process and tests.
- Dimensions:
  - Overall size of 610mm (W) X 640mm (D) X 850mm (H).
  - Seat Size: 470mm (W) x 480mm (D) X 450mm (H).
  - Mid Back size: 475mm (W) x 580mm (H).
- Construction:
  - Seat and Back Assembly:
  - Seat and Back Assembly: Seat and back are made up of 12mm thick hot pressed plywood, upholstered with fabric upholstery covers (Fabric colour shall be approved by DVET) and molded Polyurethane foam. The back foam is designed with contoured lumbar support for extra comfort. The seat has extra thick foam on front edge to give comfort to political area. The polyurethane foam shall be as per manufacturer's specification. Seat durability test (cyclic test) to perform 1,00,000 cycles for a load of 57 Kgs made to free fall on the seat from a height of 25mm.
  - High Resilience Polyurethane Foam: The HR Polyurethane foam shall be moulded with density = 45 +/-2 Kg/m3 and Hardness = 20 +/- 2 Kgs on Hampden machine complying to IS:7888 at 25% compression and it should be covered with fabric as per manufacturer's shade card. The polyurethane foam shall be as per manufacturer's specification.
- Armrest:
  - The one-piece armrests shall be injection molded from black co-polymer Polypropylene. Tested to perform 60,000 cycles for a load of 40 Kgs applied at 10 Deg.

156. Trainee Chair.

156.1 Basic Diagram

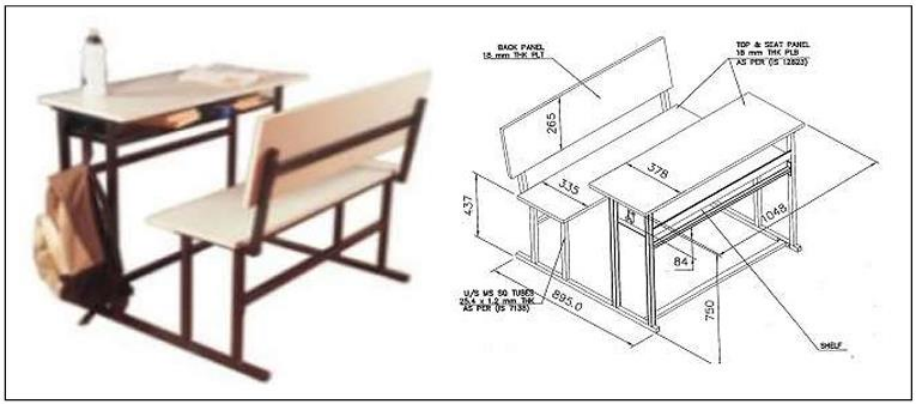
156.2 Frame Material - Metal

156.3 Writing Pad Material – Metal and Wood.

156.4 Arm Style – Full Writing Pad

156.5 A writing pad is attached to the armrest and it is flipable

157. Trainee Table for Two Trainees.



- Manufacturing, Supplying and Installation of Pre-laminated Two seater Dual Desk cum Bench as per the following design, specification, manufacturing process and tests.
- Dimensions:
- Overall size of 1025mm (W) X 890mm (D) X 750mm (H).
- Desk size 1025mm (W) x 375mm (D) X 750mm (H).
- Bench / Seat size 1025mm (W) x 335mm (D) X 435mm (H).
- Back Panel size 1025mm (W) x 260mm (H).
- Construction:
- Desk / Seat / Back and Top panel made up of 18mm thick pre-laminated board as per IS:12823 of approved shade with 2mm thick PVC edge banding all over the work surface edges. Back panel should be of Pre-laminated twin with 2mm PVC edge banding of matching colour on all the sides.
- Understructure made up of 25mm X 25mm X 1.2mm thick square powder coated Electric Resistance Welded (ERW) tube at base that are welded to the desk and seat supports that are made up of 1mm thick powder coated CRCA (IS:513) section. The welded edges should be machine finished.
- Storage shelves made up of 0.6mm thick powder coated CRCA (IS:513) sheet which is affixed below the desk top. Hooks are provided on either side of the vertical frame of the desks. Understructure is assembled using M-5 tap tight screws.
- PVC caps shall be provided to all holes, openings of the framework.
- Finish::

- Epoxy Polyester Powder to the thickness of minimum 50 – 60 microns (+/-10).

- Process:

- The body including understructure, framework, storage shelf including fittings involves an 8 step powder coating process consisting of antirust surface treatment viz. Hot water rinse, Knock of degreasing, degreasing, cold water rinse, phosphating, cold water rinse, passivation, dry off oven treatment and finished with powder coating using epoxy polyester powder of minimum 50 – 60 microns (+/-10). The material is then oven baked with a controlled temperature of 180 deg.C to 200 deg.C.

- Tests:

- The powder coating treatment shall strictly comply with IS:13871 (1993) inclusive of method of tests i.e. Dry film/ coating thickness, Finish, Gloss 60°, Colour retention, Scratch hardness, Impact resistance test, Conical Mandrel test, Erichsen cupping test, Pencil hardness, DFT measurement, Salt spray test, Adhesion Cross cut test, Rub test with MEK, Protection against humidity, Resistance to boiling water, lubricating oil, petrol, heat double bake, bleeding, detergents, acid/ alkali. The test reports shall be submitted along with the tender.

- Colour:

- The colour of the PLB shall be Core Ash / Grey and Black for framework.

- Final colour scheme will be approved by DVET at the time of placement of order.

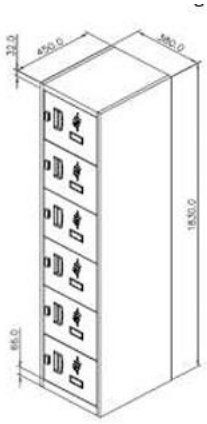
- Manufacturer to furnish various colour schemes available with them.

158. Metal Rack.

Basic Indicative Diagram

- Size – 100 cm x 150 cm x 45 cm
- Type - Angle Frame
- Material - Mild Steel Slotted Angle Percolated CRC Sheet
- Surface Finish Powder Coated
- Load Capacity per layer (Kg) 100-150 Kg

159. Lockers with Drawers.

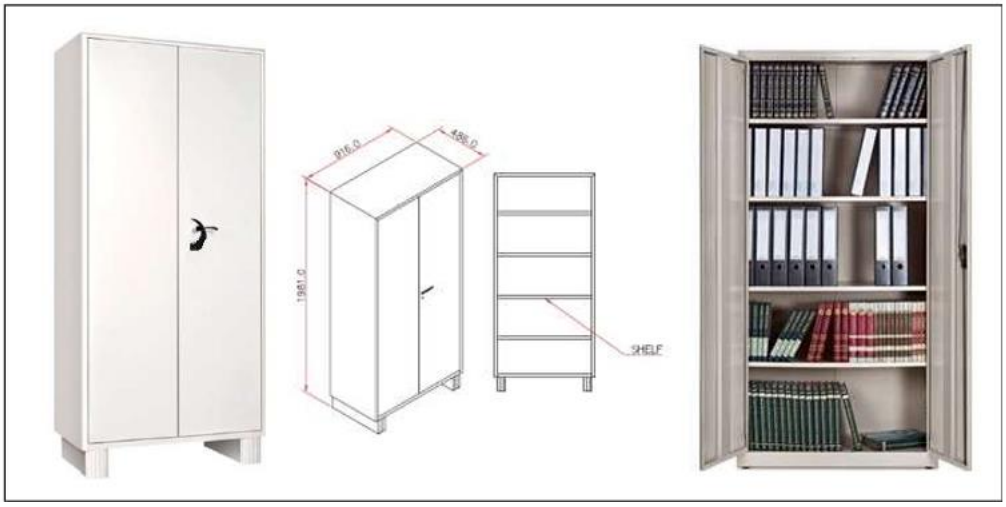


- Confirming to IS CODE – 513 (2008), 13871 (1993)
- The overall size of the storage shall be 1520mm (W) x 450mm (D) x 1830mm (H).
- There shall be 4 units of 6 Door Lockers of equal dimensions.
- Combination:
    - Door Base Unit (Size-380mmW)- one number
    - Door Add On unit (Size-380mmW)- Three number
- Construction:
    - The construction shall be Knock Down Construction.
    - Overall Construction shall be 0.6mm thick CRCA confirming to IS:513 -2008 grade.
    - Shelf should have uniform load carrying capacity up to 35Kg.
    - Handle-Aesthetically appealing Snap fit ABS plastic handle.
    - Label Holder-Plastic label holder should be provided for identification.
- The locking mechanism shall be provided for individual compartment. Lock should be 10 Lever cam lock with lock lever. Min. 03 keys for each compartment shall be provided.
- Finish:
- Epoxy Polyester Powder in fire retardant paint coated to the thickness of minimum 50 – 60 microns (+/-10).
- Process:
- The body including shelves, compartment, framework for door involves an 8 step powder coating process consisting of antirust surface treatment viz. Hot water rinse, Knock of degreasing, degreasing, cold water rinse, phosphating, cold water rinse, passivation, dry off oven treatment and finished with powder coating using epoxy polyester powder of minimum 50 – 60 microns (+/-10). The material is then oven baked with a controlled temperature of 180 deg.C to 200 deg.C.
- Tests:
- The powder coating treatment shall strictly comply with IS:13871 (1993) inclusive of method of tests i.e. Dry film/ coating thickness, Finish, Gloss 60°, Colour retention, Scratch hardness, Impact resistance test, Conical Mandrel test, Erichsen cupping test, Pencil hardness, DFT measurement, Salt spray test, Adhesion Cross cut test, Rub test with MEK, Protection against humidity, Resistance to boiling water, lubricating oil, petrol, heat double bake, bleeding, detergents, acid/ alkali. The test reports shall be submitted along with the tender.
- Colour:
    - The colour shall be Prince Grey / Snowbell Grey.

  - Final colour scheme will be approved by DVET at the time of placement of order. Manufacturer to furnish various colour schemes available with them
- Manufacturing Process:
  - The complete unit shall be as per manufacturer's specifications and Flow chart of manufacturing process shall be submitted along with the tender.
  - Raw materials (Wood working): 1) Plain Particle Board (PPB), 2) Medium Density Fibre Board (MDF), 3) Pre-laminate Board (PLB), 4) Decorative Laminate (DL), 5) Fabric and 6) Lipping (PVC lipping). Process (Wood working): MDF board from approved supplier -> Wood Cutting (cutting from mother board 600mm x 2400mm sheet to the desired size on Panel saw machine with no sharp edges, no glue marks, no scratches, no machine marks and no cracks at drill hole) -> Lamination (Hot lamination adhering Decorative laminate to MDF board using approved make adhesive) -> Sizing/ Routing (fine sizing and setting curvilinear shapes) -> Lipping/ Edge banding (adhering PVC lipping on MDF board using hot melt glue under heat and pressure) -> Finishing -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).
- Raw materials (Metal working): 1) Stainless Steel (Nickel and Chromium added to prevent steel from rusting), 2) Mild steel and 3) Epoxy polyester powder (for powder coating). Process (Metal working): CRCA sheet from approved supplier -> Notching (cutting at the edge and punching holes, shearing, turret punching/ press operation, deburring of punched sheet) -> Metal forming (blending for the purpose of different applications, sheet bending) -> Assembly/ Sub-Assembly (for welded all components get assembled and for knock down sub-assembly takes place. CO2 welding and spot welding is done) -> Pre-treatment (8 step process including anti-rust surface treatment) -> Powder coating (surface coating applied in the form of powder and on curing produces a protective coating, examination of test coating specimen for blisters, flaking and corrosion) -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).
- Raw materials (Metal working): 1) Aluminium Extrusion. Process (Metal working): Aluminium Extrusion from approved supplier -> Cutting of Aluminium extrusions to desired size -> Assembly and Packaging (carcase/ panel assembly, final inspection/ correction if required, packing and dispatch).
- The manufacturing processes given are generalized. Need to consider wherever it is applicable as per the Specifications of the product.

- Size and Weight:
  - Overall Length: 1520 mm
  - Overall Depth: 450 mm
  - Overall Height: 1830 mm
  - Net Weight: Minimum 60-80 Kg

160. Almirah.



- Manufacturing, Supplying and Installation of Steel Cupboard having four shelves making five compartments with two door shutter as per the following design, specification, manufacturing process and tests.
- Confirming to IS CODE – 513 (2008), 13871 (1993)
- Dimensions: Overall size of 915mm (W) X 485mm (D) X 1980mm (H).
- Construction:
- The construction shall be welded construction with 0.7mm thick CRCA for shelf and 0.8mm thick for sides and back confirming to IS: 513 -2008 grade. The width of the side sheet shall correspond to the depth of the top. The sides shall extend between the extreme surface of the top and bottom shelves. The width of the back sheet shall correspond to width of the top. The back shall extend between the extreme surface of the top and bottom shelves.
- The length of the top and bottom shall cover the width of the cabinet and the breadth shall cover the depth of the cabinet made of 0.8mm thick CRCA.
- The inside folded edges shall have stiffening. The welded edges should be machine finished.
- All material should be used of relevant ISI specification.
- Configuration (Doors):
- Two door shutters shall be made of 0.8mm thick CRCA and all other metal component shall be made of 0.9 mm thick CRCA. CRCA D grade conforming to IS: 513 -2008. Shutter shall have metal stiffeners suitably welded or riveted to stiffen the door. The centre to centre distance

between two adjacent hinges to the right side of the cabinet shall have a hole for the handle and key slot for the key of the lock.

- The clearance around the door between the door flanges and side top and bottom flanges shall not be more than 1.25mm.
- Hinges: The hinges shall be either plain butt type made from CRCA not less than 1.6mm thick or double folded type fabricated from CRCA sheet not less than 1.25mm thick. The hinges shall be secured to the mild steel hinge bracket not less than 2.5mm thick on one side and shall be secured to the door on the other side of the fulcrum. The number of hinges per door leaf shall not be less three.
- Lock: The locking and handle of the storage shall be oxidized brass Mazak handle with three way locking mechanism controlled by lock operated by handle with min 03 duplicate keys of Godrej/ Vijayan or of approved make.
- Shelves: The shelf panel (minimum four nos.) shall be height adjustable and should be made of 0.7mm thick CRCA steel confirming to IS: 513 -2008 grade to take the maximum load bearing capacity of 75 Kg uniformly distributed per shelf. Shelves shall have lipped flanges 25mm in width and 15mm in depth. Each shelf shall be supported on four shelf bracket. The bracket shall be made of CRCA not less than 1.6mm thick. The bracket shall be so designed and constructed that the shelf is securely supported and that adjustment inside the bracket can be effected easily. Four rack strips with machine punched slots shall be provided for supporting the shelves covering the full height of the cabinet. Rack strips shall be made of CRCA not less than 1.00 mm thick.
- Pedestal: Two pedestals spanning the depth of the cabinet shall be made from CRCA sheet not less than 1.00mm thick and shall be properly stiffened. The pedestal shall not project out of the cabinet and shall be 125 ± 5mm in height.
- Finish:
- Epoxy Polyester Powder in fire retardant paint coated to the thickness of minimum 40 – 60 microns (+/-10).
- Process:
- The body including shelves, framework for door including hinges involves an 8 step powder coating process consisting of antirust surface treatment viz. Hot water rinse, Knock of degreasing, degreasing, cold water rinse, phosphating, cold water rinse, passivation, dry off oven treatment and finished with powder coating using epoxy polyester powder of minimum 40 – 60 microns (+/-10). The material is then oven baked with a controlled temperature of 180 deg.C to 200 deg.C.
- Tests:

- The powder coating treatment shall strictly comply with IS:13871 (1993) inclusive of method of tests i.e. Dry film/ coating thickness, Finish, Gloss 60°, Colour retention, Scratch hardness, Impact resistance test, Conical Mandrel test, Erichsen cupping test, Pencil hardness, DFT measurement, Salt spray test, Adhesion Cross cut test, Rub test with MEK, Protection against humidity, Resistance to boiling water, lubricating oil, petrol, heat double bake, bleeding, detergents, acid/ alkali. The test reports shall be submitted along with the tender.
- Colour:
- The colour shall be Prince Grey / Snowbell Grey.
- Final colour scheme will be approved by DVET at the time of placement of order. Manufacturer to furnish various colour schemes available with them.
- Size and Weight:
- Overall Length: 915 mm
- Overall Width: 485 mm
- Overall Height: 1980 mm
- Net Weight: Minimum 70 to 80 Kg

161. Black Board / White Board.

- Manufacturing, Supplying and Installation of wall mounted Ceramic coated steel sheet top surface White Board with the following design, specifications, manufacturing process and tests.
- Size of White Board: 4 X 6 feet.
- Confirming to IS CODE – 3087, 733
- White Board with Ceramic Coated Steel Sheet Top Surface:
- Steel writing board for writing purpose mounted on wooden based particles board (as per IS: 3087) with electro galvanized backing steel sheet and frame anodized extruded Aluminium alloy hollow section.
- Writing Surface:
- The writing top surface shall be made of steel sheet of thickness 0.27 to 0.30 mm. It shall have vitreous enamel coating of 0.095mm min. thickness on top and 0.03 mm min. on the back. The top shall be free from waviness and shall show excellent erasability. Gloss of sheet shall be 60 deg @ Lead 60.

- Core Materials:
- The core material shall be 9mm thick wood Base plain particle board. (Supported with Test Certificates of the Manufacturers.)
- Backing Materials:
- The backing material sheet shall be minimum 0.25 mm thick electro galvanized steel sheet. Both the top and the backing sheet shall be properly fixed with particle board using rubber based adhesive to avoid any moisture absorption. (Supported with Test Certificates of the Manufacturers.)
- Aluminium Frame: The Board shall have all round framing of anodized extruded aluminium alloys hollow section. Designation 63400 as per IS: 733-1983 with Amendment No. 1 (Reaffirmed 2006) Edition 4.1. (Supported with Test Certificates of the manufacturer)
- The Frame section shall be
- Front: 25 mm,
- Side: 18 mm
- Wall thickness: 0.8 mm (+ 0.03 mm)
- Fitting Accessories:
- The writing board shall be provided with suitable heavy duty wall mounting Brackets. The board should be provided with necessary fitting clamps. The clamps should be Mild steel with suitable corrosion free

coating like chrome plating/ Powder coating material to sustain board weight. A set of 4 nos. of Screw and 4 nos for Rawal Plugs should be provided with each board for fitting on the wall.

- Board Corners:
- The corner of the board should be made up with 100 % virgin ABS material.
- Packing: The boards shall be packed in corrugated paper packing/box packing for local delivery and in wooden crate for dispatch by rail / road transport to withstand transit hazards.
- Free Accessories:
- 1 No. Chalk Tray and 1 No. Magnetic Duster and 1 No. Marker should be provided free with each board.
- Marking: Each board shall be provided with indelible marking for:
- Name/Trade mark of the manufacturer
- Type of board
- Supply Order No. and date.
- Weight: The weight of the Green board shall be 25-30 Kg