



Government of Maharashtra  
Directorate of Vocational Education and Training, Maharashtra State  
**SPECIFICATION FOR CENTRAL AIR CONDITION  
PLANT MECHANIC NSQF Level-4**  
Regional office Nagpur Year 24-25



**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
( NSQF LEVEL - 4 )**

**SPECIFICATION FOR TRADE**

# **CENTRAL AIRCONDITIONPLANT MECHANIC**

**(NSQF LEVEL - 4)**





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S.R. NO.	NAME OF ITEM	Page No.
<b>A. TRAINEES TOOL KIT</b>		
1	File flat rough double cut, 200mm	11
2	File, half round, fine double cut, length 150mm	12
3	File, round, fine double cut, length 150mm	13
4.	File flat, fine double cut, length 150mm	14
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8	Centre punch, length 100mm	18
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10	Divider spring joint, 150 mm	20
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12	Caliper, odd leg, spring joint, length 150mm	22
13	Hammer ball pain, 220 gms	23
14	Cold Chisel flat and cross cut, length 150mm	24
15	Engineers rule, 300mm long	25
16	Tape measuring, 10m graduation in mm	26
17	Pliers combination insulated, length 200mm	27
18	Pliers long nose, 200 mm	28
19	Pliers flat nose, 150 mm	30
20	Line tester, 500 v heavy duty	32



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21	End cutting nipper, 15cm	34
22	Tweezers, 10cm	35
23	Gloves for welding [Treated as consumable]	36
24	Leather Apron [Treated as consumable]	37
<b>B. INSTRUMENT AND GENERAL SHOP OUTFIT</b>		
25	Surface plate, 45 x45 cm	38
26	Oil can, 500 ml	39
27	Surface Gauge universal, 150 mm	40
28	Bench vice, 150 mm jaw	41
29	Hack saw tubular metal frame Adjustable, 300mm	42
30	Snip sheet metal straight nose, 200 mm	43
31	Snip sheet metal curved nose, 200 mm	44
32	Anvil, 100X200mm	45
33	Stakes [ different Types], 100mm	46
34	Tin smith, 400mm	47
35	Wooden mallet /Nylon mallet, 500 gm good finish	48
36	Round Punch, 3mm,4mm,6mm	49
37	Grover set, 4mm forming	50
38	Electrical drill portable drill with chuck and key, Capacity 6.4 -12 mm capacity	51
39	Tape measuring graduation in mm, 2 m	53
40	Screw driver, plastic handle, 6mm TIP length 100mm to 150mm	54
41	Screw driver, plastic handle, Flat tip, 10mm TIP length 200mm & 250mm	56
42	Philips screw driver -, complete set in leather case	58
43	Screw driver, plastic handle, Flat tip, handle 3mm TIP length 100mm to 150mm insulated	60



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44	Soldering iron exchangeable copper tip, -65 watts	61
45	Knife folded stainless steel -150mm	62
46	Tong tester (clamp on multi meter), 0-10-30 amps 0-500 v	63
47	Voltmeter, AC/DC portable precision grade Digital Panel boardtype, 0 to 500 volt	65
48	Ammeter, AC/DC portable precision grade Digital Panel board Type, belt 0 to 5 amp	67
49	Ammeter, AC/DC portable precision grade Digital Panel boardtype, 0 to 30 amp	69
50	Megger, 1000v	71
51.	Wattmeter multi-range up to 1 KW	72
52.	Multi meter digital type	74
53.	Tenon saw, 250 mm	76
54.	Firmer chisel 6,12,25mm	77
55.	Rawal plug tool, 6mm	78
56.	K.W. meter , 0 -1 K w	79
57.	Fire extinguisher, Arrange all proper NOCs and equipment from municipal / competent authorities.	81
58.	D.E spanner, 6-32 mm	82
59.	Ring spanner, 6 -32 mm	83
60.	Diagonal cutter, 15 cm	84
61.	Service Oscillator	85
62.	C.R.O Single beam, 5 MHZ	86
63.	C.R.O Dual trace/ Double beam, 60 MHZ	87
64.	A.F.O Oscillators	88
65.	Tong, Close mouth and pick up	89
66.	Welding table for gas/Arc, 1200x760 mm	90



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67.	Flaring tool set, single type for tube. 4.7mm to 16mm O.D	92
68.	Swaging tool, punch type, set of size for tube, 4.7mm to 16mm O.D	93
69.	Swaging tool, screw type with adaptor set of size for tube, 4.7mm to 16mm O.D	94
70.	Bending spring external type, for copper tube, 3mm to 16mm DIA	95
71.	Pipe cutter miniature for copper tube, 3mm to 16mm DIA	96
72.	Pinch of tool, for copper tube, 6mm to 18mm DIA	97
73.	Ratchet spanner, 6.4 sq.mm reversible	98
74.	Capillary plug gauge	99
75.	Pinch of pliers/crimping pliers tool, 6mm - 18mm DIA	100
76.	Piercing pliers & reversing valve with access fitting, 6-18mm	101
77.	Spanner double ended, 4.7mm to 16mm	102
78.	Ring spanner off set, 4.7mm to 16mm	104
79.	Wrench adjustable, length 150mm	105
80.	Wrench adjustable, length 200mm	106
81.	Wrench adjustable, length 250mm	107
82.	Valve key handle [Treated as consumable]- 4.7mm & 6.4mm sq.	108
83.	Pressure gauge Digital type, diameter 63mm with recalibration set	109
84.	Compound gauge, Digital type, diameter 63mm, with recalibration set screw, scale vacuum 76mm. Pressure 15 Kg/sq.cm	111
85.	Service man thermometer in metal case, - 30 C to +110 °C	112
86.	Scissor, gasket cutting stainless steel	113
87.	L-Allen key, set size 1.5mm to 6.4mm	114
88.	T-Allen key set, size 5/32" to 1/8"	115
89.	Pipe cutter with built in reamer and space cutter for copper tube, 3mm to 32mm	116
90.	Pipe /Tube bender lever type, 3-16 mm	117



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91.	Spanner double ended, 19mm to 31.8 mm	118
92.	Pipe wrench, size 50mm to 150mm	119
93.	Electronic leak detector for HFC, HC, R-22	120
94.	Sling psychrometer mounted on aluminum back, scale 10 °C to +50°C	121
95.	Lapping plate, 250mm x 200mm	122
96.	Hammer ball peen, 450 gms	123
97.	Puller 3 legged with flexible arm, 300mm	124
98.	Hand blower portable complete, 1/10 HP	125
99.	Spirit level precision metallic, 200mm	126
100.	Stop watch	127
101.	Tap set with matching drills, 3 mm to 16mm	128
102.	Tap set with matching drills, ¼" to 5/8"	129
103.	Refrigerant cylinder, 2.5 Kg	130
104.	Vernier caliper, length 250mm	131
105.	Micrometer outside measurement, 0 to 25mm	132
106.	Heating kit with infrared bulb, (200 w capacity)	133
107.	Plumbing hammer weight, 200 gm	134
108.	Multi meter analogue type	135
109.	Tachometer digital, multi range - , 0 RPM to 3000 RPM, Portable small size in leather Case	137
110.	Micron vacuum gauge, capable of reading up to 20 Microns	139
111.	Sensor thermometer (digital), -50 degree Celsius to 150 degree Celsius	140
112.	Fin straightened/fin comb, With strong steel wire based combing on wood	141
113.	Filler gauge, 0.05 mm - 1 mm	142
114.	Wire gauge metric and with worth, Steel plate embossing converse of British & Metric.	143



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115.	Dial thermometer remote control, armored capillary dial 75mm, - 50C to +50 C	144
116.	Anemometer Digital type,	145
117.	Compressors testers for small hermetic compressors, Fixed with electrical input / output indicating facilities	147
118.	Electrical accessories [Treated as consumable], current and potential relays, start & run capacitors, PTCs overload protectors', relays Contactors	148
119.	Engineers square, 150mm with 5' tolerance	150
120.	Digital thermometer [Treated as consumable], Graduated disc analog type	151
121.	Temperature & Humidity recorder, Capacity to record 24 hrs record	152
122.	Electronic leak detector Digital type, Capable to detect of R134a, HC, R-22	154
123.	Instrumentation screw driver set, 100mm	155
124.	Digital weighing machine, 20 kg capacity Accuracy 1 gm.	156
125.	Recycling unit,	157
126.	Quick couplers / Self sealing coupler [Treated as consumable], 1/4 - 3/8"	158
127.	Schrader valve [Treated as consumable],	159
128.	Cylinder 134 a, 5 kg	160
129.	Recovery Cylinder-R-22, 10 Kg Capacity	161
130.	Recovery & recycling machine, Suitable for R-22	162
131.	Gas charging Station suitable for- 22 along with 10 kg capacity digital weighing balance L.C 1 Gm., Vacuum pump High efficiency Blanking 50Micron	164
<b>C. GENERAL MACHINERY SHOP OUTFIT</b>		
132.	Split phase induction motor, 5 HP, 230 V	166
133.	Capacitor start induction motor, 5 HP, 230 V	167
134.	AC 3 Phase motor, 400/50 Hz, 400/50 Hz, 2 HP	168
135.	Star delta starter, 2 HP	169
136.	Auto Transformer starter, 3 HP	170



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137.	D.O.L Starter, 2 HP	172
138.	Portable air - LPC brazing kit with 2 kg. LPG cylinder, torches, Houses and stand	173
139.	Oxy-acetylene welding set complete, Cylinders, regulators welding torches with different nozzles	174
140.	Refrigerator, 165L carrying with HFC-134a, & HC	176
141.	Frost free refrigerator, 200L carrying with HC blend	177
142.	Three/four door refrigerator, 300L carrying with HC R-600a	178
143.	Bench Drilling machine, 20 mm capacity	179
144.	Grinding Machine, 200mm, 3000 rpm, Double Ended ½ HP	181
145.	Evacuating and refrigerant charging station, consist of a) Rotary two stage vacuum pump and motor (with gas ballast and anti such back) b) manifold with gauges and valves and capable of pulling vacuum up to 50 microns of Hg and with provision of connecting to a microns level vacuum gauge c) Graduated charging cylinder with provision for temperature correction and all necessary isolating valves II) Evacuating and charging station as above but fitted with weighing scale	182
146.	Two stage rotary vacuum pump, capacity approx. 60 -10 rmp capable of evacuating to 50 microns of Hg and fitted with gas ballast, anti such back valve and single phase motor	184
147.	Air compressor, Two stage for oil - less dry air, with rush proof tank assembly, heater and controls max. pr. 10 kgs/sq.cm Capacity 45 liters. Motor 1 HP.	185
148.	Reciprocating compressor, Provision of capacity control etc. for demonstration. Capacity 9000 Kcal/hr. semi Hermetic or open type.	187
149.	Dry N2 in cylinder, 2 stage regular or commercial N2 in cylinder with drier unit and 2 stage regular 7 meter Cube	189
150.	A.C	190
151.	Recovery unit with cylinders, CFC & 134 a	191





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152.	Heat pump, 3000 Kcal/hr.	193
153.	Cassette Air conditioner, 4500 kcal/hr with R-404	195
154.	De scaling pump set, with stainless steel impeller and housing complete with motor 1/2 HP and accessories	197
155.	Small capacity shell and tube condenser, 5 Ton with Cu tubing only	198
156.	Fan coil unit, with water valves (2 & 3 way)	199
157.	Shell and tube, DX chillers (small), 5 Ton with Cu tubing only	200
158.	Circulating water pump (small), 0.5 H.P with stainless steel tank capacity 20 liters with inlet/ outlet provision	201
159.	Shell and tube type condenser, 5 Ton	202
160.	Rotary hermetic compressor, 2 Ton	203
161.	Screw compressor, 5 Ton	204
162.	scroll compressor, 1 Ton	205
163.	Bottle cooler visible, 200 L carrying with HFC-134a & reciprocating compressor	206
164.	Deep freezer, 200 L carrying with HFC-134a & reciprocating compressor,	207
165.	Water cooler storage type, 200 L carrying with HFC-134a & reciprocating compressor	208
166.	Ice candy plant, 2 ton with capacity to make 32 ice candy at a time with Forma tray, stainless steel tank on trolley	209
167.	Walk in cooler, 3 Ton cap. with open type compressor, water cooled condenser, providing with PUF insulated room sealed proof size - 8 X 8 X 10Ft maintain 0 – 5 degree centigrade.	210
168.	Air-conditioning, direct and indirect water chiller. Complete with all controls including humidity control capacity 15000Kcal/hr.	212
169.	Package A/C, 7.5 ton capacity, Water cooled type with open type compressor reciprocating type	214
170.	Car A.C components(full kit) a) Wobble plate compressor with mounting brackets. b) Serpentine Evaporator c) Parallel Flow Condenser d) Hoses, tubes, Receiver, Ex. valve. e) Electrical components & wiring Harness	217



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171.	CAR AC tutorial model	219
172.	Desktop Computer, CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch.) Licensed Operating System and Antivirus compatible with trade related software.	220
173.	LCD PROJECTOR / LED / LCD TV- Big Size	221
174.	Laptop- Latest version	223
175.	UPS	224
<b>D. WORKSHOP FURNITURE</b>		
176.	Class room table, One table for each trainee size of 2.5 provisions with open rack. Frame square conduit of 1". top V2" sun mica ply board	226
177.	Work bench, 2000 x 1000 x 700 mm with 2" pipe frame. Top teak slab and fixing with 3/4" good quality rubber sheet.	228
178.	Almirah, 195 x 90 x 48 cm outer sheet 20 SWG inner partition with four shelves of 22 Swg	229
179.	Lockers, 195 x 90 x 48 set six locker in one structure	231
180.	Glass board portable, 2.5' X 4' with stand	234
181.	Instructor table, 4' X 2' X 2.5' with steel tubular frame & sun mica top	236
182.	Instructor chair, Standard	238
183.	Computer table, Standard with drawers & self to accommodate UPS & CPU	240
184.	Computer chair, metal based & metal wheel standard one	244
185.	White board, 4' X 3' ferrous base sheet to hold magnetic duster with white finish surface.	246
186.	Chart stand, 6' X 3' providing with hanging clip top & bottom plate	248
187.	Stool,	249
188.	Book Self with glass panel	250
189.	Storage rack	253
190.	Storage shelf	254



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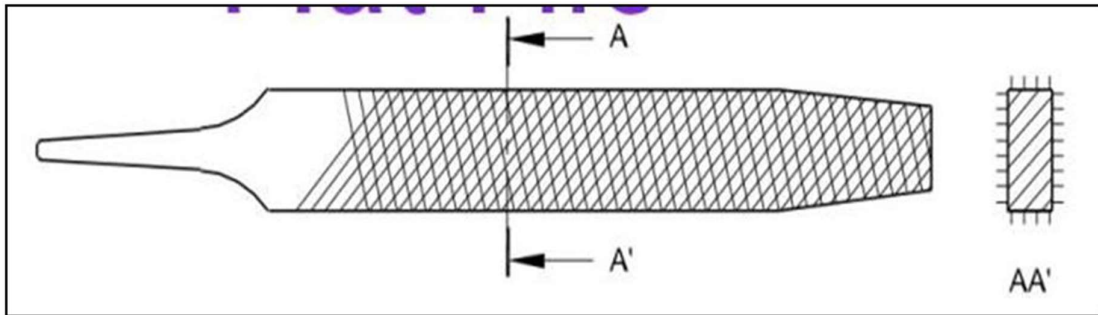
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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
 ( NSQF LEVEL - 4 )**

**1. File Flat Rough Double Cut 200 mm**

Basic Indicative Diagram



	From	To
1.2 Generally conforming to IS 1931-2000		
1.3 Body Length (L)	198	202
1.4 Tang Length (TL)	54	56
1.5 Width (W)	19.6	20.6
1.6 Thickness (T)	3.7	4.4
1.7 No. of up cut / Inch	24	26
1.8 Up cut inclination	64°	66°
1.9 No. of Overcut / Inch	18	20
1.10 Overcut Inclination	44°	46°
1.11 No. of Edge cut / Inch	25	27
1.12 Edge cut Inclination	89°	91°
1.13 Hardness	60 HRC	64 HRC
1.14 Performance in 7500 strokes	15	15.5
1.15 Rake Angle	-7°	-12°

1.16 Handle : Provided with ANTI-SLIP Plastic (PVC) HANDLE with small bumps provides anti-slip grip .



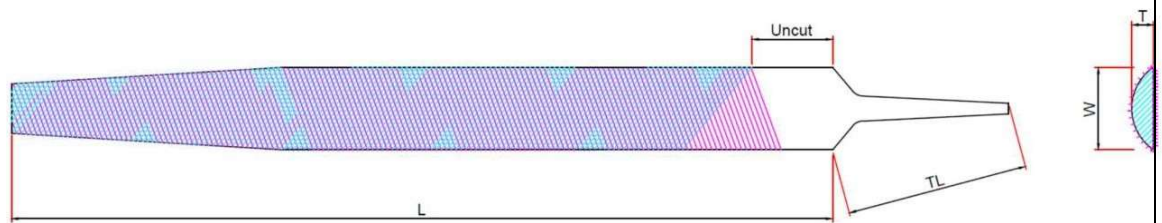
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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC**  
**( NSQF LEVEL - 4 )**

**2. File Half Round Fine Double Cut 150mm**

Basic Indicative Diagram



**Range (In MM)**  
**From To**

Generally conforming to IS 1931-2000

2.3 Body Length mm	(L) 148	152
2.4 Tang Length mm	(TL) 49	51
2.5 Width mm	(W) 15.20	16.20
2.6 Thickness mm	(T) 3.95	4.65
2.7 No. of Upcut / Inch	(41-42 F/S)	(37-38 R/S)
2.8 Upcut inclination	65°	65°
2.9 No. of Overcut / Inch	(36-36 F/S)	(32-33 R/S)
2.10 Overcut Inclination	50°	50°
2.11 No. of Edge cut / Inch	37	38
2.12 Edge cut Inclination	65°	65°
2.13 Hardness	60 HRC	64 HRC
2.14 Provided with ANTI-SLIP Plastic HANDLE with small bumps provides anti-slip grip .		

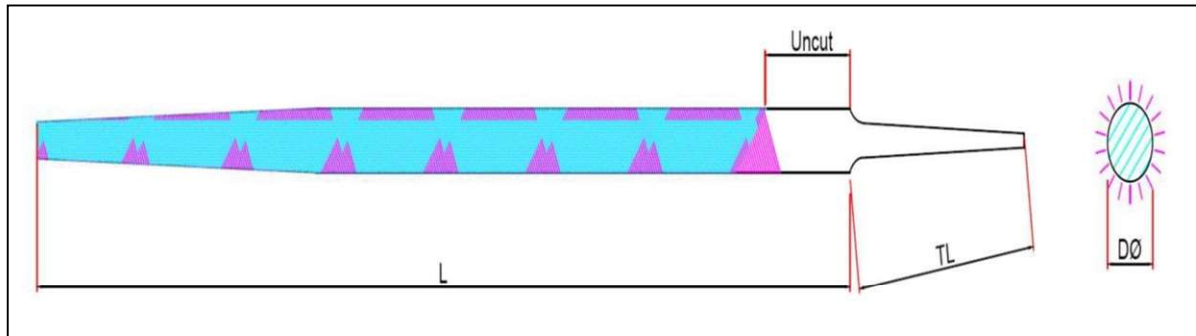


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**3. File - Round – Fine Double Cut - 150 mm**  
Basic Indicative Diagram



Generally conforming to IS 3331-25

3.2	Body Length ( L ) mm	148 to 152
3.3	Tang Length (TL) mm	49 to 51
3.4	Diameter (Ø) mm	5.4 to 6.4
3.5	No. of Upcut / Inch	31 to 32
3.6	Upcut inclination	64 <sup>0</sup> to 66 <sup>0</sup>
3.7	No. of Overcut / Inch	31 to 32
3.8	Overcut Inclination	49 <sup>0</sup> to 51 <sup>0</sup>
3.9	Hardness	60 HRC 64 HRC
3.10	Rake Angle	-7 <sup>0</sup> -12 <sup>0</sup>

Provided with ANTI-SLIP Plastic HANDLE with small bumps provides anti-slip grip .



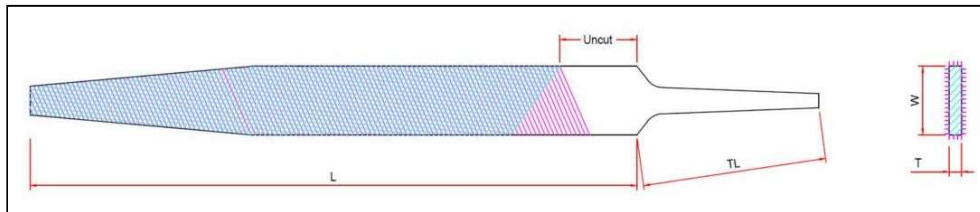
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**4. File - Flat Fine Double Cut - 150 mm**

Basic Indicative Diagram Range (In MM)



Generally conforming to IS 1931-2000

4.3	Body Length (L)	mm	148	152
4.4	Tang Length (TL)mm		50	50
4.5	Width W	mm	15.1	16.1
4.6	Thickness (T)	mm	4	4
4.7	No. of Upcut / Inch		41	42
4.8	Upcut inclination		64 <sup>o</sup>	66 <sup>o</sup>
4.9	No. of Overcut / Inch		35	36
4.10	Overcut Inclination		44 <sup>o</sup>	46 <sup>o</sup>
4.11	No. of Edge cut / Inch		43	44
4.12	Edge cut Inclination		89 <sup>o</sup>	91 <sup>o</sup>
4.13	Hardness		60 HRC	64 HRC
4.14	Rake Angle		-7 <sup>o</sup>	-12 <sup>o</sup>



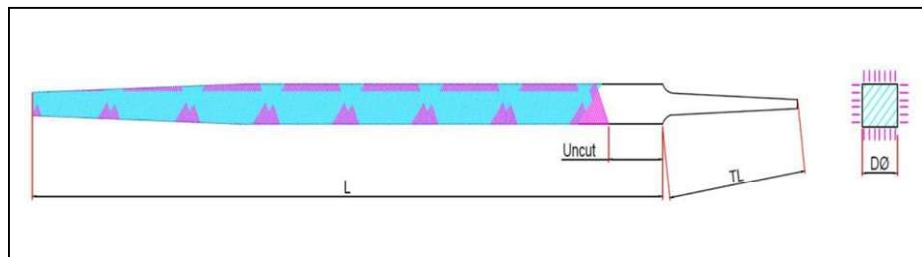
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**5. File – Square Fine Double Cut - 150 mm**

Basic Indicative Diagram



Range (In MM)                      From              To

Generally conforming to IS 1931-2000

5.3	Body Length ( L )	148	152
5.4	Tang Length (TL)	50	51
5.5	Square Side	5.10	6.10
5.6	No. of Up cut / Inch	57	58
5.7	Up cut inclination	65°	65°
5.8	No. of Overcut / Inch	50	51
5.9	Overcut Inclination	50°	50°
5.10	Hardness	60 HRC	64 HRC
5.11	Rake Angle	-7°	-12°



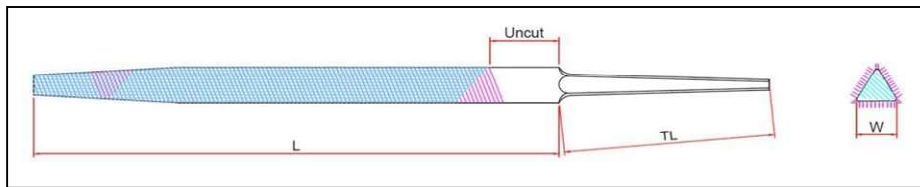
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**6. File - Triangular fine Double Cut - 150 mm**

Basic Indicative Diagram



Range (In MM)	From	To
---------------	------	----

6.2 Generally conforming to IS1931-2000

6.3 Body Length (L)	148	152
6.4 Tang Length (TL)	58	59
6.5 Equilateral Triangle Side (W)	11.05	11.75
6.6 No. of Up cut / Inch	38	39
6.7 No. of Over cut / Inch	33	34
6.8 Up cut inclination	$57^{\circ}$	$63^{\circ}$
6.9 No. of Edge cut / Inch	44	45
6.10 Edge cut Inclination	$76^{\circ}$	$78^{\circ}$
Hardness	60 HRC	64 HRC
Rake Angle	$-7^{\circ}$	$-12^{\circ}$





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7. **Scriber - 150 mm length**  
Basic Indicative Diagram



Scriber with Min. Len<sub>e</sub>

90 ° Bend and Straight

Both Point end Hardness 55 - 60 HRC

Should be of Material High Carbon Steel



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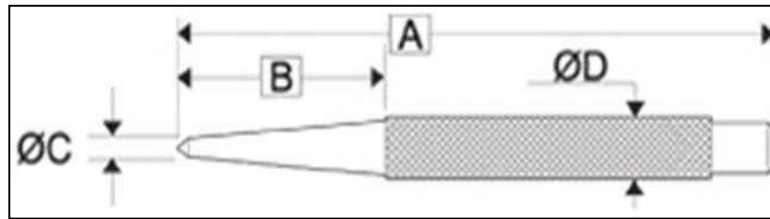
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 ( NSQF LEVEL - 4 )**

**8. Center Punch – Length 100 mm**

Basic Indicative Diagram



Generally conform to I.S. 7177 – 1974

Dimensions (in mm): A - 100, B - 33,  $\varnothing C$  - 4,  $\varnothing D$  - 10

Made from high grade chrome Steel

Hardness

Working surface: 55 - 57 HRC

8.5.2. Body: 35 - 45 HRC

Overall Length: 100mm

Black phosphate finish, Hardened & tempered

Deep knurling on body for firm grip



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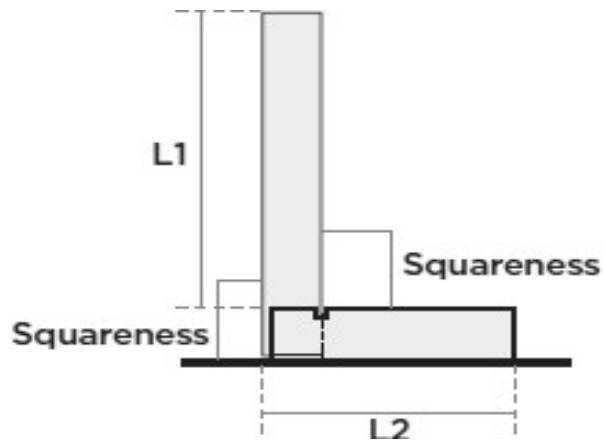
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**9. Try Square – 150mm**

Basic  
 Indicative  
 Diagram



Dimensions

Total Length: 150 mm

Total Width: 100 mm

Stock Length: 90 mm

Stock Width: 30 mm

Stock Thickness: 12 mm

Blade Length: 125 mm

Blade Width: 30 mm

Blade Thickness: 1 mm

Material: Mild Steel

Should be Fine Finish, Durable and Rust Proof.



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**10. Divider Spring Joint - 150 mm**  
 Basic Indicative Diagram



Spring Divider Size(L): 150 mm

Material for

Legs: Carbon & Alloy Steel

Spring: Spring Steel

Others: Free Cutting Steel

Finish for

Legs: Polished

Rest parts: Auto Black

Hardness for

Tip: 50 - 13 HRC

Spring: 45 - 50 HRC

Proper rust preventive packing



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**11. Caliper spring Joint In side - Length- 150 mm**  
 Basic Indicative Diagram



Inside Calipers with Size: 150 mm

Material for

Legs: Carbon & Alloy Steel

Spring: Spring Steel

Others: Free Cutting Steel

Finish for

Legs: Polished

Rest parts: Auto Black

Hardness for

Tip: 50 - 13 HRC

Spring: 45 - 50 HRC

Proper rust preventive packing



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**12. Caliper – Odd leg, Spring Joint – Length 150 mm**

Basic Indicative Diagram



Odd leg

calliper with Size: 150 mm

Material for

Legs: Carbon & Alloy Steel

Spring: Spring Steel

Others: Free Cutting Steel

Finish for

Legs: Polished

Rest parts: Auto Black

Hardness for

Tip: 50 - 13 HRC

Spring: 45 - 50 HRC

Proper rust preventive packing



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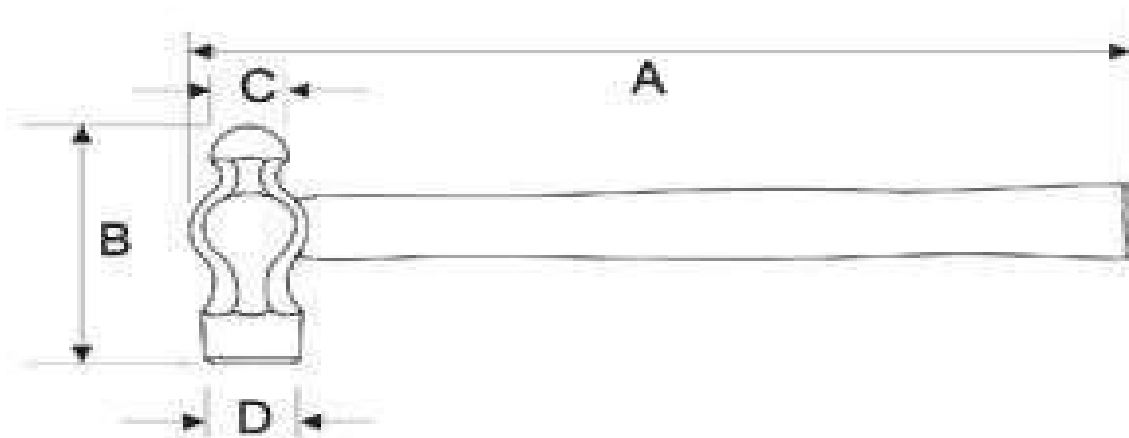
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**13.Hammer - Ball Peen - 220 gms**

Basic Indicative Diagram



Generally conform to I.S. 281 – 3383

Ball Peen Hammer

Length: 300 mm + 10%

Weight: 220 grams

Drop forged from high grade carbon Steel

Material: EN - 23

Partially hardened up to 46 - 56 HRC on striking surface

Depth of Hardness: 6 mm

Phosphated and painted

Handle

Material: Hickory Wood/ Red Wood/ Babul Wood/ Indestructible Handle

13.11. Handle fixed firmly to hammer head so that it does not come out after long use



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**14.Cold Chisel Flat and Cross Cut - Length 150 mm**

Basic Indicative Diagram



**Cross Cut Chisel**

Size: 150mm

Made from high carbon Steel 45 #

Heat treated

Hardness

Cutting Portion: 55 - 57 HRC

Striking Portion: 35 - 45 HRC

Spraying Surface

Flat Chisel

Hardened and Tempered Edges to Cut Steel and Concrete easily.

Generally Conform to IS 402 – 1990

14.3.3 Dimensions in mm: A: 150, B: 16, C: 3.25, D: 70

Drop forged from high grade carbon Steel

Hardness

Cutting Portion: 55 - 57 HRC

Striking Portion: 35 - 45 HRC

Octagonal Body to facilitate comfortable holding while in use

Cutting edges should be ground accurately to appropriate angle for metal cutting

Should be phosphated & painted to provide anti rusting propertie





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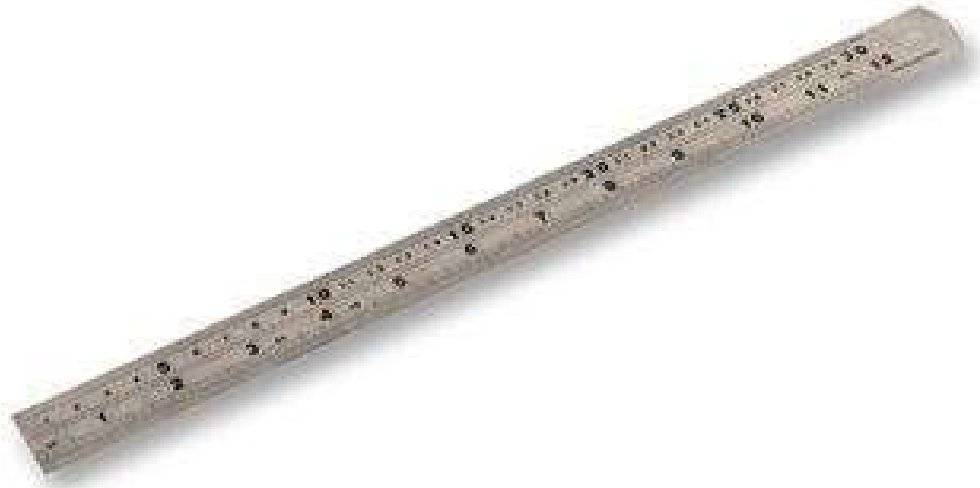


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**15. Engineers Rule - 300 mm long**

Basic Indicative Diagram



Material: Stainless Steel

Thickness: 0.5 mm

Hardness: 30 - 35 HRC (Specially Hardened)

Finish: Polished 34B / Anti-Glare Satin Chrome

Surface roughness: 0.6 Microns max

Range: 300 mm

Accuracy: Metrology Standard EEC Class – I



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**16 .Tape Measuring - 10 meter Graduation in mm**

Basic Indicative Diagram



Tape length: 10 meters

Tape width: 23.5 mm

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

Bold & Easy to read printing

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

Strong Copper Rivet to ensure stronger end hook



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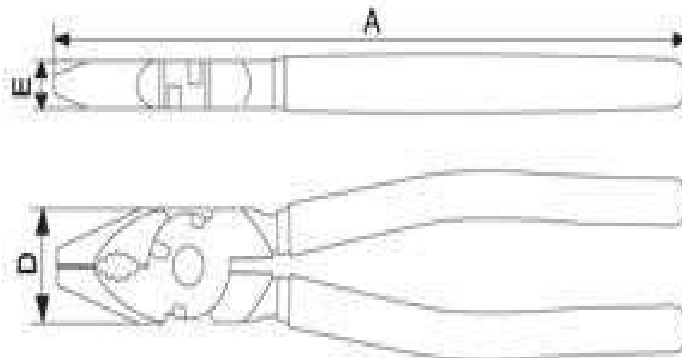


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**17.Plier Combination insulated- Length 200 mm**

Basic Indicative Diagram



Generally conform to IS 3650 – 1981

Material: C – 70

Finish: Polished / Chrome plated / Satin finish

Length (A): 200 mm

Drop forged, hardened tempered

Differential hardening

Radius Gap from front side: Upto.2 mm

Play between shanks: Up to 0.3 mm

Shank Material: C70 / EN23

Rivet material: SAE 1541 / 40Cr4

Cutting Edge Hardness: 60 - 62 HRC

Shank Hardness: 40 - 48 HRC

Rivet Hardness: 38 - 42 HRC

High Voltage Insulation: Should be able to withstand 400 V DC or 280 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 (7 to 28 Kg/mm<sup>2</sup>) & Hard (140 Kg/mm<sup>2</sup>) wires



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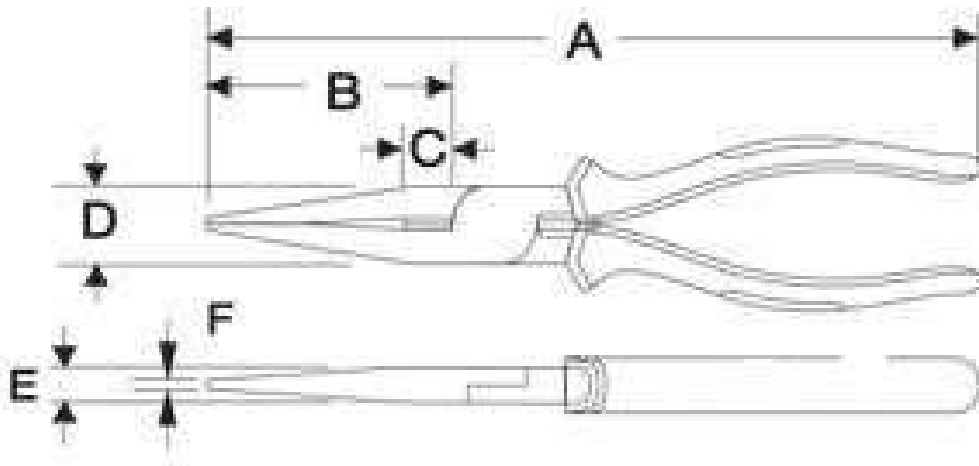
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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**18.Plier - Long Nose - 200 mm**

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 -48 HRC)

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 400 V DC or 280 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.



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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 (7 to 28 Kg/ mm<sup>2</sup>) & Hard (140 mm<sup>2</sup>) wires

Should be able to cut Hard wire of Diameter: 1.60 mm & Soft wire of Diameter:  
 1.0mm

Cutting edges should be sharp and precision machined to appropriate angle to cut thick and thin wires with ease.



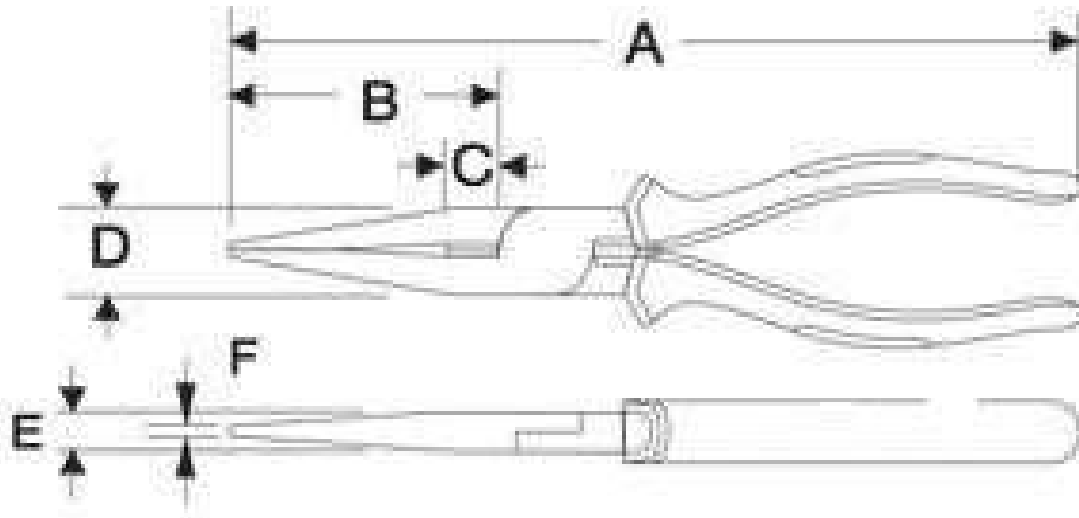
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**19.Plier Flat Nose - 150 mm**

a. Basic Indicative Diagram



- b. Generally conform to IS 3552 – 1989
- c. Length: 150 mm
- d. Drop Forged made from High Carbon Steel & scientifically treated to give tough body (45 -48 HRC)
- e. Cutting edges should be induction hardened. Cutting edge Hardness 55 - 60 HRC.
- f. Rivet should be hardened and made of carbon Steel
- g. High Voltage Insulation: Should be able to withstand 4000 V DC or 2800 V AC
- h. Minimum load value: 23.58 Kg
- i. 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.
- j. Thicker Sleeves for comfortable Grip



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- k. Special thumb protector for sleeves to minimize the risk of electric shock in case pliers slip while in use.
- l. Should be able to cut soft (7 to 28 Kg/ mm<sup>2</sup>) & Hard (140 mm<sup>2</sup>) wires
- m. Should be able to cut Hard wire of Diameter: 1.60 mm & Soft wire of Diameter: 1.0mm
- n. Cutting edges should be sharp and precision machined to appropriate angle to cut thick and thin wires with ease.



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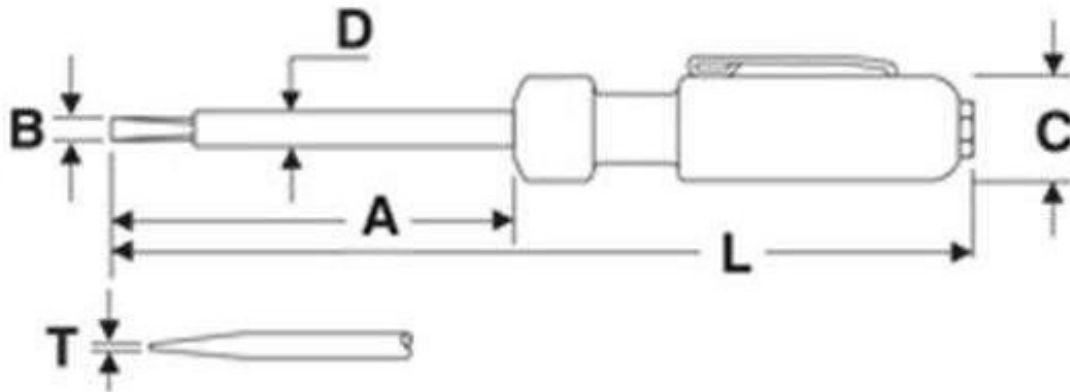
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**20 Line Tester - 500 V Heavy Duty**

a. Basic Indicative Diagram



- b. Generally conforming to IS 5579 – 1985
- c. Dimension -
  - i. A: 60 mm
  - ii. D: 6 mm
  - iii. Tip Size: B X T = 3.5 mm X 0.5 mm
- d. Minimum Torque Value: 0.09 Kg.m
- e. Generally conform to IS 5579 - 1985
- f. Blade made of high grade Silicon - Manganese Steel (EN - 45A)
- g. Blade should be differentially hardened & tempered to resist wear, bending & meethigh torque requirement
- h. Hardness on Tip: 55 - 57 HRC
- i. Bright and Smooth Nickel Chrome plating finish to effectively protect blade againstcorrosion
- j. Handle should be made of High grade CA Plastic, which is non - flammable & unaffectedby oil, petrol, grease, water - practically anything
- k. Suitable for checking at minimum 90 V DC and 60 AC voltage and maximum up to 500 VAC





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- l. Blade is provided with PVC insulation sleeve & resistance having 1 mega ohm for preventing the electric shock
- m. NEON filled glow lamp should give a visible glow in normal day light
- n. Maximum leakage current of 0.12 microampere ensures safe & shock free in use.
- o. Tip should be precision - ground to 5 degree angle to ensure firm grip in the screw slot.



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**21 End cutting nipper**

a. Basic Indicative Diagram



21.2 Material	High-grade special tool steel, forged, oil-hardened
21.3 Product Dimensions	23.5L x 6.7W Centimeters
21.4 Colour	Red, Black
21.5 Handle Material	Plastic
21.6 Item Weight	358 Grams
21.7 Specific Uses For Product	Cutting, Twisting



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**22 Tweezers – 10 cm**

a. Basic Indicative Diagram



- b. Total Length: 120 mm  $\pm$  1 mm
- c. Total Width : 9.3 mm  $\pm$  0.1 mm
- d. Total thickness: 1.2 mm  $\pm$  0.05 mm
- e. Material : -Stainless Steel
- f. Hardness: 40 - 42 HRC



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**23 Gloves for welding (Treated as consumable)**

a. Basic Indicative Diagram



- b. Made from cotton fiber or top leather
  - c. One side dots printed for better gripping
  - d. Approximate Weight - 90 gms per pair
  - e. Size - 8 inch (Approx.)
  - f. Elastic Length 2 inch
-



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**24 Leather Apron (treated as consumable)**

SPECIFICATION FOR SAFETY EQUIPMENTS GROUP ITEMS Page 3 Version 3 2018 - 19

- a. Basic Indicative Diagram



- b. Should be made from leather with pocket and straps.  
c. Should have spark resistance

24.4 Size: 31”X19”



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**25 Surface Plate – 45 x 45cms**



- a. Basic Indicative Diagram
- b. Total Length: 45cm  $\pm$  2mm
- c. Total Width: 45cm  $\pm$  2 mm
- d. Total Height: 700 mm  $\pm$  2 mm
- e. Plate Thickness: 60 mm  $\pm$  1mm
- f. Surface Plate Material: Cast Iron
- g. Surface Finish: Precision Lapped Finish.
- h. Uniformity in Hardness, Low Porosity, Non Magnetic, Easy to Clean, Rust Proof, Noncorrosive
- i. Should be useful for measuring area flatness.
- j. Suitable plywood cover should provided
- k. Provided with Mild Steel Handles for lifting



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**26 Oil Can - 500 ml**

a. Basic Indicative Diagram



- b. Metal Oil can with 500 ml Capacity
- c. 150mm rigid Steel spout
- d. Tin coated Steel body with premium powder coated finish
- e. Steel pump with double ball check
- f. Discharge of 16 - 18ml per 10 strokes with general Mobil oil.



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**27 Surface Gauge Universal – 150 mm**



- a. Basic Indicative Diagram
- b. Base should be made from case hardened steel, ground on bottom and at one end.
- c. Should have provision for Fine adjustment. This adjustment should be made by aknurled thumb screw
- d. Height: 450 mm
- e. Base length: 100 mm
- f. Width: 85 mm
- g. Scriber: 150 mm
- h. Should be supplied in Wooden / Plastic Box with proper cushioning.
- i.





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**28 Bench Vice - 150 mm Jaw**



- a. Basic Indicative Diagram
- b. Total Length:  $435 \text{ mm} \pm 2 \text{ mm}$
- c. Height:  $175 \text{ mm} \pm 2 \text{ mm}$
- d. Jaw Width:  $150 \text{ mm} \pm 2 \text{ mm}$
- e. Jaw depth:  $80 \text{ mm} \pm 2 \text{ mm}$
- f. Jaw opening:  **$150 \text{ mm} \pm 2 \text{ mm}$  to  $300 \text{ mm} \pm 2 \text{ mm}$** .
- g. Body should be made from shock resistant Cast Iron & should be free from sand holes.
- h. Malleable Steel nuts for extra tough grip.
- i. Jaw made of special carbon Steel (properly heat treated grinded).
- j. Clamping force: 3400 Kgf
- k. Built to withstand the shocks of hammering, chipping and other tough applications.
- l. Fixed base vices with an integrated anvil for shaping & beating.
- m. Extra heavy-duty sliding jaw and large diameter screw.
- n. Forged tommy bar along with the steel main screw helps in effective transmission of pressure on the work piece.
- o. Carbon Steel jaws are hardened  $50 \pm 5 \text{ HRC}$  to withstand tough use and are serrated for non-slip grip.
- p. Safety stopper provided at the end of slide prevents slide from fall during usage.





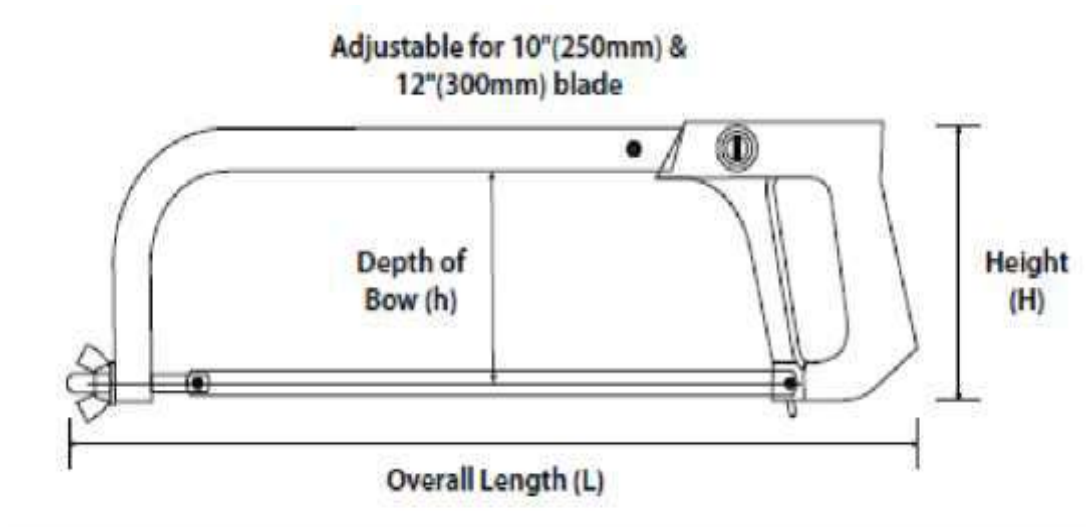
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**29 Hacksaw Tubular Metal Frame Adjustable 300 mm**

a. Basic Indicative Diagram



- b. Adjustable for 10 inch (1160mm) & 12 inch (300mm) blades
- c. The blade can additionally be set for sawing at 90°
- d. Storage compartment in the tubular bow should allow for storing spare blades
- e. Should be Fitted with a 12" (300 mm) Steel hacksaw blade
- f. Overall Length (L): 430mm + 10%

29.7 Height (H): 150 mm + 10%

Depth of Bow (H): 106mm + 10%

**Strong Frame**

Should have adjustable tension lever

Should be able to build 30000 PSI in 12 turns



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**30 Snip Sheet Metal Straight Nose - 200 mm**

a. Basic Indicative Diagram



- b. Size: 200 mm
- c. Straight Cut
- d. Made of durable Chrome Vanadium Steel
- e. Hardened & Serrated Edges for controlled cutting
- f. Cuts metal sheet upto 1.34 mm thickness & stainless Steel upto 0.7 mm thickness
- g. Ergonomic Comfort Grip handle for better comfort
- h. One hand release mechanism



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**31 Snip Sheet Metal Curved Nose 200 mm**

a. Basic Indicative Diagram



- b. Size: 200 mm
- c. Made of durable Chrome Vanadium Steel
- d. Hardened & Serrated Edges for controlled cutting
- e. Cuts metal sheet up to 1.34 mm thickness & stainless Steel up to 0.7 mm thickness
- f. Ergonomic Comfort Grip handle for better comfort
- g. One hand release mechanism



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**32 Anvil – 100 x 200 mm**

- a. Basic Indicative Diagram



- b. Size : 100 mm \* 200 mm  
c. Material: Ductile Cast Iron  
d. Suitable stand should be supplied for Anvil



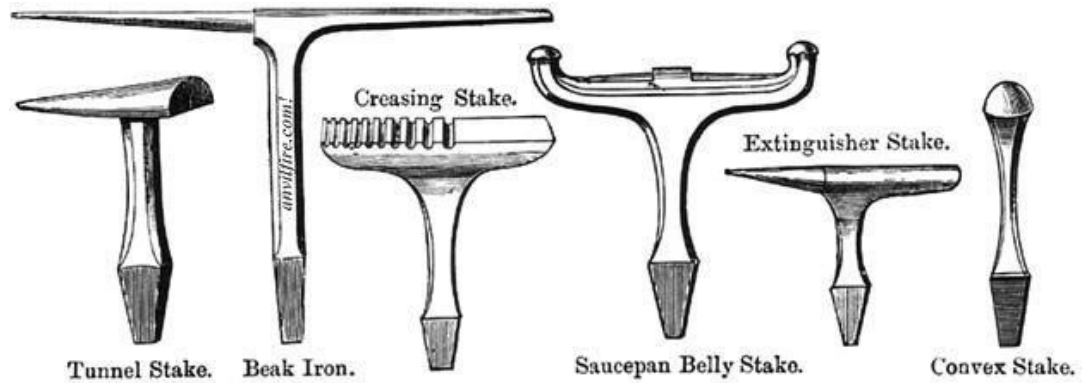
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**33 Stakes [Different Types] - 100 mm**

a. Basic Indicative Diagram



b. Types –Different

c. Material –Cast Iron

d. With Hardened Surface



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**34 Tin smith 400 mm**

- a. Basic Indicative Diagram



- b. Should have wooden handle  
c. Length: 14 inches long ( $\pm 10\%$ )  
d. Hatchet material Copper  
e. Shape: Chisel type  
f. Should be suitable for soldering





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**35 Wooden Mallet / Nylon mallet- 500gm good Finish**

a. Basic Indicative Diagram



b. Dimensions

- i. Total Length:  $325 \text{ mm} \pm 3 \text{ mm}$
  - ii. Max. Width:  $128 \pm 1 \text{ mm}$
  - iii. Min. Width:  $112 \pm 1 \text{ mm}$
  - iv. Thickness:  $60 \text{ mm} \pm 1 \text{ mm}$
- c. Wood material: Hard Wood
  - d. Handle grip is secured by a long taper
  - e. Should be light weight for fine working
  - f. Finishing: Fine finishing with body or chamfered.
  - g. Should easy to operate for operator during hammering.



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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**36 Round Punch - 3 mm, 4mm, 6mm**

a. Basic Indicative Diagram



b. Size For 3mm

- a. Length: 115 mm  $\pm$  1 mm
- b. Diameter: 8 mm  $\pm$  0.1 mm
- c. Pin Diameter: 3 mm  $\pm$  0.05 mm
  - c. Hardness: 45 - 50 HRC

d. Size For 4mm

- a. Length: 115 mm  $\pm$  1 mm
- a. Diameter: 8 mm  $\pm$  .2 mm
- b. Pin Diameter: 4 mm  $\pm$  0.05 mm
- c. Hardness: 45 - 50 HRC

e. Size For 6mm

- d. Length: 115 mm  $\pm$  1 mm
- e. Diameter: 10 mm  $\pm$  0.5 mm
- f. Pin Diameter: 6 mm  $\pm$  0.5 mm
- g. Hardness: 45 - 50 HRC

f. Should have uniformly heat treated and knurled body.

g. Black oxidized finish



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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**37 Grover set – 4 mm Forming**

- a. Basic Indicative Diagram



- b. Size 3mm,4mm,5mm  
c. Material Steel Hardened & Tempered  
d. Length 120mm  
e. Head -Square /Hexagonal



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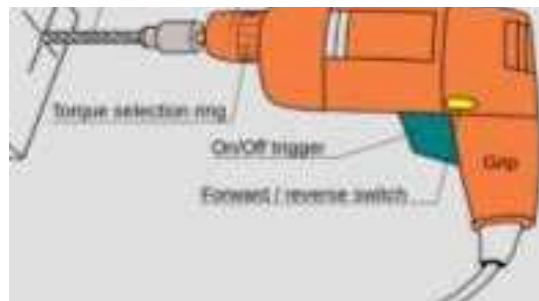
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 ( NSQF LEVEL - 4 )**

**38 Electric Drill Portable Drill with chuck and key - Capacity 6.4 mm to 12 mm capacity**

a. Basic Indicative Diagram:



a.

- b. Drilling machine should generally conforming to IS 36501 - 1981.
- c. Power input: 600 Watt (Min.)
- d. Drilling diameter:
  - i. Concrete: 13 mm
  - ii. Steel: 10 mm
  - iii. Wood: 345 mm
- e. No load speed: 0 – 2800 rpm
- f. Impact rate: 345000 bpm
- g. Should have soft in line grip for a secure hold
- h. Should have Rotating brush plate for constant power in reverse and forward rotation
- i. Should have Forward / Reverse rotation for inserting and removing screws
- j. Should be able to have Easy and precise control of the RPM - variable speed
- k. Should have double insulation – shock proof fiber body
- l. Dimensions:
  - i. Overall Length in mm ( $\pm 10\%$ ): 275 mm
  - ii. Overall Height in mm ( $\pm 10\%$ ): 180 mm
  - iii. Net Weight (without cable & blade) ( $\pm 10\%$ ): 1.7 kg
  - iv.
  - v.
- m.
- n.



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o. Protection Class: Double Insulation

p. Standard Accessories

i. Auxiliary handle = 01 no

ii. Blow moulded plastic case to securely fit all pieces for easy organization and convenient portability = 01 no

iii. Depth gauge = 01 no

iv. Spirit level (225 mm) with 3 spirit bulbs (for horizontal, vertical & angular level testing) = 01 no

v. Knife (Length - 150 mm, Blade width 15 mm) = 01 no

38.14.6 Claw Hammer (Weight 20 grams) = 01 no

38.14.7 Adjustable Wrench (Length 150 mm, Maximum jaw opening 19 mm) = 01

38.14.8 Combination Plier (Length 160 mm, Maximum jaw opening 345 mm) = 01 no

38.14.9 Measuring tape (Length 3 meter, 11 mm tape width) = 01 no

38.14.10 Drill bits

34.14.10.1 Masonry: 05 no

34.14.10.2 Wood: 04 no

34.14.10.3 HSS: 05 no

38.14.11 CRV Bit: 10 no

38.14.12 Magnetic Bit Holder: 01 no

38.14.13 Socket: 7 no

38.14.14 Socket Adaptor: 1 no

38.14.15 Assorted Screws: 30 no

38.14.16 Assorted Plastic Plugs: 30 no



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**39 Tape measuring Graduation in mm – 2 meter**

a. Basic Indicative Diagram



i.

- b. Tape length :- 02 meters
- c. Tape width: 13 mm
- d. Tape is coated with Epoxy based scratch guard material to ensure longer life
- e. Bold & Easy to read printing
- f. Ensures Class II Accuracy at 20 Degrees when subjected to tension of 50 Newton Strong Copper Rivet to ensure stronger end hoo



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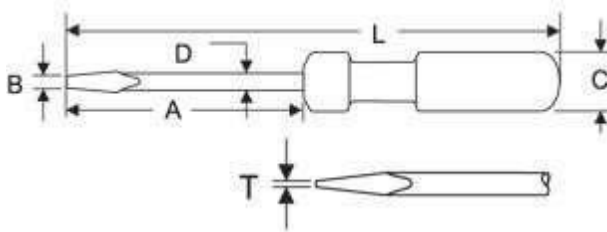
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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**40 Screw Driver Plastic Handle – 6mm Tip Length 100 to150 mm**

a. Basic Indicative Diagram



b. Generally conform to IS 844 - 1979

c. Dimensions:

Size: 6 mm X 100 mm to 150mm

Tip Bit Size: B X T: 6 mm X 0.6 mm

d. Blade:

Blade made of highgrade Silicon - Manganese Steel (EN 45 A)

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

Hardness on Tip: 55 - 58 HRC

Minimum Torque Value: 0.21 Kgm

Bright and Smooth Nickel Chrome plating finish to effectively protect blade against corrosion

e. Handle:

Material of Handle: Cellulose Acetate

Handle should be made of high grade CA Plastic, which is non - flammable &

Unaffected by oil, petrol, grease, water - practically anything

Handle should withstand rough use including hammering

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



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Handle & blade assembly should be insert moulded

f. Tip:

- i. Tip should be formed by Forging & Trimming
- ii. Tip should be precision - ground to  $10^0$  angle to ensure firm grip in the screw slot.
- iii. The Blade tip should be magnetized to lift small screw from confined places or to hold the screw in position
- iv. Tip sides & faces should be well ground with good finish. Double ear coining should be provided for the blade.







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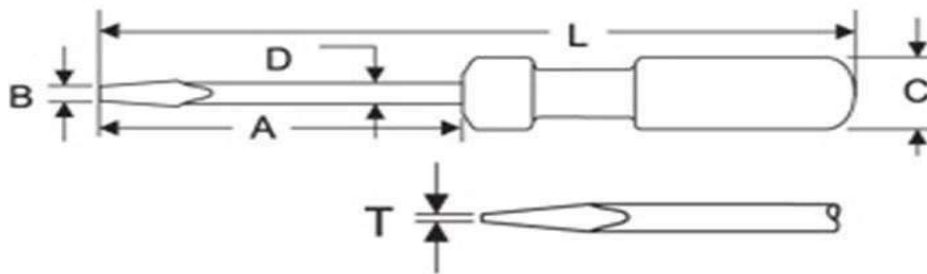
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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
 ( NSQF LEVEL - 4 )**

**41 Screw Driver Plastic Handle Flat Tip 10mm Tip 200mm & 250 mm**

a. Basic Indicative Diagram



b. Generally conform to IS 844 - 1979

c. Insulated Blade

d. Dimensions:

i. Size: 10 mm X 200 and 250 mm

ii. Tip Bit Size: B X T: 10 mm x 1.2 mm

e. Blade:

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

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

iii. Hardness on Tip: 55 - 58 HRC

iv. Minimum Torque Value: 1.46 Kg.m

v. Bright and Smooth Nickel Chrome plating finish to effectively protect blade against corrosion

f. Handle:-

i. Material of Handle: Cellulose Acetate

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

iii. Handle should withstand rough use including hammering

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

v. Handle & blade assembly should be insert moulded

vi.





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41.7 Tip:

- 41.7.1 Tip should be formed by Forging & Trimming
- 41.7.2 Tip should be precision - ground to  $10^0$  to ensure firm grip in the screw slot.
- 41.7.3 The Blade tip should be magnetized to lift small screw from confined places or to hold the screw in position
- 41.7.4 Tip sides & faces should be well ground with good finish
- 41.7.5 Double ear coining should be provided for the blade



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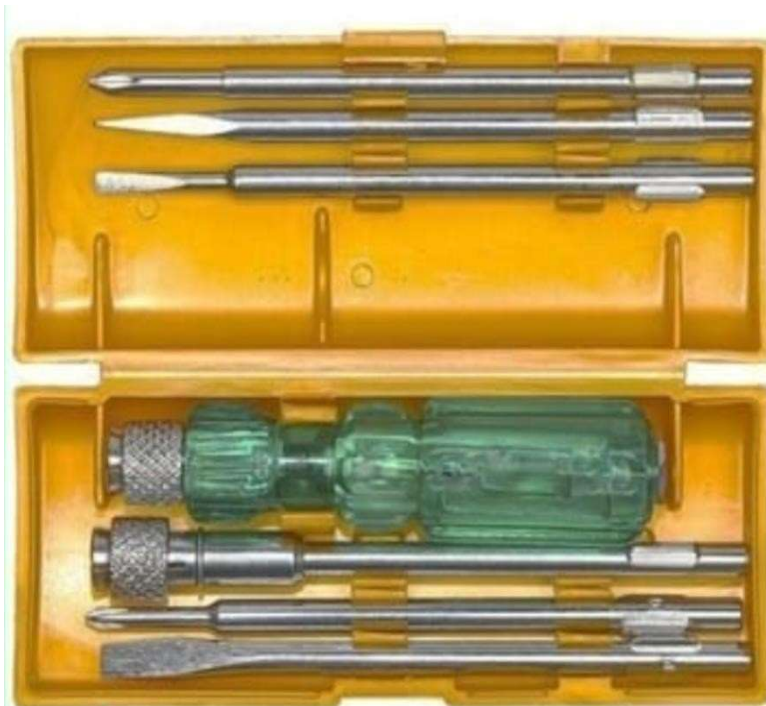
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**42 Phillips Screw Driver – Complete set in leather case**

a. Basic Indicative Diagram



b. Generally conform to IS 844 - 1979

c. Sizes:

A: 50 mm D: 3 mm TIP SIZE: 00

A : 60 mm D: 3 mm TIP SIZE: 0

A: 75 mm D: 3 mm TIP SIZE: 1

A: 100 mm D: 6 mm TIP SIZE: 2

A: 200 mm D: 8 mm TIP SIZE: 3

d. Blade made of High Grade Silicon - Manganese Steel

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

f.



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- g. Hardness on Tip: 55 - 58 HRC
- h. The Blade tip should be magnetized to lift small screw from confined places or to hold the screw in position
- i. Bright and Smooth Nickel Chrome plating finish to effectively protect blade against corrosion
- j. Handle should be made of high grade CA Plastic, which is non - flammable & unaffected by oil, petrol, grease, water - practically anything
- k. Handle should withstand rough use including hammering
- l. Handle design should be such that it gives comfortable grip even at higher torque



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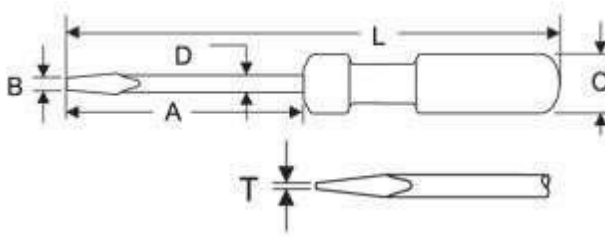


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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**43 Screw Driver Plastic Handle flat Tip – Handle 3mm TIP Length 100 to 150 mm Insulated**

a. Basic Indicative Diagram



b. Generally conform to IS 844 – 1979

c. Dimensions:

Size: 3 mm X 100mm to 150 mm

Tip Bit Size: B X T: 3.0 mm X 0.5 mm

d. Blade:

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

Hardness on Tip: 55 - 58 HRC

Minimum Torque Value: 0.08 Kg.m

Bright and Smooth Nickel Chrome plating finish to effectively protect blade against corrosion

e. Handle:

i. Material of Handle: Cellulose Acetate

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

iii. Handle should withstand rough use including hammering

iv. Handle design should be such that it gives comfortable grip even at high torques

v. Handle & blade assembly should be insert moulded

f. Tip:

Tip should be formed by Forging & Trimming

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

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

Tip sides & faces should be well ground with good finish

Double ear coining should be provided for the blade.



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**44 Soldering Iron Exchangeable Copper Tip - 65 Watt**

a. Basic Indicative Diagram



- b. This compact designed station is ideal for professional use
- c. Should be suitable for soldering
- d. Should have changeable iron plated tips are available to make the soldering station excellent for electronic and electric use
- e. Length: 20 cm ( $\pm 5\%$ )
- f. Cable Length: 150 cm ( $\pm 5\%$ )
- g. Working Voltage: 240V 50HZ
- h. Power: 65W
- i. Suitable for lead-free soldering semiconductors
- j. Iron Tips: 5
- k. Low current leakage
- l. Constant tip temperature
- m. High quality Pointed Bit for high end precision soldering
- n. Quickly attains working temperature
- o. hinner grip for high comfort





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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**45 Knife Folded stainless Steel - 150 mm**

- a. Basic Indicative Diagram



- b. Blade should be made of high grade steel for sharp and long cutting  
c. Hardness: 634 - 64 HRC  
d. ABS Plastic Body for higher strength & soft material for comfort in use  
e. Slider locking system for enhanced safety  
f. Blade Width: 18 mm



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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**46 Tong Tester(Clamp on Multimeter) 0-10-30 Amp 0-500 V**

a. Basic Indicative Diagram



1.

- b. Display: 3½ digit 569 counts LCD display with automatic sign & functions.
  - c. Jaw opening size: 32 mm
  - d. Sensing: Average sensing.
  - e. DC Voltage: 2V / 200V / 1000V.
  - f. AC Voltage: 200V / 750V.
  - g. AC Current: 20A / 200A / 300A.
  - h. Resistance: 200 Ω / 200k Ω.
  - i. Diode & Continuity Test: Required
  - j. Over range indication: OL / (1) or (-1) should be displayed.
  - k. Low battery indication: Low Battery Symbol should be displayed when the battery
  - l. Voltage drop below the operating Voltage.
  - m. Measurement rate (internal design): 3 measurements per second nominal
  - n. Operating Temperature & Humidity: 0°C to 50°C: < 70% R.H.
- 46.15. With battery removed Features
- Overload protection on all ranges
  - Recessed safety designed input jacks
  - Data Hold switch to freeze reading



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Tough ABS plastic housing

Power Supply: Single standard 9V battery.

Dimensions: 190 mm (L) x 80mm (W) x 35mm (H) ( $\pm 10\%$ )

Net Weight: 220 Grams (Excluding battery) ( $\pm 10\%$ )

Accessories

Test leads (Pair)

Battery Carrying Case Drop Proof Wrist Strap



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**47 Voltmeter AC / DC Portable Precision Grade, Digital Panel Board type 0 to 500 volts**

a. Basic Indicative Diagram



- b. Set of two meters. One for AC and the other for DC
- c. Range should be user adjustable, from 10% to 100% of the full-scale value, for simple adaptation of the digital readout to the input value.
- d. Size: 96mm x 48mm DIN-standard housings.
- e. Display
  - i. Display range: 1999
  - ii. Decimal point position: selectable by rear jumper position
  - iii. Negative display indication: “-”
  - iv. Digit height: 14 mm / 7-segment digits
- f. Overload indication: Last 3 digits blank
- g. Accuracy: Measuring Accuracy DC < 0.5% + 1 digit
- h. Temperature coefficient: 100 ppm/ C, plus
- i. Zero point drift: 200 ppm/ C

47.10 Input Current DC: 0..2mA/0..20mA/0..200mA/4..20mA

47.11 Input Voltage DC: 0..75mV/0..150mV/0..2V/0..20V/0..200V/0..500V

Input Current AC: 5A (Higher current range requires external CT)

Input Voltage AC: 0 to 500 V (50/60Hz)

Range adjustment span from: 10% to 100% of range

Auxiliary Supply

DC: 30 V  $\pm$ 15% 4W approx.



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47.15.2 AC: 500 V  $\pm 10\%$  -15% 4W approx.

Operating temperature: 0 to 50<sup>0</sup>C

Storage temperature: -40 to 80<sup>0</sup> C

Regulations and Standards

Protection class front: IP50

Climatic class: Class 2 VDE/DIN 3540

Safety class: II to IEC 348 / VDE 0411

Device safety to: IEC EN 61 010

EMC immunity: DIN EN 61 000-4-1 to 4

EMC radiated interference: DIN EN 50 081 class B



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**48, Ammeter AC/DC Portable Precision Grade Digital Panel board type belt 0 to 5 Amp**



**Basic Indicative Diagram**

Should have Low Back Depth (behind the panel) of less than 40 mm  
 Re scalable Display range: The meter should be completely programmable and users should easily scale the values as per his requirements on-field. Setting for '-ve' sign and decimal point position should also be provided  
 Should be provided with 2 Function keys so that it becomes easy and convenient for the user to program the meter without any difficulty

The meter should support bent characteristics so that the user can configure the meter as per requirement

The meter should give an accurate indication of the ambient temperature in °C and °F

Auxiliary supply : 230 V AC

Ultra Bright LED display: 14mm full range display should be possible of 4 digits having maximum count - 9999

Enclosure Protection for dust and water: Should conform to IP 50 (front face) as per IEC 60529

Compliance to International Safety standards: Should Comply with International Safety standard IEC 61010-1-2010

EMC Compatibility: Should Comply with International standard IEC 61326 Class B

Input Current: 0-5A

Max continuous input current: 120% of Nominal value

Accuracy (Voltage drop < 600mV): < 0.5% of Display End value ±1 digit for A/mA



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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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Ambient Temperature:  $\pm 3$  °C

Influence of Variations

Temperature coefficient: 0.05% / °C, plus,

Zero point drift: 0.025% / °C

Display

Type: 1 line 4-digit LED display

Display Count Setting: -9999...-10 or +10...+9999 counts

Digit Height: 14mm

Decimal point position: Configurable

Negative Display indication: '-'

Overload Indication: "- OL -" (above 125% of nominal value)

Auxiliary Supply: 230 V AC

Reference frequency

Reference Temperature: 23°C  $\pm 2$ °C

Auxiliary Supply Voltage Rated Value:  $\pm 1$ %

Auxiliary Supply Frequency Rated Value:  $\pm 1$ %

Applicable Standards:

48.20.1 EMC: IEC 61326-1:2005

Immunity: IEC 61000-4-1 up to 4. Level 3 industrial Low level

Safety: IEC 61010-1:2010, Permanently connected use

IP for water & dust: IEC60529

Pollution degree: 2

Installation category: III

High Voltage Test: 2.2 kV AC, 50Hz for 1 minute between all Electrical circuits.

Environmental:

Operating temperature: -10 to +55°C

Storage temperature: -20 to +70°C

Relative humidity: 0... 90% non- condensing

Warm up time: Minimum 3 minute

Can measure AC and DC Current



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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**49. Ammeter, AC/DC Portable Precision Grade Digital Panel Board Type 0 to 30 amp**  
 Basic Indicative Diagram



Should have Low Back Depth (behind the panel) of less than 40 mm

Re scalable Display range: The meter should be completely programmable and user

should easily scale the values as per his requirements on-field. Setting for '-ve' sign and decimal point position should also be provided

Should be provided with 2 Function keys so that it becomes easy and convenient for the user to program the meter without any difficulty

The meter should support bent characteristics so that the user can configure the meter as per requirement

The meter should give an accurate indication of the ambient temperature in °C and °F

Auxiliary supply : 230 V AC

Ultra Bright LED display: 14mm full range display should be possible of 4 digits having maximum count - 9999

Enclosure Protection for dust and water: Should conform to IP 50 (front face) as per IEC 60529

Compliance to International Safety standards: Should Comply with International Safety standard IEC 61010-1-2010

EMC Compatibility: Should Comply with International standard IEC 61326 Class B

Input Current: 0-30A

Max continuous input current: 120% of Nominal value

Accuracy (Voltage drop < 600mV): < 0.5% of Display End value ±1 digit for A/mA





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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC**  
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- Ambient Temperature:  $\pm 3$  °C
- Influence of Variations
- Temperature coefficient: 0.05% / °C, plus,
- Zero point drift: 0.025% / °C
- Display
- Type: 1 line 4-digit LED display
- Display Count Setting: -9999...-10 or +10...+9999 counts
- Digit Height: 14mm
- Decimal point position: Configurable
- Negative Display indication: '-'
- Overload Indication: "- OL -" (above 125% of nominal value)
- Auxiliary Supply: 230 V AC
- Reference frequency
- Reference Temperature: 23°C  $\pm$  2°C
- Auxiliary Supply Voltage Rated Value:  $\pm$  1%
- Auxiliary Supply Frequency Rated Value:  $\pm$  1%
- Applicable Standards:
- 49.20.1 EMC: IEC 61326-1:2005
- Immunity: IEC 61000-4-1 up to 4. Level 3 industrial Low level
- Safety: IEC 61010-1:2010, Permanently connected use
- IP for water & dust: IEC60529
- Pollution degree: 2
- Installation category: III
- High Voltage Test: 2.2 kV AC, 50Hz for 1 minute between all Electrical circuits.
- Environmental:
  - Operating temperature: -10 to +55°C
  - Storage temperature: -20 to +70°C
  - Relative humidity: 0... 90% non- condensing
- Warm up time: Minimum 3 minute
- Can measure AC and DC Current



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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC  
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**50. Megger - 1000 V**

Basic Indicative Diagram



DET2/3 Earth Tester, 0.001 Ohm to 20 kOhm, Memory Storage and USB Download + US (NEMA) Mains

Plug with English

Should provide leads - See kits and accessories for full system

should have High resolution of 1 mΩ, ideal for large ground systems

Versatile test modes

High accuracy for ground electrode grid and soil resistivity tests

Rechargeable battery power that can last all day with a fast re-charge (up to 10 hours)

Instrument with IP65 protection

Automatic test frequency selection, with filters and high current features

Diagnostic trace display

Data storage - 900,000 points

Large colour display that shows numeric and graphical results



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**51. Wattmeter Multi-Range Up to 1 KW**

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 CT ratios

Fully programmable PT ratios

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

51.18.1 52V L-L (63.5V L-N)

51.18.2 100V - 120V L-L (57V - 69V L-N)



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- 51.18.3                    230V L-L (133V L-N)  
51.18.4                    94V - 239V L-L (70V - 139V L-N)  
51.18.5                    415V L-L (239.6V L-N)  
51.18.6                    240V - 480V L-L (140V - 277V L-N)

Input Current:

Nominal input current: 5A AC RMS

- 551.19.2                    External CT to be connected to meter to step down 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: 0... 90% noncondensing

Warm up time Minimum: 3 minute

Shock: 15g in 3 planes

Vibration: 10... 55 Hz, 0.15mm amplitude



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## 52 . Multi Meter Digital Type

Basic Indicative Diagram



b.

Display Count: 4000

DC Voltage: 400mV-500V (Accuracy  $\pm 0.8\% +1$ )

AC Voltage: 400mV-500V (Accuracy  $\pm 1.34\% +3$ )

AC Current: 400 $\mu$ A -10A (Accuracy  $\pm 1\% +34$ )

DC Current: 400 $\mu$ A- 10A (Accuracy  $\pm 1.5\% +5$ )

Resistance: 400 $\Omega$  to 40M $\Omega$  (Accuracy  $\pm 1\% +34$ )

Capacitance 4nF to 100uF (Accuracy  $\pm 4\% +3$ )

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

52.15 Size: 130 mm X 75 mm X 35mm ( $\pm 10\%$ )

Compliance: CE Certificate, CAT II, ETL Certified



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Accessories

Test Lead

Manual

Required Batteries

Calibration Certificate

Plastic or Wooden Carrying Case with required cushioning



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**53. Tenon Saw - 250mm**

53. 1 Basic Indicative Diagram



Item Dimension–LxWxH  
 = 9.84 x 0.04 x 3.78 inches (25 x 0.1 x 9.6 cm)  
 Power Source Hand Powered  
 Cutting Angle 90 Degrees  
 Length 350mm  
 Blade per inch: 15  
 weight: 270g



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**54. Firmer Chisel - 6, 12, 25 mm**

Basic Indicative Diagram



Dimensions

S.N.	Total Length	Blade Length	Blade Width
54.2.1	1160 ±34 mm	130 ± 34 mm	6 ± 0.5 mm
54.2.2	1160 ±34 mm	130 ± 34 mm	12 ± 0.5 mm
54.2.3	1160 ±34 mm	130 ± 34 mm	16 ± 0.5 mm

Material: Hardened carbon Steel

Arc blade with wooden handle

Should be able to make arc groove on wood

Should be rust resistant and durable

54.7 Hardness Cutting portion: 49 - 55 HRC





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**55. Rawal Plug Tool – 6 mm**

Basic Indicative Diagram



Length: 153 mm  $\pm$  1 mm

Diameter: 6 mm  $\pm$  0.2 mm

Angle: 45 Degree

Hardness: 30 - 35 HRC

Point Diameter: 6 mm

Material: EN – 8



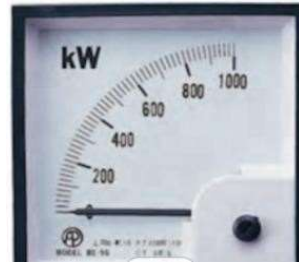
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**56. K.W. Meter 0 -1 KW**

Basic Indicative Diagram



Range: Watt Meter – 0 to 1 KW,

Analog Accuracy: Class 1.5%

Should work with single phase 230 V power supply

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.

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.

Reference Standards

Performance Standard: IEC 60051 & IS 1248

Safety standard: IEC 61010

Nominal case and cut out dimensions: IS 2419 & DIN 43700

Scale and Pointer: DIN 43802

Connection and Terminal markings: DIN 43807

Terminal bolts / leads: DIN 46200 / 46282



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Safety requirements and protective measures: IS 9249 - 1979

Front frames dimensions: DIN 43718

Environmental conditions specifications: IS 9000 part 5, 7, 8

Certifications

ERDA Type tested

CE Certified

UL Approved

RoHS complied



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**57. Fire Extinguisher- ABC Dry Powder Type 2KG Capacity**

Basic Indicative Diagram



Wall mounted type

Capacity 2Kg

Type ABC dry powder

ISI, ISO and CE Certified Product and Multipurpose Uses ABC Type fire extinguisher 2 Kg



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**58. DE Spanner 6 - 32 mm**

Basic Indicative Diagram



Generally Conform to IS 2028 - 1928

58.3 Sizes: 6X7, 8X9, 10X11, 12X13, 14X15, 16X17, 18X19, 20X22, 21X23, 24X27, 25X28, 30X32 mm

Slightly Rounded handles - Sand Blasted

Non Damaging Grip on nut due to close wrench opening tolerances

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

Salt Spray Test should be conducted

Should not have Sharp Cuts, Pit Marks, Cutting Burs

Should have Anti - Slip design Feature

Thoroughly corrosion protected with Nickel chrome finish

Deep forged from Chrome vanadium Steel (31CrV3)

Hardness: 42 - 45 HRC

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

Web should be provided in forging

Minimum Torque Values in Kg.m

58.15.1 Nominal Width A/F 6-0.6, 7-0.9, 8-1.3, 9-1.9, 10-2.5, 11-3.3, 12-4.2

58.15.2 Nominal Width A/F 13-5.3, 14-6.5, 15-7.8, 16-9.4, 17-10.9, 18-13.0

58.15.3 Nominal Width A/F 19-15.2, 20-17.50, 21-20.20, 22-22.9, 23-26.0, 24-

58.15.4 Nominal Width A/F 25-32.8, 26-36.6, 27-40.7, 28-45.0, 30-54.6, 32-65.50



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**59. Ring Spanner 6 - 32 mm**

Basic Indicative Diagram



Generally Conform to IS 2028 - 1998

59.3 Sizes: 6X7, 8X9, 10X11, 12X13, 14X15, 16X17, 18X19, 20X22, 21X23, 24X27, 25X28, 30X32 mm

Thin walled rings to provide accessibility in confined spaces

Slightly rounded handles - sand blasted to give comfortable grip

Non Damaging Grip on nut due to close wrench opening tolerances

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

Thoroughly corrosion protected with Nickel chrome finish

Deep forged from Chrome vanadium Steel (31CrV3)

Forging Finish: Should be free from forging defects such as pitted, un-filling, excess

Flash etc

A/F broaching finish should be good and should have flank bihex

Grinding finish: Partline flash is smooth & enough ground

Surface finish: Bright Ni - Cr plated

Plating thickness: Minimum 3.5 microns

Hardness: 42 - 48 HRC

Minimum Torque Values in Kgm

59.16.1 Nominal Width A/F 6-1.8, 7-2.6, 8-3.50, 9-4.6, 10-5.90, 11-7.40, 12-9.10

59.16.2 Nominal Width A/F 13-10.90, 14-13.0, 15-15.30, 16-17.80, 17-20.50

59.16.3 Nominal Width A/F 18-23.4, 19-26.6, 20-30.0, 21-31.6, 22-37.5, 23-41.6

59.16.4 Nominal Width A/F 24-46.0, 25-50.6, 26-55.5, 27-60.6, 28-66.0, 30-77.5

59.16.5 Nominal Width A/F 32-90.10



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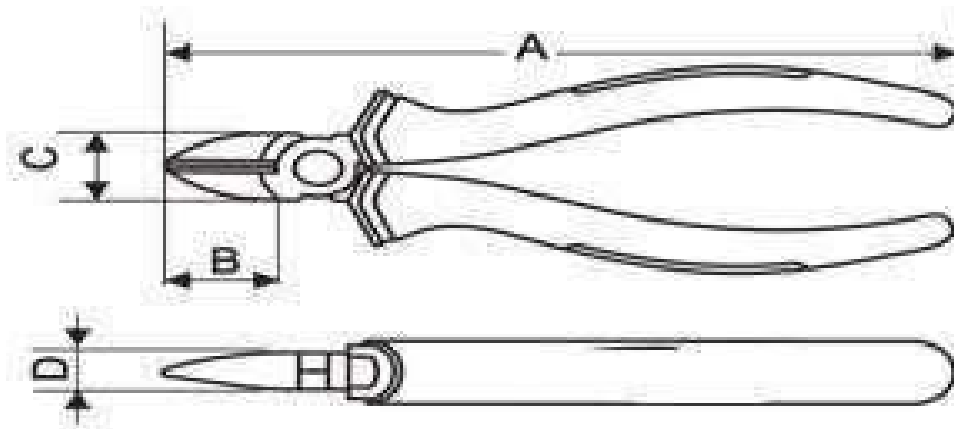


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**60. Diagonal cutter 15 cm :-**

As Per DVET, Maharashtra State SPECIFICATION FOR MECHANICAL  
 TOOLS AND EQUIPMENTS GROUP ITEMS – VOLUME 03 Sr.No:- 99 Page No.:-  
 105

**Basic Indicative Diagram :-**



Generally conform to IS 4378 - 1990

Drop Forged from High Carbon Steel & scientifically treated to give tough body (45 - 48 HRC)

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<sup>2</sup>) & Hard (140 Kg/ mm<sup>2</sup>) 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 the in wires with ease.



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**61. Service Oscillator**



Basic Indicative Diagram

Frequency Range- 125 KHz to 30 Mhz

Output Voltage – Approx.0.5V

Input Voltage–230 V

Accuracy – Approx.-/+ 5%

PANEL DETAILS :1- Power ON Indicator 2-

Frequency Readout

3- Function Selector Switch

4- Radio Frequency Output (RF)

5- Audio Frequency Output (AF)

6- Output Multiplier Switch

7- Output Control 8- Tuning Adjuster

9- Audio Frequency Control

10- External Modulation

11- Frequency Band Selector TECHNICAL SPECIFICATIONS :Carrier Frequency Ranges(7-BAND)

Accuracy of Frequency Max.

Output Voltage Internal Modulation

Frequency Output Multiplier

Output Control Power Consumption:

A 100KHz to 250KHz B, 200KHz to 500KHz C, 350KHz to 550KHz D, 500KHz to 1500KHz E  
 1.4MHz to 3.5MHz F, 3.2MHz to 10MHz G, 10MHz to 30MHz: Approx.  $\pm$  5%: Approx. 0.5V:

Approx. 1KHz: in 4 steps on 10 : 1 Ratio: Continuously variable: AC 230V, 50-60Hz. Approx. 10VA.





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**62. C.R.O. Single Beam – 5MHZ**

Basic Indicative Diagram



**SINGLE BEAM CRO**

Vertical Amplifier

Sensitivity- 5mV/Div to 90 V/Div in 12 calibrated steps in a 1, 2, 5 sequence .

Continuous control between steps reduces the sensitivity by a min of 2.5 times.

Accuracy :- +/- 3%

Band Width – DC to 20 MHz (-3db) DC coupling ,

0.5Hz to 20 MHz(-3db) AC coupling

Input Impedance - 1MV/4 pf

Rise Time – better than 18ns

Max I/p voltage – 400V (DC to AC peak)

Signal display – Built in delay line sufficient to display leading edge of the wave form.



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**63. C.R.O. Dual Trace / Double beam - 60 MHz**

Basic Indicative Diagram



Maximum Sensitivity : 5mV/div and B.W.15MHz  
 Operating Temperature : 5 to 40 degree C  
 Measuring Area : 8 x 10 Div  
 Screen type : B31 or 3B1  
 Total Acceleration Voltage : 2KV  
 Input coupling : AC/DC  
 Deflection Accuracy : +\_ 5%  
 Input impedance : 1m ohm /35 pF  
 Max Rated Input Voltage : 400v  
 Chopper Frequency : 120kHz  
 Trigger Source : CH A, B or Ext



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**64. A.F.O. Oscillators**

Basic Indicative Diagram



Frequency Range : 1Hz to 100Khz

Output Voltage : 0-10 V

Output Impedance : 50 Ohms

Input Voltage : 220v DC

Amplitude : 0-1 / 0-10v

Digital Display



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**65. Tong Close Mouth And Pick up**

Basic Indicative Diagram



Material: Mild Steel

Flat Tong: 300 mm

Length: 300 mm



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**66. Welding Table For Gas /Arc - 1200 X 760**

Basic Indicative Diagram

66.2 Length: 1200 mm,  $\pm 10\%$

66.3 Width: 760 mm,  $\pm 10\%$

Height (Including leveller): 750 mm  $\pm 10\%$

Material: Mild steel

Table top

Thickness: 16 mm

Finish: Nitride finish for weld splash, rust & scratch resistance

Should have 16 mm holes in Grid form of 50 mm x 50 mm

Should have M.S. structure with M.S. angle of 50 x 50 x 5 mm.

Should be provided with suitable GTAW, GMAW welding Gun Holder

Should be supplied with suitable KIT of Jigs/ Fixtures / Clamps (Clamping and Holding Kit) for welding of different jobs like

Square Tube Framing

Round Tube Framing

I-Beam Framing

Sheet metal Box welding

LAP joint position

Butt joint position

T-joint position.

Should be supplied with minimum ten sets of required clamps and accessories for the above jobs.

KIT Should be supplied to perform one job at a time.

All the Jigs / Fixtures / Clamps should be fit into holes on the table for quick and accurate holding and mounting the job.





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Should be provide Accessories:

Cleaning brush

Spanner set

Allen key set

Anti-spatter liquid 5 litre



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**67. Flaring Tool Set Single Type For Tube - 4.7mm to 16mm OD**

Basic Indicative Diagram



Flaring block size: 4.7mm to 16 mm OD

Suitable for Copper Tubing

With Yoke

Material Stainless Steel grade 304

Suitable for soft pipe viz. Copper, Aluminium, Brass tubing.

Must give uniform & smooth flairs with minor force, even on large diameter of the tubing.

Its hardened steel flaring cone, gives uniform flare walls 45°,

Sizes of tubing holes clearly marked on the bar & must cover 7 sizes of flares.



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**68 - Swaging Tool, Punch Type, Set Of Size For Tube - 4.7 mm to 16 mm OD**

Basic Indicative Diagram



Swaging tool size: 4.7mm to 16mm OD Copper Tube

Set of Six PCS.

Material :- Should Heat Treated Alloy Steel with chrome Plating





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**69. Swaging tool, screw type, with adaptor set of size for tube, 4.7mm to 16mm O.D.**

Basic Indicative Diagram



Flaring block size: 4.7mm to 16 mm OD  
 Suitable for Copper Tubing  
 With Yoke

Swage Adapters that Swage 7 Tube Sizes:-

**3/16" O.D., 1/4" O.D., 5/16" O.D., 3/8" O.D., 1/2" O.D., 1/2" O.D., 5/8" O.D., 3/4" O.D.**

Material Stainless Steel grade 304

Suitable for soft pipe viz. Copper, Aluminium, Brass tubing.

Must give uniform & smooth flairs with minor force, even on large diameter of the tubing.

Its hardened steel flaring cone, gives uniform flare walls 45°,

Sizes of tubing holes clearly marked on the bar & must cover 7 sizes of flares.

**NOTE :-**

Screw-type swaging tool. Far easier to work with in close quarters than punch type tools.

Perfect swaging alignment of tube every time. The three [3] hardened steel, chrome finished adapters change quickly.

Includes tool case.



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**70. Bending Spring External Type, For copper tube – 3mm to 16 mm DIA**

Basic Indicative Diagram



Size 3mm to 16mm OD

Suitable For Copper Tube

Material: Spring tube benders should be made of oil-hardened and hardened spring steel with galvanized

Should be rust proof.

Must be designed for bending thin wall tube to the precise angle (up to 180 degrees) without crimping or collapsing the pipe,

Can slide tubing easily and return to original shape after using,

Can be useful for both indoor and outdoor

Must provide a long-term service.



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**71. Pipe Cutter miniature for copper tube - 3 mm to 16 mm DIA**

Basic Indicative Diagram



Body material: Cast Iron

Holding capacity: 3 mm to 16 mm

Fast and superior cutting

Should be provided with long shank



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**72. Pinch off Tool For Copper Tube – 6mm to 18 mm DIA**

72.1 Basic Indicative Diagram



Should pinch off and re round copper tubes of the 6mm to 18mm dia.

Type Block style pinch off tool

Material : Stainless steel.

72.5 Must pinches off and locks on copper tubing and Leaves both hands free to do other work.



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**73. Ratchet Spanner – 6.4 sq.mm Reversible**

Basic Indicative Diagram



size 6.4mm

hexagonal type single

material- high carbon steel



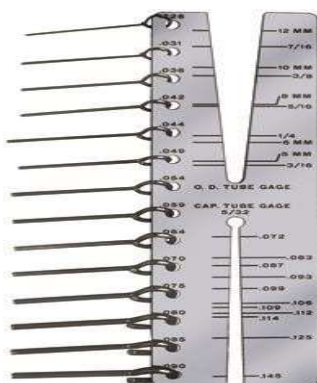
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**74. Capillary Plug Gauge**

Basic Indicative Diagram



Precision engineered with stainless steel wire plugs.

Features a specially designed file to cut and open tubes.

The numbers are etched in black for better legibility. Fourteen ID sizes from 0.026 to 0.090 and 22 OD sizes from 0.072" to 7/16" (5 to 12 mm).

Use both ID and OD calibrations to correctly determine tube size.

"V" slot must be Provided to measure OD. Pin gauge measures ID.

The cap tube file must be provided to cut and open the tube by filling a notch around the tubing at desired cutting point. Clean burrs by reaming out with the special file tip.



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**75. Pinch Off Pliers / Crimping Pliers Tool – 6mm to 18 mm DIA**

Basic Indicative Diagram



Should pinch off and re round copper tubes of the 6mm to 18mm dia.

Material : Drop forged steel jaws.

Size : throat 7", depth 1", jaw thickness 14"

Must pinches off and locks on copper tubing and Leaves both hands free to do other work.



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**76. Piercing Plier & reversing valve with access fitting - 6-18 mm**

Basic Indicative Diagram



For recovering refrigerant from defective but still pressurised refrigeration circuits.

Suitable for copper tubes.

For tube outer diameters of Size 6.4 , 9.5,12.5 and 15.8 mm

Hose connection: 1/4" SAE Flare.

Handle Material : Alloy Steel

Should Provide replaceable hardened steel needle .

Should provide spare gaskets.





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**77. Spanner Double Ended :- 4.7 mm to 16 mm**



**Basic Indicative Diagram**

Generally Conform to IS 2028 - 1998

Slightly Rounded handles - Sand Blasted

Non Damaging Grip on nut due to close wrench opening tolerances

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

Salt Spray Test should be conducted

Should not have Sharp Cuts, Pit Marks, Cutting Burs

Should have Anti - Slip design Feature

Thoroughly corrosion protected with Nickel chrome finish

Deep forged from Chrome vanadium Steel (31CrV3)

Hardness: 42 - 45 HRC

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



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Web should be provided in forging.

77.14 Sizes : 4 X 5, 6X7, 8X9, 10X11, 12X13, 14X15, 16X17

77.15 Minimum Torque Values in Kg.m

77.15.1 Nominal Width A/F 6 - 0.6, 7 - 0.9, 8 - 1.3, 9 - 1.9, 10 - 2.5, 11 - 3.3, 12 - 4.2

77.15.2 Nominal Width A/F 13 - 5.3, 14 - 6.5, 15 - 7.8, 16 - 9.4, 17 - 10.9, 18 - 13.0

77.15.3 Nominal Width A/F 19 - 15.2, 20 - 17.50, 21 - 20.20, 22 - 22.9



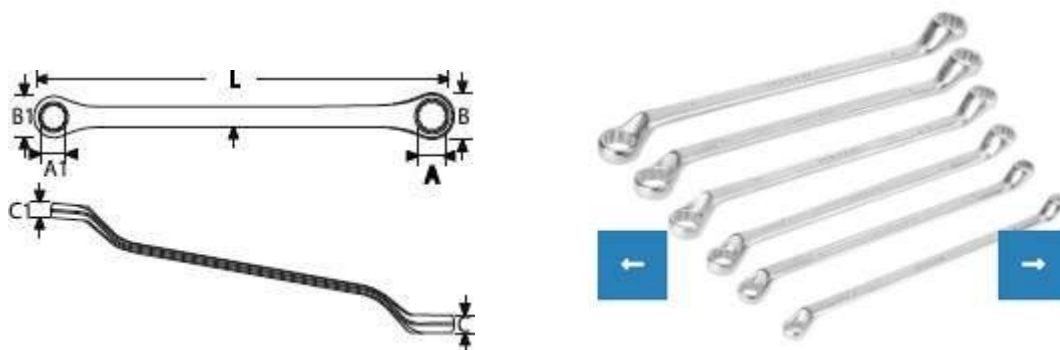
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**78. Ring Spanner off set 4.7 mm to 16 mm**

Basic Indicative Diagram



Generally Conform to IS 2029 - 1998

Slightly Rounded handles - Sand Blasted.

Non Damaging Grip on nut due to close wrench opening tolerances

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

Salt Spray Test should be conducted

Should not have Sharp Cuts, Pit Marks, Cutting Burs

Should have Anti - Slip design Feature

Thoroughly corrosion protected with Nickel chrome finish

Deep forged from Chrome vanadium Steel (31CrV3)

Hardness: 42 - 48 HRC

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

Web should be provided in forging

78.14 Sizes : 4 X5, 6X7, 8X9, 10X11, 12X13, 14X15, 16X17

Thin walled rings to provide accessibility in confined spaces

Minimum Torque Values in Kg.m

78.16.1 Nominal Width A/F 6-1.8, 7-2.6, 8-3.50, 9-4.6, 10-5.90, 11-7.40, 12-9.10

78.16.2 Nominal Width A/F 13-10.90, 14-13.0, 15-15.30, 16-17.80, 17-20.50

78.16.3 Nominal Width A/F 18-23.4, 19-26.6, 20-30.0, 21-31.6, 22-37.5, 23-41.6

78.16.4 Nominal Width A/F 24-46.0, 25-50.6, 26-55.5, 27-60.6, 28-66.0, 30-77.5

78.16.5 Nominal Width A/F 32-90.10



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**79. Wrench Adjustable – length 150 mm**

Basic Indicative Diagram



Generally Conform to IS 6149 - 1984 Grade II

Length (L): 150 mm

Plain Carbon Steel/ Cr - V Steel

Knurl adjusting mechanism for quick & precise adjustment

Built - in tension spring stabilizes movable jaw.

Laser - etched mm jaw scale for easy adjustment

Drop forged with high grade forging Steel

Play between jaws: 1.20 mm (maximum)

Hardness: 40 - 50 HRC

Minimum Torque Value: 8Kgm

Maximum Opening (A): 19 mm

Made with 15 degree head angle to allow use in narrow spaces having arc movementOf only

30 degree

Jaw Shank should not protrude out even when fully opened. In full condition,

Movable jaw should align with outer radius of the handle.

Adjustable Wrenches Black Phosphate Finish

Light weight handle design



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**80. Wrench Adjustable –length 200 mm**

Basic Indicative Diagram



Generally Conform to IS 6149 - 1984 Grade II

Length (L): 200 mm

Plain Carbon Steel/ Cr - V Steel

Knurl adjusting mechanism for quick & precise adjustment

Built - in tension spring stabilizes movable jaw.

Laser - etched mm jaw scale for easy adjustment

Drop forged with high grade forging Steel

Play between jaws: 1.20 mm (maximum)

Hardness: 40 - 50 HRC

Minimum Torque Value: 49 Kg.m

Torque Test: Should with stand torque till 52.5 Kg.m

Maximum Opening (A): 35 mm

Made with 15 degree head angle to allow use in narrow spaces having arc movement of only 30 degree

Jaw Shank should not protrude out even when fully opened. In full condition, movable jaw should align with outer radius of the handle.

Adjustable Wrenches Black Phosphate Finish

Light weight handle design



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**81. Wrench Adjustable –length 250 mm**

Basic Indicative Diagram



Generally Conform to IS 6149 - 1984 Grade II

Length (L): 250 mm

Plain Carbon Steel/ Cr - V Steel

Knurl adjusting mechanism for quick & precise adjustment

Built - in tension spring stabilizes movable jaw.

Laser - etched mm jaw scale for easy adjustment

Drop forged with high grade forging Steel

Play between jaws: 1.20 mm (maximum)

Hardness: 40 - 50 HRC

Minimum Torque Value: 49 Kgm

Torque Test: Should withstand torque till 52.5 Kg m

Maximum Opening (A): 35 mm

Made with 15 degree head angle to allow use in narrow spaces having arc movement of only

30 degree

Jaw Shank should not protrude out even when fully opened. In full condition, movable jaw

should align with outer radius of the handle.

Adjustable Wrenches Black Phosphate Finish

Light weight handle design



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**82 Valve key With handle [Treated As consumable] - 4.7 mm & 6.4mm sq.**

Basic Indicative Diagram |



One End Size 4.7 mm Sq.

Other End Size 6.4 mm Sq.

Material MS Steel with Chrome Plating

82.5	Item Dimensions	16 x 4 x 1.5 CM ( LxWxH)
82.6	Finish Type	Chrome
82.7	Head Style	Square



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**83. Pressure gauge Digital type - diameter 63 mm with recalibration set**

Basic Indicative Diagram



- Should have Re-zero feature and peak pressure reading
- Backlight should turn on when on/off button is pressed and with pressure changes
- Should have 316L welded diaphragm seal
- Case Size: 2.5" (63mm)
- Case material: ABS (IP64)
- Rubber Boot: Silicone rubber (IP65)
- LCD Display: 2" x 3/4" (48mm x 16mm)
- Connection: 1/4" Flare 304SS
- Sensor: 316L Welded, Piezo
- Operation Life: 1 million cycles
  - Power Supply: 2 x AAA battery (1.5V)
  - Battery Life: 2 years (auto shut-off mode)
  - Power Mode: Auto or manual shut off mode
  - Display Digits: 4 digits to 5,000 psi
  - Five digits for 10, 000 psi





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Resolution: 1 digit

Pressure Unit Selection: psi, mm H<sub>2</sub>O

Operation Mode: Continuously reading or peak pressure reading

Accuracy:  $\pm 0.5\%$



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- 84. Compound Gauge Digital type, diameter 63mm, with recalibration set screw, scale vacuum 760mm. Pressure 15 Kg/sq.cm**

Basic Indicative Diagram



Should have Re zero pressure with Vacuum and peak pressure reading  
 Backlight should on when on/off button is pressed and with pressure changes  
 Should have 316L welded diaphragm seal  
 Case Size: 2.5" (63mm)  
 Case material: ABS (IP64)  
 Rubber Boot: Silicone rubber (IP65)  
 LCD Display: 2" x 3/4" (48mm x 16mm)  
 Connection: 1/4" Flare 304SS  
 Sensor: 316L Welded, Piezo turn  
 Operation Life: 1 million cycles  
 Power Supply: 2 x AAA battery (1.5V)  
 Battery Life: 2 years (auto shut-off mode)  
 Power Mode: Auto or manual shut off mode  
 Display Digits: -30" Hg to 5,000 psi  
 Resolution: 1 digit  
 Pressure Unit Selection: psi mmH2O  
 Operation Mode: Continuously reading or peak pressure reading  
 Accuracy:  $\pm 0.5\%$



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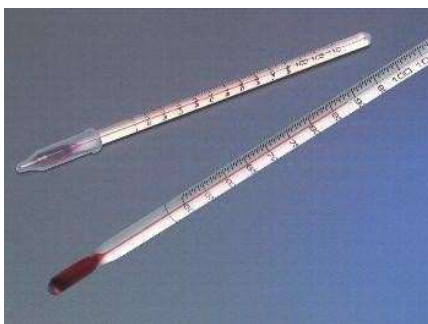
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**85. Service man thermometer in metal case -30degree C to +110 degree C**

Basic Indicative Diagram



Min Temperature = -30 degree Celsius

Max Temperature = 110 degree Celsius

Division 0.5 degree Celsius

Thermometer fill : Mercury

Stem Material : Glass

Provided with Metal case.



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**86. Scissor, Gasket cutting, Stainless Steel - length 25cm**

Basic Indicative Diagram



Material: Tampered Scissor

Should have Brass Handle

Should be suitable for right hand use

Working Part Hardened to 52-56 HRC

86.6 Size: 250 mm (+/- 10%)

86.7 Should be able to cut Asbestos Gasket Shee



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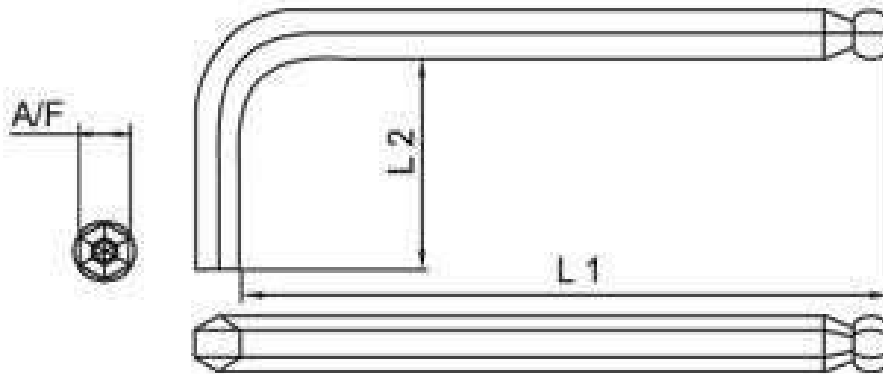
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**87. L-Allen key - set size 1.5 mm to 6.4 mm**

Basic Indicative Diagram



Generally conform to I.S 3082 - 1988 pipe 117.3 Sizes in mm

Made from high grade alloy Steel - Chrome Vanadium Molybdenum (S34) 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

Specially coated and Oiled for rust prevention



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**88. T-Allen key set size 5/32" to 1/8"**

Basic Indicative Diagram



Made with chrome-vanadium steel, rust-resistant chrome coat

Precisely-machined Allen wrench L keys for snug fit

Long arm design for extended reach

Ball-end design, entry angle of up to 25°

Higher Hardness 57 - 62 HRC

Specially coated and Oiled for rust prevention



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**89. Pipe cutter with built in reamer and space cutter, for copper tube 3 mm to 32 mm**

Basic Indicative Diagram



Body material: Cast Iron

Fast and superior cutting

Suitable for copper tube cutting

Should be provided with long shank and reamer



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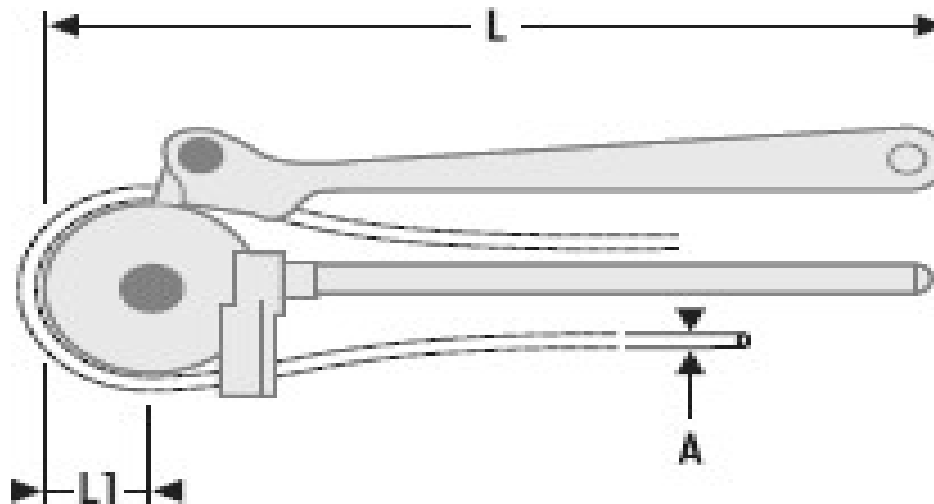
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**90. Pipe /Tube bender lever type - 3-16 mm**

Basic Indicative Diagram



To shape pipes in cold drawn or annealed copper

Bending angle measurement (0 degrees to 180 degrees)

Made in forged and machined Steel

Can be carried on a tool box

Set consisting of 3.0mm to 16mm





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**91. Spanner double ended 19 mm to 31.8 mm**

Basic Indicative Diagram



Generally Conform to IS 2028 – 568

Sizes: 19mm to 31.8mm

Slightly Rounded handles - Sand Blasted

Non Damaging Grip on nut due to close wrench opening tolerances

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

Salt Spray Test should be conducted

Should not have Sharp Cuts, Pit Marks, Cutting Burs

Should have Anti - Slip design Feature

Thoroughly corrosion protected with Nickel chrome finish

Deep forged from Chrome vanadium Steel (31CrV3)

Hardness: 42 - 45 HRC

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

Web should be provided in forging

Minimum Torque Values in Kgm



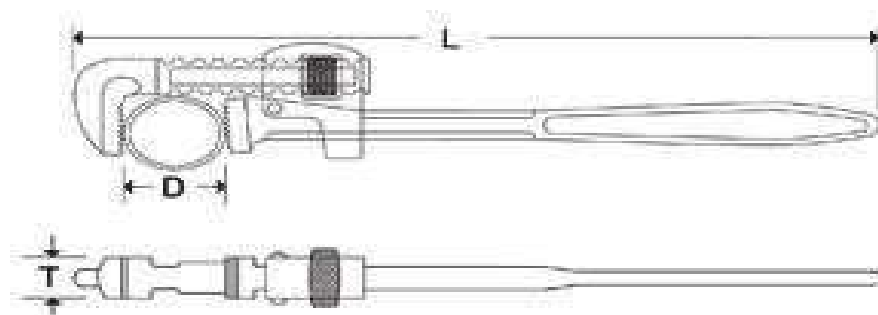
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**92. Pipe wrench size 50mm to 150mm**

Basic Indicative Diagram



Generally Conform to IS 4003 (I) 1978

Length L: 150 mm

Opening D: 50 mm

Suitable to pipe size: 25 mm

Jaws should be dropped forged from high grade carbon Steel

Differential Hardness pattern of the handle & jaw permits resistance teeth & tough body  
 Hardness

Jaws: 50 - 60 HRC

Jaw Shank: 35 - 45 HRC

Torque Value: 51 Kg.m

Jaws should have precision machined integral teeth with included angle of 76 degrees

to provide best matching, strength & firm gripping, without biting on jobs

Should be provided with conical compression springs to balance the movable jaw

properly so that forward and backward action is possible.

High grade malleable Cast Iron housing

Heat treated rivets of carbon Steel

Heat treated and specially knurled nut

Phosphated and painted to guard against rust



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**93. Electronic Leak Detector for HFC, HC & R-22**

Basic Indicative Diagram:



Micro-processor control with advance digital signal  
 High – low leak sensitivity selector

Detection of Gas

93.4.1 CFCs e.g.R12, R11, R500, R503 etc.

93.4.2 HCFCs e.g. R22, R123, R124,R502 etc.

93.4.3 HFCs e.g.. R134a, R404s, R125 etc.

93.4.4 HC e.g. R-600a, R-290 etc

Probe length: 13.98 inches flexible Stainless Probe

Auto Power Off

Warm up time : 90sec

Max sensitivity: to halogenated refrigerants, 0.11 oz yr

Battery life: 30 hours under normal condition

Working temperature: 0°C~52°C

93.11 Working mode: Continuous and no limit

Reaction time: instant

Resetting time: 2 seconds

Warm-up time: about 6 seconds

Size: 9 x 2.6 x 2.6 inches

Power supply: 3V DV, 2 x C batteries

Package includes: 1 Detector, 1 Sensing Tip, 1 User Manual



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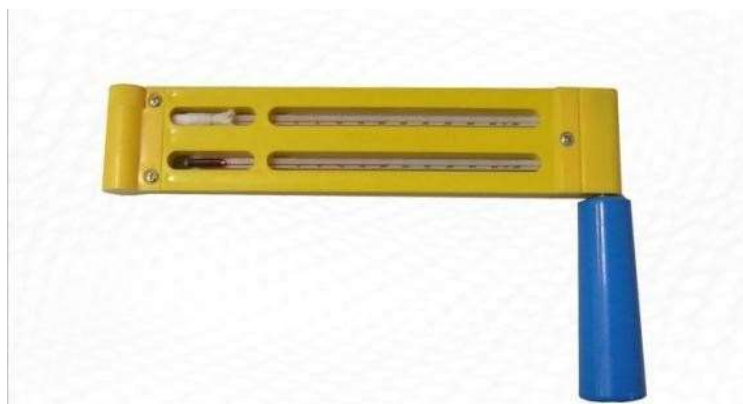


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**94. Sling Psychrometer mounted on Aluminium back,**

**Scale :- -10 Degree C to + 50 Degree C**

Basic Indicative Diagram:



Made in accordance with BS2842.

Housed in a yellow plastic case with whirling Handle.

Thermometer should be filled with Red Spirit.

Supplied with Hygrometric tables, spare wick and instructions.

Made out of two thermometers mounted on a frame which rotates around a handle, so it can be whirled in the air by hand.

One thermometer is covered with a tight-fitting muslin sock which is kept wet by preferably with distilled water.

Thermometer can measure ambient air temp. from  $-10^{\circ}\text{C}$  to  $110^{\circ}\text{C}$ .



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**95. Lapping plate - 250 mm x 200 mm**

Basic Indicative Diagram



Float Glass Lapping Plate 250mm x 200mm x 08 mm Thick

Type -Toughen Glass



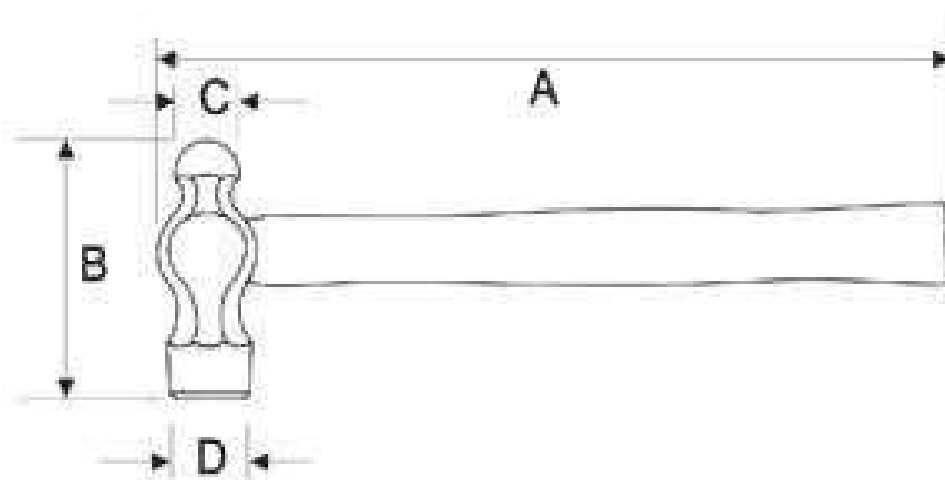
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**96. Hammer ball peen 450 gms**

Basic Indicative Diagram



Generally conform to I.S. 841 – 1983

Ball Peen Hammer

Length: 300 mm + 10%

Weight: 450 grams

Drop forged from high grade carbon Steel

Material: EN - 9

Partially hardened up to 46 - 56 HRC on striking surface

Depth of Hardness: 6 mm

Phosphatide and painted

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



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**97. Puller 3 legged with flexible arm - 300 mm.**

Basic Indicative Diagram



Should generally conform to I.S 9193 - 1988

No of Jaws: 3

Minimum Spread: 35 mm

Maximum Spread: 300 mm

Drop forged jaws made of carbon Steel

Hardness: 35 - 45 HRC

Reversible Jaw design to enable inside and outside operation

Jaw Design should allow flexibility of use in shallow or deep spaces

Screw threads should be precision maintained

The Pulling force should be equally distributed evenly on the bearing or gear to

Facilitate smooth and fast operation without any damage to bearing or gear

Protective cap on screw end to increase life of screw tip. The centre screw is provided

With a special adjustable cap for better gripping.

Screws should be black anodized

Jaws, link plates, protective cap and connecting bolts should be plated



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**98. Hand blower portable complete - 1/10 HP**

Basic Indicative Diagram



Should have dual function blower with blowing and extracting functions

Power: 1/10 HP Motor

Should have air flow of 4.5 cubic meters per min for powerful cleaning performance

Should have variable speed control for extra versatility in different applications

Should have ergonomic handle design and good weight of balance to reduce fatigue

Should easy-to-change carbon brush allows fast servicing

Should have 3-meter power cord for more flexible work





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**99. Spirit level precision metallic 200mm**

Basic Indicative Diagram



Size: 200 mm

Accuracy: 0.50 mm/ meter

Precision milled base for high accuracy

Have a solid spirit bulb which doesn't break easily.

The Aluminium 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 moulding 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



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 ( NSQF LEVEL - 4 )**

**100. Stop Watch**

Basic Indicative Diagram:



100.2 Timing : 23Hrs, 59Min, 59sec

100.3 Accuracy : +/- 3 sec/day

100.4 Alarm : yes

100.5 Time Base : Quartz oscillator

Minimum time interval: 48 Hr

Digital Display

Minimum Elapsed time at Roll over : 1hr



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**101. Tap set with matching drills - 3 mm to 16 mm**

Basic Indicative Diagram



- 101.2 Tap Size-03 mm to 16 mm
- 101.3 Material -HSS
- 101.4 Tap Set of 3 Pcs. each
- 101.5 Provided Suitable Drill For each tap size.
- 101.5 Drill Material High speed Steel /High Carbon Steel.
- 101.6 Tap and Drill Size Chart must be supplied.
- 101.7 Wooden Box should be provided to Keep the drill and tap safely.



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**102. Tap set with matching drills - 1/4" to 5/8"**

Basic Indicative Diagram



Tap Size-01/8 inch to 5/8 inch

Material -HSS

Tap Set of 3 Pcs. each

Provided Suitable Drill For each tap size.

Drill Material High speed Steel/High Carbon Steel.

Tap and Drill Size Chart must be supplied.

Wooden Box should be provided to Keep the drill and tap safely.



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**103. Refrigerant cylinder - 2.5 Kg**

Basic Indicative Diagram



Type Refillable

Fitted with service Valve Brass

Capacity 2.5 kgs.

Specification – IS – 3196.2(Pt2)

HydroStatic – Stretch test  $50\text{kg}/\text{cm}^2$

103 .7 Pnuematic leakage test-  $10\text{kg}/\text{cm}^2$

Max working pressure –  $26.71\text{kgf}/\text{cm}^2$

Valve confirms to IS3224

Fabrication, Testing & Markings are to be done as per Gas Cylinder Rules 2004 of Explosive Act, 1884 & IS: 123000

Warranty: The contractor shall furnish a warranty against defective workmanship and materials for minimum period of 12 months from the date of safe delivery at the site of purchaser for the cylinders.



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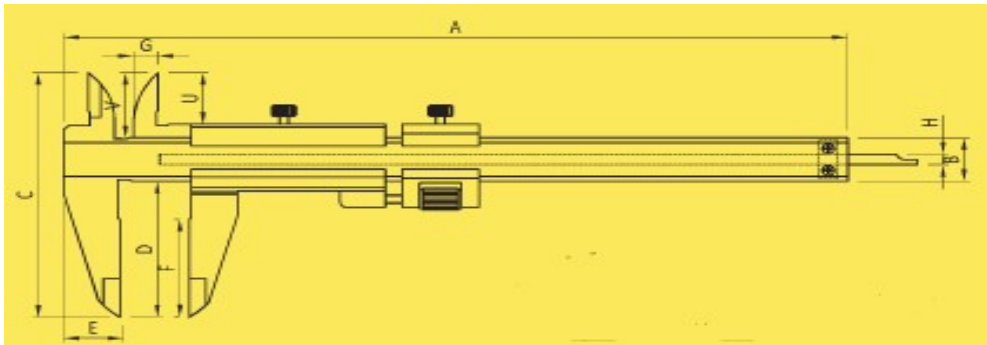
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**104. Vernier Calliper - length 250 mm.**

Basic Indicative Diagram:



Compliance: Generally Compliant to DIN 8634

Range: 0 mm - 250 mm

Overall Length: Approx. 400 mm

Lower jaw length: Min. 60 mm

Upper jaw length: Min. 116 mm

Graduation: 0.034 mm

Accuracy:  $\pm 0.05$  mm

Material: Stainless Steel / Alloy Steel

Standard Accessories:

Operating Manual

Wooden / Plastic Box with proper cushioning



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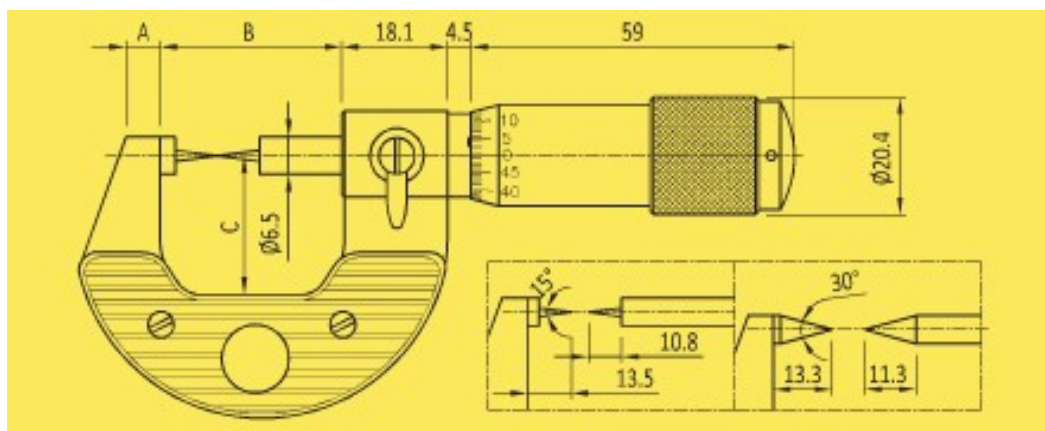
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**105. Micrometer Outside measurement - 0 to 25mm.**

Basic Indicative Diagram:



Compliance: Generally Compliant to DIN 889

**Range: 0 mm -25 mm**

Reading: 0.01 mm

Accuracy: 4  $\mu$ m

Point angle of spindle in Degree: 30 Degree

Material: Stainless Steel / Alloy Steel

Standard Accessories:

Suitable spanner

Wooden / Plastic Box with proper cushioning

Operating Manual



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**106. Heating kit with infrared bulb - (200 W capacity)**

Basic Indicative Diagram



Power Consumed: 200W

Overheat Protection

Voltage 230V AC





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**107. Plumbing hammer weight 200 gm**

Basic Indicative Diagram



Approx. weight of Hammer 200 gram

Mallet Diameter: 30 mm

Mallet should be made of Cellular Acetate Material

Striking part (Head) should be replaceable

Handle

Material: Should be made of cold rolled mild Steel pipe and should be chrome plated

Handle should be fitted with rubber grip sleeves.

Handle fitted firmly to hammer head so that it does not come out after long



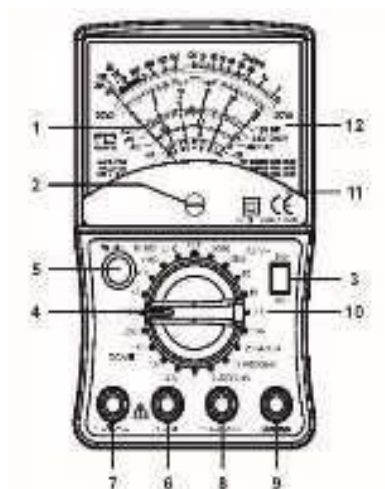
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**108. Multi meter analogue type**

Basic Indicative Diagram:



108.2 DC Voltage Ranges: 0.25/1/2.5/10/50/250/1000V

Accuracy:  $\pm 2\%$  F.S.

Sensitivity: 50kohm /V

108.5 AC Voltage: Ranges: 2.5/10/50/250/1000V

Accuracy:  $\pm 3\%$  F.S.

Sensitivity: 10kohm /V

Decibel Meter: -20 to 62dB (0dB=1mW/600 $\Omega$ )

Direct Scale: -20 to + 10dB

DC Current Ranges: 25uA/1mA/25mA/500mA

A (on separate input):

Accuracy:  $\pm 2\%$  F.S.

Sensitivity: 250mV

AC Current Ranges: 10A

Accuracy:  $\pm 3\%$  F.S.



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Resistance Ranges: Rx1 (0.2 to 20k $\Omega$ ), Rx10 (2 $\Omega$  to 200k $\Omega$ ), Rx100(20 $\Omega$  to 2M $\Omega$ ), Rx1K  
(200 $\Omega$  to 20M $\Omega$ )

Zero Corrector: Required

Polarity Reversal Switch: Required

Range Selector: Required Features :

108.20.1 EN 61010-1 CAT III 600V

108.20.2 EN 61326 -1



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**109. Tachometer digital, multi range - 0 RPM to 3000 RPM, Portable small size in leather case**

Basic Indicative Diagram



Display: 4 digits 18mm LCD White Backlight display  
 Sampling Time (internal design): 0.8 Sec (Over 120 RPM)  
 Test Range: Auto Ranging  
 Range I: Non- contact: 0 to 3000 RPM  
 Range II: Contact: 0 to 3000 RPM (Surface speed 0.05 to 569.9 m/min)  
 Accuracy:  $\pm (0.05\% + 1\text{digits})$   
 Resolution: Non-contact, 0 to 3000 RPM - 0.1 (34.5 ~ 999.9) / 1 RPM (over1000RPM)  
 Contact: 0.1 RPM (0.5 to 999.9 RPM) / 1 RPM over 1000 RPM  
 Surface speed: 0.01m/min (0.05 to 99.99m/min), 0.1m/min (over 100m/min)  
 Memory: Last value, Max Value, Min Value  
 Detecting Distance: 50 to 500mm (photo)  
 Operating Temperature: 0 to 50 °C  
 Operating Humidity: Less than 80% RH  
 Power Consumption (Internal Design): Approx. 95mA



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Dimensions with Adaptor: 25 (L) X 70 (W) X 43 (H) mm ( $\pm 10\%$ )

Net Weight: Approx. 78 Grams excluding batteries ( $\pm 10\%$ )

Power Supply: 3 x 1.5 V AA Size Battery

Other Features

Photo Light Pointer

Automatic Data Hold

Auto Power Off

Low Battery Indication

Response Time 500ms

Accessories

Carrying Case

Surface speed Test Wheel

RPM Adapter (Cone)

RPM Adapter (Funnel)

Pieces of Reflecting Tape (350mm)

User Manual



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**110. Micron vacuum gauge - capable of reading up to 20 microns**

Basic Indicative Diagram



Should be precisely designed

High Accuracy

Auto shut off

Built in Hanger conforms to the IP classification 54.

Connection: Standard male 1/4 inch SAE

Capable of reading up to 20 Microns

Continuous reading of measured values during the evacuation process out in the field

Power Supply 3\*1.5 V AAA /LR03 Battery.

Units :-Pascal , Microns, mbar, Torr, mTorr, psi, inches of Hg.



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**111. Sensor thermometer (digital) = - 50 Degree Celsius to 150 degree Celsius**

Basic Indicative Diagram



Temperature Range: -50 to 150 degree Celsius

Display Resolution:  $\pm 0.1$

Temperature Reading Accuracy:  $\pm 1$  degree Celsius

The module is powered by a pair of LR44 batteries



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**112. Fin straightened / fin comb. - With strong steel wire-based combing on wood**

Basic Indicative Diagram



Handle made with good Plastic material.

Can cleans and straightens fins for better operating efficiency

Teeth Material:- Stainless steel

Teeth tension can be Adjustable

Suitable for Copper / Alluminium fins

Size: Approx. 150 X 25.4mm





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**113. Feeler gauge - 0.05 mm to 1 mm**

Basic Indicative Diagram



Material: Spring steel C-60

Hardness: 48 -62 HRC

Range: 0.05 mm to 1.0 mm

Accuracy: As per T34 grade tolerances

No. of Blades: 13 to 16

Finish: Fine Polished

Uses: Feeler gauges each leaf should be made by fine blanking

Each leaf should have permanent marked leaf thickness in metric & English

Stacking: Each assembly should be stacked with external cover duly marked with

Model size with tightening screw in plastic pouch



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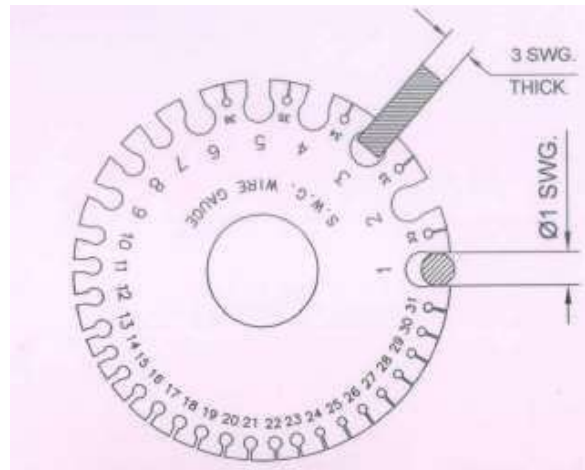
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**114. Wire gauge Metric & with worth - Steel plate embossing converse of British & Metric**

Basic Indicative Diagram



Material: Stainless - X12CrMnNi18-9-5

Thickness: 1.0 mm

Hardness: 30-35 HRC (specially hardened)

Finish: Polished 34B / Antiglare Satin Chrome

Surface roughness: 0.6 microns max

Range: 0 To 36 SWG (incremental of 1 gauge)

Measuring least count: 36 SWG (0.19 mm)

Accuracy: Within + 0.05 mm

Should be supplied in Wooden / Plastic Box with proper cushioning



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**115. Dial Thermometer Remote Control, Armoured capillary, dial 75mm - 50°C to +50°C**



Basic Indicative Diagram:

- 115.2 Back flange surface mount, bottom connection
- 115.3 Actuation: Liquid Mercury Gas
- 115.4 Dial Size: 75 mm
- 115.5 Temperature Range: -50 to 50 degree Celsius
- 115.5 Capillary length: 4 feet of 0.040 "Dia.
- 115.6 Stainless steel or black steel case
- 115.7 Vapour actuated
- 115.8 Panel mounted (Front Flange or U-Clamp)
- 115.9 Dual scale (°F & °C)
- 115.10 ASME B40.200 complaint



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**116. Anemometer Digital type**

Basic Indicative Diagram:



Wind Speed: 0~30m/s

Resolution: 0.1m/s

Accuracy:  $\pm 5\%$  rdg + 5dpts

Wind Scale: Level 0~12

Temperature: -10°C to 50°C, Accuracy  $\pm 1^\circ\text{C}$

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



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Current Consumption:

Working:  $\leq 25\text{mA}$

Power off:  $\leq 10\mu\text{A}$

Working Environment:

Temperature:  $0\sim 40^{\circ}\text{C}$

Humidity:  $\leq 80\% \text{ RH}$

Accessories:

Operating Manual

Calibration Certificate

Plastic or Wooden Carrying Case with required cushioning, with required Batteries



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**117. Compressors testers for Small Hermetic compressors .  
 Fixed with electrical input / output, indicating facilities**

Basic Indicative Diagram



Operating Voltage :- 230V AC

Suitable for Hermetically sealed comp. 1/8 HP to 3HP

Equipped with Suction and Discharge Pressure Gauge.

HP / LP Cut out should be Provided.

Proper size angle Stand must be provided.



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**118. Electrical Accessories (Treated as consumable) – Current & Potential Relay, Start & Run capacitors, PTCs, OLP, Relay contactors**

**118 A) Current coil relay 1/8 HP & 1/6 HP**  
 Basic Indicative Diagram



**18 B) Potential Relay (For 1.5 Ton AC)**



Basic Indicative Diagram

**118 C) PTC Relay**  
 Basic Indicative Diagram





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**118 D) OLP (1/8 HP & 1/6 HP)**



Basic Indicative Diagram

**118 E) Starting Capacitor (40/60 mfd & 60/80 mfd & 80/100 mfd)**



Basic Indicative Diagram

**118 F) Running Capacitor (25 mfd & 36 mfd & 45 mfd)**

Basic Indicative Diagram



**NOTE – All items treated as consumable. All items required 01 No. each**





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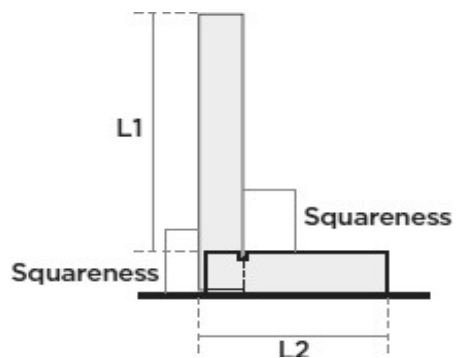
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**119. Engineers Square – 150 mm with 5' tolerance**

Basic Indicative Diagram



Dimensions

Total Length: 150 mm

Total Width: 100 mm

Stock Length: 90 mm

Stock Width: 30 mm

Stock Thickness: 12 mm

Blade Length: 125 mm

Blade Width: 30. mm

Blade Thickness: 1 mm

Material: Mild Steel

Should be Fine Finish, Durable and Rust Proof.



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**120. Digital thermometer (Treated as consumable) - Graduated disc analogy type**

Basic Indicative Diagram



Display: 3½ digit liquid crystal display (LCD) with maximum reading of 1999.

Temperature Range: 0°C ~ 1000°C

Basic Accuracy:  $\pm(0.3\% + 1^\circ\text{C})$ .

Temperature Type: K-Type

Thermocouple °C / °F Selection: Required .

Data Hold Function: Required Resolution: 0.1 °C / 1 °C

Battery: Standard 9V battery (NEDA 1604, IEC 6F22)

Probe 1 No. type "K" thermocouple bead probe (125°C, Teflon tape insulated)

Probe accuracy  $\pm 2.2^\circ\text{C}$  or  $\pm 0.75\%$  of 0.75% of reading (whichever is greater) from 0°C to 800°C

Dimensions: 160 (L) x 80 (W) x 40 (H) mm (including Holster) ( $\pm 10\%$ )

Net Weight: 220 g (Excluding battery) ( $\pm 10\%$ )

Accessories : 9V Battery

Holster and "K" thermocouple bead probe - 1 Number (upto 125 deg. C

User Manual



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**121. Temperature & Humidity recorder. Capacity to record 24 hrs. record**

Basic Indicative Diagram



Humidity range: 0.0-99.9%  
 Temperature Range: -40.0 to 70.0°C

121.4 Accuracy:  $\pm 0.5$  °C,  $\pm 4.0$ % RH

Housing: IP 40

Resolution: Temperature: 0.1 Degree Celsius; Humidity: 0.1%

LCD Display: 43 mm X 33 mm

Other Features:

Up to 16000 data record point

Low power Indication

Real Time Clock RTC

Auto Dormancy and wake up function

Maximum / Minimum display and alarm function

Sampling time Settable

Dimensions ( $\pm 10$ %): 110 X 75 X 30 mm



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Net Weight ( $\pm 10\%$ ): 140 g (Including Battery)

Power Supply: ER 14250 Lithium battery, 3.6 V

Accessories

Carrying Case

Battery Installed

PC Software

USB Cable

User Manual



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**122. Electronic Leak Detector Digital type, Capable to detect of R-134a, HC, R-22**

Basic Indicative Diagram:



Micro-processor control with advance digital signal  
 High – low leak sensitivity selector

Detection of Gas

- 122.4.1 CFCs e.g.R12, R11, R500, R503 etc.
- 122.4.2 HCFCs e.g. R22, R123, R124,R502 etc.
- 122.4.3 HFCs e.g.. R134a, R404s, R125 etc.
- 122.4.4 HC e.g. R-600a, R-290 etc

Probe length: 13.98 inches flexible Stainless Probe

Auto Power Off

Warm up time : 90sec

Max sensitivity: to halogenated refrigerants, 0.11oz yr

Battery life: 30 hours under normal condition

Working temperature: 0°C~52°C

Working mode: Continuous and no limit

Reaction time: instant

Resetting time: 2 seconds

Warm-up time: about 6 seconds

Size: 9 x 2.6 x 2.6 inches

Power supply: 3V DV, 2 x C batteries

Package includes: 1 Detector, 1 Sensing Tip, 1 User Manual



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**123. Instrumentation screw driver set 100mm**

Basic Indicative Diagram



1 bit driver

Set of 31 pieces viz 30 bits and  
 Philips bits of size 0, 1, 2, 3 4 Nos

- 123.2.2 Flat bits of size 2.5, 3.0, 4.0, 5.0, 6.0 mm 5 Nos
- 123.2.3 Torx bits T9, T10, T15, T20, T25, T30, T40 7 Nos
- 123.2.4 Tri wing Bits 1, 2, 3, 4 4 Nos
- 123.2.5 Hex bits of size 2.0, 2.5, 3.0, 4.0, 5.0, 6.0 - Total 6 Nos

Square bits of size S0, S1, S2, S3 - 4 Nos

Bit Driver 1 No

Material: CRV Steel

Finish: Satin finish

Handle: Made from Polypropylene + Thermo Plastic Rubber

Bits

Material: CRV material (or better high special quality Steel)

Finish: Sanding grey finish

Hardness: 57 - 62 HRC

Special coating & rust prevention oil for protected against corrosion.

Philips Screw Driver Bits generally conform to IS 12168 Part II 1978

Hex Screw Driver Bit generally conform to IS 12481 - 1988

Tip should be precision ground to ensure firm grip in screw slot

Dimensions: Width - 50 mm, Height - 100 mm, Depth 50 mm



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**124. Digital weighing machine - 20 kg capacity Accuracy 1 gm**



**Basic Indicative Diagram**

Capacity: 100Kg  
 Scale Type: Platform Type  
 Weighing Scale Approval  
 Legal Metrology Department, India  
 Class III Approved  
 Readability (gms): 20 gms  
 Platform Size (mm): 600 mm x 600 mm Display  
 Green Vacuum Florescent Display (VFD)  
 6-digit  
 Height (minimum): 14 mm  
 Platform Material: SS304  
 Temperature Range: 0- 45 degrees  
 Power Supply: 230 V AC 50 Hz



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### 125. Recycling Unit

#### Basic Indicative Diagram



Recycle refrigerant - R-410A, R-32, R-134a  
 Recycle method Liquid recycle method (possible to vapor recycle)  
 Recycle method Electric statistic separation reclaim method  
 Power supply V / Hz 220–240V 1-phase / 50/60 Hz / 8A minimum  
 Compressor 750W (1HP) Oil-free  
 Dimension (LxWxH) mm 562 x 538x 976  
 Weight kg - 60  
 Electric current operation A / Hz 8.0/6.0 / 50/60  
 Operating temperature °C 5-35  
 Degrees of protection IP10  
 Noise value dB (A) Max 75.8 at normal operating condition (in accordance with  
 2006/42/EC cl. 1.7.4.2

Applicable cylinder Refrigerant Recycle Cylinder (minimum working pressure of 400psi) 125.14

Recycle rate a) R-410A = 220                      b) R-32 = 100                      c) R-134a = 100





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**126. Quick Coupler / Self sealing coupler [Treated as consumable] - 1/4" & 3/8"**

Basic Indicative Diagram



126.2 Sizes- 1/4", 3/8"

Material :- Zink Alloy

Thread Type - BSPT



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**127. Schrader valve (Used in Air Conditioner) – Treated as consumable**

Basic Indicative Diagram



Type: Valve Core Remover Tool

Material: Steel or brass

Remover Tool size :- 1/4" 5/16"

Quantity: 12pcs Valve Core and 2pcs Remover Tool



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**128. Cylinder 134a - 5 kg**

Basic Indicative Diagram



Refillable

With cylinder service valve

Heavy Duty

Capacity 5KG

Specification – IS – 3196.2(Pt2)

Hydrostatic – Stretch test  $50\text{kg}/\text{cm}^2$

Pneumatic leakage test-  $10\text{kg}/\text{cm}^2$

Max working pressure –  $26.71\text{kgf}/\text{cm}^2$

valve confirms to IS3224

Fabrication, Testing & Markings are to done as per Gas Cylinder Rules 2004 of Explosive Act,  
 1884 & IS: 123000

Warranty: The supplier shall furnish a warranty against defective workmanship and materials for minimum period of 12 months from the date of safe delivery at the site of purchaser for the cylinders.



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**129. Recovery Cylinder R-22 - 10 kg capacity**

Basic Indicative Diagram



Capacity 10kg

Type- 3 pieces welded

Specification – IS – 3196.2(Pt2)

Fabrication, Testing & Markings are to done as per Gas Cylinder Rules 2004 of Explosive Act, 1884 & IS: 123000

HydroStatic – Stretch test  $50\text{kg}/\text{cm}^2$

Pneumatic leakage test-  $10\text{kg}/\text{cm}^2$

Max working pressure –  $26.71\text{kgf}/\text{cm}^2$

valve confirms to IS3224

Inspection and test – cylinder should be supplied with BIS test certificate

Warranty: The contractor shall furnish a warranty against defective workmanship and materials for minimum period of 12 months from the date of safe delivery at the site of purchaser for the cylinders.



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**130. Recovery and Recycling Machine – Suitable for R-22**



Basic Indicative Diagram

With Accessories

Rubber Hoses 2 mtr. Long – 03 Nos

Empty Cylinder size – 10 Kgs. - 01No.

Digital Weighing Scale 20 Kgs

Should provide suitable pressure gauges, comfortable handle, and simple controls

Must Handles almost all refrigerants - CFC, HFC, and HCFC refrigerants

Provided with twin-cylinder, oil-less compressor , capable of recovering both liquid and vapour

Power Consumption 3/4 HP, 220v V AC, 50 Hz



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Equipped with oversized condensers and fan to ensure maximum cooling performance and Shortercycle times.

Dimensions-17 L x 9 W x 12 H inches

High pressure safety shut-off switch automatically shuts machine off if pressure rises above 550 PSI;

Provided with self-purge feature to eliminate potential for cross-contamination and saves time.



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**131. Gas Charging Station suitable for R-22 along with 10 kg capacity digital weighing  
 balance LC 1 gm Vacuum pump High efficiency Blanking 50 Micron**

Basic Indicative Diagram



Vacuum Pump: 2 Stage Rotary Type

Motor: 0.5 HP

131.4 RPM : 1450

With Gauge Manifold

Vacuum Pulling Capacity : Up to 50 microns

With Microns Vacuum Gauge

Provided with Gas Charging Cylinder of 5 KG-1 No. and 10 kg- 1 No.

Provided with Graduated Charging Cylinder

Drier: 1/4" Flare [ DM25 ]

With Hand Shut off Valve 1/4"Flare x 1/4"Flare



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With Ammeter ( 0 to 30 Amp) and Voltmeter ( 0 to 500 VAC)

141.13 Provided with High Pressure Gas Charging Hoses / Lines that can with stand 2000 to 2200 psi Pressure :- 2 Nos.

Digital Weighing machine of 10 KG

Suitable for R22 , R134 ,R 32 , R410 .





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**132. Split phase induction motor - 5 HP, 230V**

Basic Indicative Diagram



Power : 5 HP

Voltage input : 220V 50/60 Hz

Body Material : Aluminium Casting

Speed :1440 to 1500 RPM



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**133. Capacitor start induction motor 5 HP, 230 V**

Basic Indicative Diagram



Single Phase 230v AC

Power : 5HP

Speed : 2980 RPM

Body : Aluminium Casting

Insulation : Class c



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**134. AC 3 Phase motor, 400/50 Hz - 2 H.P.**

Basic Indicative Diagram



Capacity : 2 HP

Power input : 400 V / 50 Hz

134.4 RPM : 1800

Foot Mounting

Material : Rolled Still



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**135. Star delta starter - 2 HP,**

Basic Indicative Diagram



Suitable For 2HP

Current Rating : 30A

Material : Metal Box CRCA Sheet

OLP :Variable with 0 to 60 sec.

Indication Lamp : RYB

Push Button



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**136. Auto Transformer Starter - 3 HP**

Basic Indicative Diagram



Panel Construction – Bolted Type , Panel with PU Foam Gasket.

Sheet

Enclosure -2 mm CRCA

Mounting Plate – 2.5 mm CRCA

Cable Gland Plate-.5 mm CRCA

Cable Entry – Bottom

Foundation Chanel – ISMC-75

Lifting Angle – 50\*50\*6mm angle

Painting – Structure Finish Power Coating

Air cooled Auto Transformer

Frequency of operation – 6 Starts/Hr.

Starting Time 12 Sec.

Thermal Cut Off – In Built.

Contactors – AC 3 ,Duty Rated at 55 Deg.C ambient

Protection –

Incomer – MCCB with Rotary Handle.

Overload – Through Thermal Overload Relay.



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Earth Leakage- ELR +CBCT

U/V,O/V- Electronic Relay.

Control Supply – HPC Fuse,Link/DP MCB

Metering and Indication-

96\*96 mm Voltmeter with Selector Switch

96\*96 mm Ammeter with Selector Switch

LED Type ON and Trip Indication.



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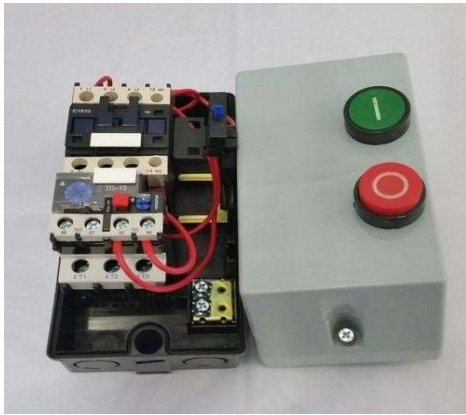
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**137. D.O.L. Starter 2 HP**

Basic Indicative Diagram



Current Rating :7A

Power Rating : 2HP

Moulded case Circuit Breaker

Proximity Sensor

Push Button And Indicator

warning Light And Siren



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**138. Portable air - LPG brazing kit - 2 kg LPG cylinder, torches, hoses, stand**



Basic Indicative Diagram

LPG Cylinder Capacity : 2KG

With ; set of different Torch Nozzles

8mm LPG Hose Pipe single Flex Double Layer :- Length 3 mtr

Hose must be produced accordingly BS 5120, ISO 3821, EN 559, DIN 8541, SIS 278265, I.S. 714.

Tube: Seamless. Synthetic rubber suitable for welding gases.

Reinforcement : High tensile synthetic fibers.

Colour: Red.

Hose must be Weather, heat and abrasion-resistant.

High Pressure Regulator Material:

- Brass CDA-360,
- Brass IS-319 Grade III
- Brass Free Cutting High Grade & any special brass material composition

Brazing Torch Made regulator body and bonnet are specially forged from extruded brass rod thus eliminating casting porosity. The forged body can withstand one and half times the full cylinder pressure.

Torch Size - 12 inch.

Style : Gun With Gas Canister





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**139. Oxy-acetylene welding set complete - cylinders, regulators, welding torches with difference nozzles**

Basic Indicative Diagram



Torch

Should have ANM nozzle for use with Acetylene

Should have “ Positive suction” NM nozzles to safeguard the torch and operator from “sustained backfire” or “flashback”.

Maximum cutting thickness: 300 mm

Length of torch: 450 to 500 mm

Weight of torch: 1 to 1.5 Kgs :

pressure Regulators :

133.3.1 Compliance: generally conforming to IS: 6901 - 2009.

Should have stainless steel diaphragm in first stage to absorb shock of inlet pressure up to 230 bar.

Should have forged brass bonnet in first stage and die cast special alloy bonnet in second stage for higher strength.

Should have Teflon moulded valve at the heart of the regulator and stainless steel machined & ground valve spindle in the valve assembly capsule in both stages for leak proof performance.

Should have distinctive colour for pressure adjusting knob labels.

Weight: 2.40 Kg.



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Should have self-adjusting safety valve, Double protection through separate safety valves in first and second stage.

Should have second stage plenum chamber volume is six times than first stage ensuring very stable flow characteristics.

Hose Pipe

Should be manufactured as per IS 447

Diameter: 8 mm

Length: 10 Meters

Should be highly flexible and electrical resistant

Should be light in weight and abrasion resistant

Colour: RED

Core: Plasticized PVC

Reinforcement: High Tensile Polyester Yarn

Cover: Hyper Flame Retardant Thermo-compound

Temperature Range: -400C to +550C

Working Pressure: 200PSI / 15bar

Minimum Bursting Pressure: 800 PSI / 55bar

Minimum Bending Radius: 25mm



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**140. Refrigerator – 165 litres carrying with HFC 134a & HC (single door- direct cool)**

Basic Indicative Diagram



BEE Star Rating as on date(Central Ministries/ Departments while procuring shall ensure that the items carry 3 star or higher Star Rating of BEE) - 3 to 5 star

Storage Volume (NET CAPACITY) (Liters) : 165 Ltrs or 190 litres

Voltage : 220/230 Volts

Shelf Type : Glass

Freezer Capacity : 25 Ltr

Body Material : Steel

Certification : Star Rating

Refrigerant : HC/ HFC

Insulation – Polyurethane (PUF)

Type of Door – Single Door



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**141. Frost free refrigerator – 200 Liters carrying with HC blend**

Basic Indicative Diagram



BEE Star Rating as on date (Central Ministries/ Departments while procuring shall ensure that the items carry 4 star or higher Star Rating of BEE) :- 3 to 5 Star

Storage Volume (NET CAPACITY) (Liters) :- 200 Litres to 250 litres

Voltage : 220/230 Volts

Shelf Type : Glass

Freezer Capacity : 65 Ltr

Body Material : Steel

Certification : Star Rating

Defrost System : Frost Free

Refrigerant : HC/ HFC (Eco Friendly Refrigerant)

Type of Door :- Double Door



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**142. Three / four door refrigerator - 300 Litres carrying with HC - R-600a**

Basic Indicative Diagram



BEE Star Rating as on date (Central Ministries/ Departments while procuring shall ensure that the items carry 4 star or higher Star Rating of BEE) :- 3 to 5 Star

Capacity	: 300 Litre.
Voltage	: 220/230 Volts
Shelf Type	: Glass
Freezer Capacity	: 73 Ltr
Body Material	: Steel
Certification	: Star Rating
Defrost System	: Frost Free
Refrigerant	: HC 600a
Special Feature	: Stabilizer Free Operation
Type of Door	:- Three Door
Insulation	- Polyurethane (PUF)



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**143. Bench Drilling Machine - 20 mm capacity, 200 to 2500 RMP**



Basic Indicative Diagram

Specification

Drilling Capacity (in Steel) 0-20mm

Column Diameter 74.35 mm

Spindle Centre to back distance 200 mm

Spindle nose to table distance 405

Spindle nose to base distance 635 mm

Table Travel 250 mm

Taper in Spindle MT.2

Number of Speed 8 Speed

Range of Speed 86 to 3360 RPM

Table Size 260 x 260 mm

Base Size (Machined Area) 250 x 220 mm



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Overall Base Size 450 x 295 mm

Spindle Travel 125 mm

Column Length 900 & 1220 mm

Overall height with pulley Guard 1100 mm

V. Belt Section A. 42

weight (Approx.) 90 Kg.

Motor 1440 RPM 3 Phase 440 Volts 1 H

Provided with Standard Accessories motor pulley , Drill drift Key , Machine Light Holder,

Drill Chuck Key , Drill Arbour MT 2 , Drill Sleeve No.2-3



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**144. Grinding Machine - 200mm, 3000rpm, Double Ended 1/2 HP.**

Basic Indicative Diagram



Wheel Size :- 200mm Dia.\*25 mm thick ( A36 and A60)

Wheel Centre distance : 404 mm (approximately)

Pedestal material Good quality CI casting.

Electric Motor :-1/2 HP. 1Phase , 440 VAC

RPM :- 3000 RPM

provided with Push button starter with Over load Relay.

Coolant Pump Motor :- 1/10 HP fitted on coolant tank tray.

Machine should be vibration free.

Provided with drill grinding attachment.





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**145. Evacuating and refrigerant charging station, consist of**

- a) Rotary two stage vacuum pump and motor (with gas ballast and anti-suck back)
  - b) Manifold with gauges and valves and capable of pulling vacuum up to 50 microns of Hg and with provision of connecting to a microns level vacuum gauge
  - c) Graduated charging cylinder with provision for temperature correction and all necessary isolating valves
- ii) Evacuating and charging station as above but fitted with weighing scale  
 (Cap. 2 kg in lieu of (b) above and with accuracy of +/- 1g for charging Hydrocarbons)



Basic Indicative Diagram

Vacuum Pump : 2 Stage Rotary Type

Motor : 0.5 HP

145.4 RPM : 1450

With Gauge Manifold

Vacuum Pulling Capacity : Up to 50 microns

With Microns Vacuum Gauge

Provided with Gas Charging Cylinder of 5 KG



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With Graduated Charging Cylinder

140.10 Drier : 1/4" Flair [ DM25 ]

With necessary Hand Shut Off Valve size :- 1/4"Flare x 1/4" Flare

Provided with Ammeter and Volt Meter

Must provide High pressure Gas Charging Hose/ Line (can withstand 2200 psi pressure)

Digital Weighing Scale for HC Capacity 2 KG



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**146. Two stage Rotary vacuum pump. Capacity approx. 60 – 10 rmp capable of evacuating to 50 microns of Hg and fitted with gas ballast, anti-suck back valve and single-phase motor.**

Basic Indicative Diagram



Rotary vane 2-stage  
 Field blank off 50 microns  
 Intake connection :- 1/4" and 5/16" Male flares  
 Motor 1/2 HP - 1725 rpm  
 Thermal overload protection Yes  
 Voltage (single phase) 230V / 50 Hz  
 Power cord 6' - motor mounted switch  
 Oil capacity :- Approx. 36 oz.  
 Dimensions Approx. :- 16" L x 6" W x 11.5" H  
 Net weight 30.3 lbs. (13.7 kg)  
 Capacity :- 3 to 4 cfm



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**147. Air compressor, two stage for oil less dry air, with rust proof tank assembly, heater and controls max. pressure 10 kg/sq.cm, capacity 45 liters. Motor 1 HP.**

Basic indicative diagram



Should have two pressure gauges, one for pressure setting in the receiver and one for regulating the outlet pressure from the receiver.

Should have pressure switch with overload protection keeps the compressor safe even in voltage fluctuations.

Should have oil dipstick with vent hole keeps a check on oil level in the oil sump and releases excess pressure.

Should have pressure regulator to regulate the outlet pressure from the tank.

Should have plastic shroud keeps the hot and moving parts safe and prevents any Air Comp accidents.

Should have shock absorber pad effectively absorbs the vibration generated during operation and keeps the whole unit stable.



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Should have large wheels (125 mm diameter) to enhance the portability of the compressor.

Should be supplied with Poly Urethane retractable hose for attaching any equipment

Cylinder block should be made up of cast iron that prevents wear & tear thus imparting longevity to the unit

Crankcase & cylinder head should be made from aluminium

Pump head should be directly coupled with the motor for reliable and quiet operation.

Motor Rating: 1 HP

Cylinder: 1 stage

Air receiver capacity: 45 litres

RPM: 2850 fad (free delivery) 170 lpm / 6 cfm max.

Pressure: 116 PSI / 8 Bar

Noise level: 80 db

Dimensions

Width: 600 to 650 mm

Depth: 300 to 350 mm

Height: 550 to 600 mm

Weight: Min 35 Kg

Electric Supply: 230V, 1 Phase, 50 Hz



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**148. Reciprocating compressor, Provision of capacity control etc. for demonstration.  
 Capacity 9000Kcal/hr., semi hermetic or open type.**



**147.1 Basic indicative diagram**

Open type, 2 cylinder, single stage reciprocating compressor

Bore / Stroke: 160 mm / 110 mm.

Swept Volume: From 265.4 Cubic meter per hr To 1327.0 Cubic meter per hr (at 1000 rpm)

Refrigerant: R-22, R134a, R-717 (NH<sub>3</sub>) & other HFC's (Ozone friendly refrigerant)

Capacity – 9000 kcal/hr.

Fabricated modular rugged construction



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Superior COP values at full and part load operation

Low cost :- Capital cost, operating cost, maintenance cost

Easy site maintenance and troubleshooting

Low vibration and noise level

CE approved



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**149. Dry N2 Cylinder 2 Stage regulator or commercial N2 in cylinder with drier unit and 2 stage regulator and 7 meter cube.**

Basic Indicative Diagram



Provided with

Two stage pressure regulator

High pressure hose with suitable adaptor

Cylinder must withstand with  $14\text{kgf/cm}^2$  pressure

Cylinder Material-Carbon Steel

Should be as per IS-7285/88

Cylinder valve-Brass Material, right hand thread 5/8inch BSP female

Cylinder should be tested at  $250\text{ kg/cm}^2$





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**150. Split A.C. - 1 Ton with R-32 or R-410A Refrigerant**

**Basic Indicative Diagram**

Cooling Capacity 1.0 ton

Refrigerant - R32 / R410A

Compressor- Rotary type

Operating Current approx. 7 to 8 Amp

BEE Star Rating :- 3 to 5 star

Power supply – 220-240 VAC (50Hz)

Condenser coil Corrosion Resistant Blue Fin Condenser (material copper)

Evaporator Coil Corrosion Resistant Blue Fin Condenser (material copper)

With remote control circuit

Machine design for 52 deg. C ambient temp

Technology of air conditioner - Inverter AC - Variable Speed

Classification by function - Cooling only (Cooling and dehumidification during cooling mode)

AC Machine warranty (in Year) – 1

Warranty on compressor (in Years) – 10

Installation - Standard Installation included (Scope of installation as per STC attached)

**Out Door Stand :-**

Material - Made Up of heavy duty GI steel (for maximum strength)

Type: Wall Mountable,

Finish: Powder Coating .



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**151. Recovery unit with Cylinders CFC, HFC & HCFC**

Basic Indicative Diagram



With Accessories

Rubber Hoses 2 metre. Long – 02 Nos

Empty Cylinder size – 05 Kgs. - 01No.each for CFC ,HCFC ,HFC

Digital Weighing Scale 10 Kgs

Should provide suitable pressure gauges, comfortable handle, and simple controls

Must Handles almost all refrigerants - CFC, HFC, and HCFC refrigerants including R-

410A

Provided with twin-cylinder, oil-less compressor , capable of recovering both liquid and vapour

Power Consumption 3/4 HP, 220v V AC, 50 Hz



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Equipped with oversized condensers and fan to ensure maximum cooling performance and shorter cycle times.

Dimensions-17 L x 9 W x 12 H inches

High pressure safety shut-off switch automatically shuts machine off if pressure rises above 550 PSI;

Provided with self-purge feature to eliminate potential for cross-contamination and saves time.



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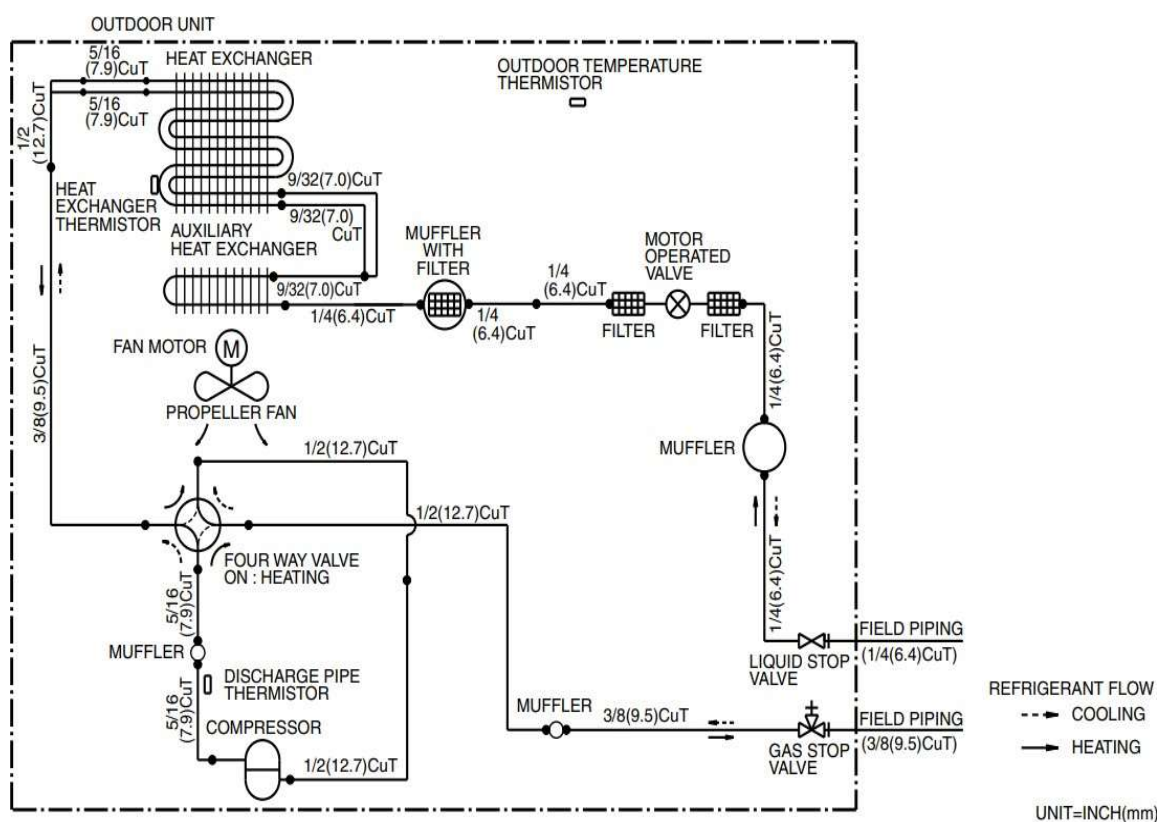


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### 152. Heat Pump – 3000 kcal / hr.

#### Basic Indicative Diagram



3D062171A

Capacity Rated (Min.~Max.) A) Cooling = 12,000 Btu/hr.

B) Heating = 16,000 Btu/hr.

Running Current (Rated) = 4.30 to 5.64

Power Consumption Rated (Min.~Max.) - A) Cooling = 860 Watt

- B) ) Heating = 1,160 Watt

Piping Connections = Liquid Line -  $\phi$  1/4" (6.4 mm)



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Piping Connections = Suction Line -  $\phi$  3/8" (9.5 mm)

Heat Insulation = Both Liquid and Gas Pipes

**Indoor Unit**

Airflow Rate = 494 cfm

Fan = Cross Flow Fan

Air Filter = Removable / Washable

Temperature Control = Microcomputer Control

**Outdoor Unit**

Compressor = Hermetically Sealed

Condenser = Fins type (copper coil and aluminium fins)

Refrigerant = R-410A or R-32

Airflow Rate = 1,262 cfm

Fan = Propeller

**Installation - Standard Installation included**



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**153. Cassette Air Conditioner 4500 kcal / Hr.**

Basic Indicative Diagram



Mounting type ceiling

Voltage:- 230 V AC Single Phase

Cooling Capacity 1.5 ton

Power Consumption 1536 W

BEE Star Rating- 3 to 5 star

Air Flow- 730 cfm

Refrigerant R32 / R410A

Suitable for 52 Deg.C ambient temp

AC Machine warranty (in Year) – 1

Warranty on compressor (in Years) – 10

150.12 Technology of air conditioner - Inverter AC - Variable Speed

Classification by function - Cooling only (Cooling and dehumidification during cooling mode)

Installation - Standard Installation included (Scope of installation as per STC attached)



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**Out Door Stand :-**



Material Made Up of heavy duty GI steel (for maximum strength)

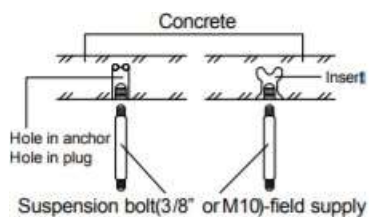
Type: Wall Mountable,

Finish: Powder Coating .

Compatible with: Air Conditioners 1.5 TON Capacity,

Load carrying capacity up to 200 kg (Best in class) AC out Door Stand

**Indoor unit Hanging kit :-** Should provide suspension bolts (use W3/8 or M10 suspensionbolts)





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**154 . De-scaling pump set with stainless steel impeller and Housing complete with motor 1/2 HP and accessories.**



Basic Indicative Diagram

Material

Impeller – Stainless steel

Flow Rate – 40 L /min

Max head 20m

Chemical handling – All commercial available acid, alkaline solutions, chlorine soln.

Max temp: – 70 deg. C

Water inlet and dump hose reinforced material

With fresh water flush facility





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**155. Small capacity Shell and tube type condenser 5 Ton with Cu tubing only.**

Basic Indicative Diagram



Capacity 5 ton

Material

Tubes material of construction – sa179, bs3059, astm a312 tp-304 316

Shell – carbon steel P265GH

Tube sheet – carbon steel P265GH

Coolant reversing cover – cast iron

Equipped with pressure relief Valve

Can with stand 500 psi pressure.

Shell and tube type condenser 5 Ton with copper tubing only with mounting plates.

Finned copper tube 3/4" OD

No. of copper tube- 24 Nos

Provided with with Air purging Valve.

Cooling Medium : - Water



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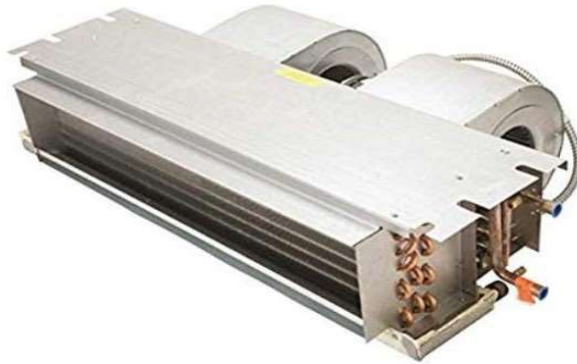


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**156. Fan coil unit with water valves (2 & 3 way)**

Basic Indicative Diagram



Cooling Capacity - 1TR

156.3 Size – 884 x 490 x 251 mm

Sound level – below 36Db

Noise control level:- 31Db

Chilled water temp Inlet 7 deg. C

Outlet temp. 14 deg. C

Equipped with inlet and outlet isolating valve

Coil Material :- copper

fins material:- Alluminum.

Chilled Water Pipe line Material :- GI /MS

Equiped with Suitable size blower with Elect.cabling .

Provided with suitable size MS Structure frame



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**157. Shell and tube, DX Chillers (small ) - 5 Ton with Cu tubing only**



Basic Indicative Diagram

Cooling capacity 5 Ton

Tube material:- Copper : Nickel (70:30) seamless tube

Shell material MS / Carbon steel (P265GH)

Baffle plate material- MS / Carbon steel

Tube sheet-MS / Carbon steel

Dish End Material :- MS.

Suitable for 5 degree C To 15 degree Celsius water temp.

Pressure Testing :-

Shell side :- 350 psi – Pneumatic

Tube side : -150 psi – Hydraulic

chiller Shell must be as per design codes IS, ASME & TEMA

Tubes material of construction – sa179, bs3059, astm a312 tp304 316

Painting: Synthetic enamel paint after two coats of red oxide primer

Suitable for water cooling

Provided with suitable size MS Structure frame.



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**158.Circulating water pump (small) - 0.5 H.P. with stainless steel tank,  
 Capacity 20 litres with inlet / outlet provision.**

Basic Indicative Diagram

TDA-75



Power supply 230V AC- single phase

Power ½ HP

158.4 RPM 1400

Head 5-10 m

Material Mild steel or Aluminium casting

flow rate- 40-50LPM

Type self-priming pump

Water storage tank-20L

Tank material :- SS

Tank should be provided with ½ "inlet and ½ "outlet connection



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**159. Shell and tube type condenser - 5 Ton.**

Basic Indicative Diagram



Capacity 5 ton

Material

Tubes material of construction – sa179, bs3059, astm a312 tp304 316

Shell – carbon steel P265GH

Tube sheet – carbon steel P265GH

Coolant reversing cover – cast iron

Equipped with pressure relief Valve

Can with stand 500 psi pressure.

Shell and tube type condenser 5 Ton with copper tubing only with mounting plates.

Finned copper tube 3/4" OD

No. of copper tube-24 Nos

Provided with with Air purging Valve.

Cooling Medium : - Water



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**160. Rotary hermetic compressor - 2 Ton**

Basic Indicative Diagram



Capacity 2 ton

Power – 1850 Watts

Type rotary

Operating voltage 180-230V

Winding material -Copper

Refrigerant - R32/R 410a

Provided with essential accessories :- Relay ,OLP , Capacitor etc. or PCB



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**161. Screw Compressor.**

Basic Indicative Diagram



**Cooling capacity – 46.4 KW / 40 to 50 KW**

Semi Hermetic Screw Compressor

Power Source: AC Power

Voltage: 380v-415 V / 3 Ph / 50Hz

Refrigerant - Gas: R22 / R404a / R507a

Max power consumption: 33KW

Certification: CE, ROHS

Oil: Mineral oil / Polyester Oil

Max operating current :- 52.0 A

Starting current (Rotor locked) - 126.0 A

Capacity control :- 100-90-70% (Standard)

Displacement (2900 RPM 50 Hz) :- 84 m<sup>3</sup>/h or 49 CFM

Max. pressure (LP/HP) :- 275 / 400 psi

Connection suction line :- 54 mm / 2 1/8"

Connection discharge line :- 42 mm / 1 5/8"

**NOTE :- A Compressor of such low capacity is not available in the market, so the specification is written as above.**



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**162. Scroll Compressor.**



Basic Indicative Diagram.

162.2 Hermetic / sealed	
162.3 Nominal horsepower – HP	= 4
162.4 Displacement - m <sup>3</sup> /hr	= 11.7
162.5 Motor type - 50Hz	= TFD
162.6 Locked rotor current (LRA)	= 46.0 Amps
162.7 Maximum operating current (MOC)	= 7.1 Amps
162.8 Maximum continuous current (MCC)	= 8.0 Amps
162.9 Rated load current (RLA=MCC/1.4)	= 7.1 Amps
162.10 Rated load current (RLA=MCC/1.56)	= 6.4 Amps
162.11 Winding resistance at 25°C	= 3.64 Ohm
162.12 Oil quantity	= 1.5 litre
162. Make – Emerson – Copeland or Danfoss	





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**163. Bottle cooler visible – 200 Litres carrying with HFC-134a & Reciprocating compressor.**

Basic Indicative Diagram.



Dimension : 168x56x53 cm

Weight : 70 to 77KG

Capacity : 200Ltr

Including Components :

Plane Toughened Glass For Door

UV Grade Plastic Material For Inner Side

Built In Stabilizer

Temperature indicator and Controller : Digital Type

With LED Tube Light inside the cabinet.

Machine warranty (in Year) – 1

Warranty on compressor (in Years) – 1



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**164. Deep Freezer - 200 Litres, carrying with HFC-134a & Reciprocating compressor.**

Basic Indicative Diagram

Sliding Double layered Glass doors with toughened Glass Top

Gross Capacity : 200 ltr

Temperature : -18<sup>0</sup>c to -26<sup>0</sup>c

Insulation : PUF

No of Doors : 02

Power Supply : 220 VAC , Single Phase

Refrigerant : R134a / HC 600a / R-290

Energy Rating : 5 Star

Compressor :- Hermetically Sealed Compressor.

Condenser :- Air cooled Fins type with cooling Fan .

Painting: Synthetic enamel paint after two coats of red oxide primer

Number of inner storage compartments with insulated doors and - 1

Number of corrosion resistant racks - 2

Warranty of Freezer in Years (from the date of installation) - 2



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**165. Water cooler storage type – 200 Litres, carrying with HFC-134a & Reciprocating**



**compressor.**

Basic Indicative Diagram  
 Drinking Water Cooler, Storage type

storage capacity : 200 litres

Current : 4.0 to 5.0 Amps.

Input voltage - 230/240 Volt, 50 Hz, AC, Single Phase

Inner Cabinet Material : Stainless Steel - SS Grade 304

Temperature Control : Manual

Water Over Flow : 1/2 BSP

Provided with 2 or 3 or 4 Water Dispensers.

**Material of drinking water cooler body** - Fully SS with  $\geq 0.5$  mm thickness or PPGI ( Pre-painted Galvanized Iron).

**Water Tank cover lid and bottom Sheet material** - High impact Polystyrene (HIP)

**Warranty on Machine** in Years (from the date of installation) - 1

**Warranty on Compressor (in Years) - 1**



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**166. Ice Candy Plant - 2 ton with capacity to make 32 ice candy at a time with Forma tray,  
 stainless steel tank on Trolley.**

Basic Indicative Diagram



Material: Stainless Steel

Capacity : 2 Ton

Standard Design Type

Temperature Range:  $-5^{\circ}\text{C}$  to  $-26^{\circ}\text{C}$

Tank Orientation: Horizontal

Compressor : Reciprocating Type (Hermetic)

Temperature Controller: Digital Type

Provided with Ice candy Moulds

Air cooled Condenser with cooling fan .

Warranty **on Machine** in Years (from the date of installation) - 1

**Warranty on Compressor (in Years) - 1**



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**167. Walk in cooler - 3 Ton cap. with open type compressor, water cooled condenser, providing with PUF insulated room sealed proof, size 8X8X10ft maintain 0 – 5 degree centigrade.**

Basic Indicative Diagram



Capacity : 3 Ton

Temperature Range : 0<sup>0</sup>C to 5<sup>0</sup>C

Body Material : GI or Stainless Still

Insulation : PUF

Cabinet Size : 8 L x 8 W x 10H ft.

Compressor : Open type – Reciprocating or Hermetic

No. Of Door : 01

Power Supply : Three Phase – 415 v AC

Water Cooled Condenser (Shell and Tube Type)

Temperature Controller : Digital167 .12

Door Alarm

Equipped With Suitable Safety Control And Gauges.



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Separate earthing must be provided – Yes

Thermal conductivity of insulation - 0.17w/w2k or better for hot zone climate

Minimum thickness of insulation - 100 millimeter

Outer and inner panels - Powder coated, Galvanised steel panels, Double wall having thickness 22SWG each

Roof and panel skin material - Stainless steel of grade 304

Construction - Pre fabricated, Modular complete with floor and ceiling panels, Mounted on a flat, Solid concrete base.

Flooring-

Base 1st layer - 75 mm thick cement concrete

2nd layer of specified - Extruded polystyrene slabs laid with the joints staggered to achieve a U'value of 0.17 W/m. K or better.

3rd layer of specified - 6 mm non slip finish aluminium checker plate.

Door Type - Heavy duty lock - lockable with 100% fail-safe provision for opening from inside, The door should be self-closing type.

Warranty on Machine – 2 Years.

Guarantee - Guaranty of availability of spare for 10 year.

Standard-safety of Electrical and refrigeration components and the panels should have - National or international approvals like UL , IEC 60335-1 2006.

**Installation** - Complete Installation , testing and commissioning is to be done by supplier inclusive of - Installation of stabilize, Drainage system, Assembly of the panels, Refrigeration units.



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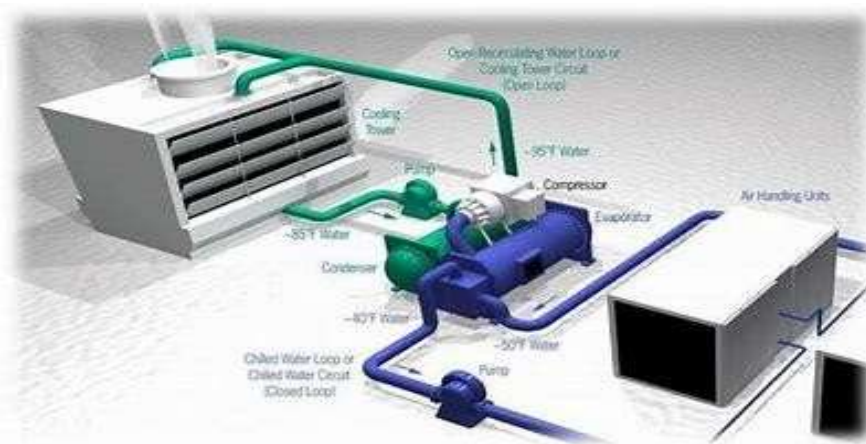
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**SPECIFICATION FOR TRADE - CENTRAL AIRCONDITION PLANT MECHANIC**  
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**168. Air-conditioning, direct and indirect water chiller - Complete with all controls including humidity control capacity 15000Kcal/hr.**

Basic Indicative Diagram.



Capacity :- 5 Ton of Refrigeration or 15000Kcal/hr.

Compressor :-Open Type Reciprocating Compressor capacity, 15000kcal / hr – 01 No.

Evaporator Coil for indirect system :- Water cooled shell and Tube type chillers of suitable capacity with mounting plate complete with suitable size water pump for circulating water in chilled water coil.

165.5. Fan Coil Unit 1.0 Ton Capacity (QTY 05 No ) With Fan / Blower and Motor, Air Supply Grill, Air inlet filter, Water valves. Fan coil unit capacity 1 Ton. cooling coil with grill & Damper , Blower housing, filter, Electric motor (copper winding) direct coupled with two blower -01No

165.6 Condenser :- Water Cooled – shell & tube Type with Cooling Tower.

166.7 Equipped with Instrument and Gauge Panel Board , consist of LP/HP Cut out , Suction and Discharge pressure gauges on it.



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Provided with Motor Starters

For maintaining 25°C (+/- 5 °C) Room Temp.

With Suitable Chilled Water Circulating Pump

With Suitable GI Piping and Valves ,Strainers

Necessary Insulation Provided for chilled water Piping and Chiller.

Digital/Dial type Temp. Indicator for Chilled water piping mounted on.

Panel With necessary Electrical Controls.

Humidity control system for facilities making the change in the humidity condition with humidity - 01No

Gauges pressure and compound 0-30 kg/sq.cm and 760 mm mercury vacuum and 15 kg/sq.cm -01  
 No.each

Hand shut off valve suitable size

Solid core filter drier suitable size -01No

Liquid Line indicator -01No

Solenoid valve suitable size for liquid line- 01No

Suction accumulator -01No

FCU thermostat Digital type - 01No each.

Ampere meter digital type - 01No

Volt meter digital type 0-500 V - 01No

Energy meter - 01 No.

Suitable MCB two pole – 01No

Copper pipe and fitting as per requirement

Water pipe and fittings as per requirements

**Basic structure:-**

The complete plant assembled should be a single structure and mounted on heavy duty square pipe frame painted, electrical control panel also fitted on frame with Ampere meter, Voltmeter, Indicating Light, Rotary Switch, MCB&, contractors. This will be installed at destination , duly gas charged & in perfect working condition. Unit operated on Single phase / three phase supply including inter locking wiring. etc.

**Installation** - Complete Installation , testing and commissioning is to be done by supplier inclusive of -  
 Installation of Refrigeration units, Drainage system, Assembly of the panels,





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**169. Package A/C - 7.5 ton capacity, Water cooled condenser, with open type compressor - Reciprocating type.**



Basic Indicative Diagram.

Capacity :- 7.5 Ton of Refrigeration

Compressor :- Open type - Reciprocating Compressor or Hermetic Reciprocating / scroll

Evaporator Coil :-Fins type Evaporator

Condenser :- Water Cooled Type (Shell and Tube Type)

Equipped with Instrument and Gauge Panel Board , consist of LP/HP Cut out , Suction and Discharge pressure gauges on it.

Provide with Motor Starters

Room Temp.16<sup>o</sup>c.

Digital/Dial type Temp. Indicator for Chilled water piping.

With necessary Electrical Controls.

Refrigerant type : R410a /R32

Power Source : 3Phase

**Specification-** This Package A/C is floor mounted type.



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A) **Package A.C. Unit** structure made of iron square pipe frame with heavy base for motor & compressor & body of iron frame covered with G.I powder coated sheet in such a way no inner structure of iron frame pipe is showing from outside. Indoor unit consists compressor, motor, water cooled (shell and tube type) condenser, evaporator, all refrigeration controlling items & one L band of duct. Unit consists of following items;

- 1) Brand new Reciprocating compressor open type or Hermetic / Hermetic Scroll type 7.5 ton capacity. With drives, tested and certified by principal manufacturer with model number.
- 2) Motor - copper winding 1440 rpm, operated on 3 phase supply
- 3) Variable frequency drive of suitable capacity as per above motor for compressor capacity control.
- 4) Expansion device thermostatic expansion valve 5-ton capacity
- 5) Pressure gauge
- 6) Compound gauge
- 7) Liquid line indicator
- 8) Liquid line Solenoid valve
- 9) Solid core filter drier
- 10) Liquid receiver with inlet and outlet valve 5 ton capacity
- 11) Suction Accumulator
- 12) HP and LP cut out
- 13) Hand shut off valve 3/8"
- 14) Cooling coil.- made of copper tube and alluminium fins of 7.5 - ton capacity with blower and housing and electric motor copper winding heavy duty.

**C) Control Panel:-** consists of following items.

- 1) Human interface 10" touch display with that is linked with Data Acquisition system and enables the following features: -
- 2) Block diagram with measurement points
- 3) Display of measured values (pressures and temperatures)
- 4) Voltage, Ampere
- 5) Suction Pressure
- 6) Discharge pressure
- 7) Compressor inlet temp.
- 8) Compressor outlet temperature
- 9) Condenser outlet temperature
10. Expansion valve inlet temp. and Expansion valve outlet temp.



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11. Evaporator outlet temperature
12. Evaporator inside temperature
13. Display of electrical failures
14. Automatic temperature control & speed control of blower.
15. Facility of Automatically Compressor Capacity control of plant through speed control of motor.
16. Interface with PC through Direct USB 2.0 port

A. There should be following minimum twelve failures/Faults switch bank, Faults details given below which are activated from fault switch bank showing on display through Data Acquisition system.

- Dehydrator clogged.
- Coil of the liquid line solenoid valve broken.
- Compressor failure.
- Failure of evaporator fan.
- Failure of the condenser fan.
- Failure of an expansion valve
- Failure on the control pressure switch LP.
- Failure on the temperature controller- relay broken.
- Failure on the temperature controller- temperature probe broken.
- Failure on the condenser- fouled exchanger
- Failure on the evaporator- fouled exchanger

B) Other electrical items like MCB, phase sequence preventer, Contactor with overload relay, light indicator etc.

**Installation** - Complete Installation, testing and commissioning is to be done by supplier inclusive of -  
 Installation of Refrigeration units, Drainage system, Assembly of the panels.



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**170. Car A.C components (full kit)**

- a) Wobble plate compressor with mounting brackets.
- b) Serpentine Evaporator
- c) Parallel Flow Condenser
- d) Hoses, Tubes, Receiver, Ex. Valve.



**e) Electrical components & wiring Harnes**

Basic Indicative Diagram.

Compressor Wobble type

Capacity : 10 CFM to 1000 CFM

Refrigerant: 134a

Voltage : 12 to 24 V DC

Evaporator

Serpentine Evaporator

Material : Alluminium Fins Coil.

Condenser

Fins Type Condenser parallel Flow

Material : Alluminium Fins Coil.



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Expansion valve :- Thermostatic Type

Liquid Receiver

Blower motor

Suitable Hose tubes

Suitable All Elect. Components and Wiring.



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**171. Car AC Tutorial Model**

Basic Indicative Diagram.

Compressor wobble plate type

condenser parallel flow type suitable for car

Evaporator serpentine type with thermostatic expansion valve , blower motor and grill.

Receiver with sight glass and other accessories .

All ideal controls and safety controls for car ac.

Single phase electric motor 1.0 HP to run the compressor

Suitable 12 volt battery to run condenser fan, evaporator fan and to operate magnetic clutch of compressor.

Alternator facility to recharge Battery.

Other accessories like on/off switch, fan speed selector and complete wiring jack and clips. Digital temperature indicator in test chamber.

Refrigerant R134a



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**172. Desktop Computer - CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.**



Basic indicative Diagram :-

CPU: i5/i7 or latest processor

Speed: 3 GHz or Higher.

Cache Memory:- Minimum 3 MB or better

RAM:- 8 GB DDR-IV or Higher.

Hard Disk Drive: 500GB or Higher, 7200 rpm (minimum) or Higher, Wi-Fi Enabled.

Network Card: Integrated Gigabit Ethernet (10/100/1000)

Wi-Fi, USB Mouse, USB Keyboard and Monitor (Min. 17 Inch)

Standard Ports, HDMI, and connectors. DVD Writer, Speakers And

Mic.

Operating System:- Licensed Windows Operating System /OEM  
 Pack (Preloaded), Antivirus / Total Security



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**173. LCD Projector / LED / LCD TV Big Size**

Basic Indicative Diagram



Batteries : 2AAABatteries

Ram :1.5 GB

Operating System : Web OS

Hardware Interface : USB ,HDMI

Mounting Hardware : 1 UHD 4K TV, 1 Table Top Stand, 1 User Manual, 1 Warranty Card, 1

Remote Control, 2 AAA Batteries | Magic remote to be purchased separately, not included in the box

Remote Control Type : IR ,Bluetooth

Display Technology : LED

Display Size : 65''

Display Type : IPS

Image Aspect Ratio : 16:9

Contrast Ratio : 10000000:1

Resolution : 3840 x 2160 pixels





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Audio Output Mode : Surround

Supported Audio Format : Mp3 Audio , Wma

Audio Wattage : 20Watts

Power Source : AC

USB Port : 2

Mounting Type : Wall And Table Mount

Supports Bluetooth Technology

Connector Type : Wi Fi



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**174. Laptop Latest version**

Basic Indicative Diagram



Intel i7 Processor,  
 RAM - 8 GB,  
 Hard Disc - 1TB ,  
 Win11 / latest Preloaded Licensed OS,  
 Graphics Card - 8GB , NVDI  
 DVD RW, Standard Ports And Connectors.  
 Provided with USB mouse and mouse Pad.  
 HDMI PORT  
 Battery Back up – Min.4Hrs.  
 With 3yrs total Security Anti virus (QH)



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### 175. UPS - 2 KVA

Basic Indicative Diagram



UPS JMSW 2000/24V is a DSC Based Intel Pure Sinewave UPS.  
 PWM Controlled Multistage ATM (Auto Trickle Mode) Charging.  
 Smart Overload Sense, Short Circuit and Over Temperature Protection.  
 Safely suited to run Computers & Other IT Applications.

175.6. Should have optimum efficiency to reduce utility and cooling costs.

Emergency Power Off (EPO): for remote UPS shutoff in the event of a fire or other emergency (2200VA models and above).

Alphanumeric LCD Display: intuitive interface to provide detailed and accurate information with ability to configure locally.

175.9. Easy to disconnect battery for transportation.

Network-grade Power: provides stable, conditioned power with noise filtering, automatic voltage regulation (AVR) and surge protection.

Communication Ports: serial, USB, and SmartSlot for network accessory cards.

Enhanced with Advanced Battery Management: temperature.

#### Smart-UPS Display

LCD Display Screen: clear, consistent and detailed information of choice of basic or advanced menus.

Must show Power Status: operating mode and efficiency, load VA/Watts/Amps, input/output voltage and frequency, battery capacity and runtime, energy meter.

Control: UPS settings.

Configuration: language, power quality settings, alarm, delay and threshold settings.

Test and Diagnostics:

Should initiate battery and runtime calibration tests.



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Should indicate: UPS and replacement battery part numbers, serial numbers, battery install, and suggest replacement dates.

Quick Status Indicators: online, on battery, fault, and replace battery LEDs for quick status identification.

Provide

Function Escape: exits to the previous menu or screen.

Return: use to enter or confirm settings.

Navigation Arrows: allows for quick adjustment of settings.

Warranty 2 Years Onsite



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**176. Class room table. - One table for each trainee size of 2.5 provisions with open rack.**



**Frame square conduit of 1". Top sun mica ply board.**

Basic Indicative Diagram

Material : Wooden And Square Conduit Pipe 1"

Table Top : Sun Mica Ply Board

Dimension : 750 x 600mm Variable Height Adjustment

Seating Capacity : Single Seater

Construction:

The table is to be supplied in completely knock down conditions for assembly at site.

The construction of the main table shall be free standing structure constructed with the help of minifix dowels and pins.

Work Surface:

The table top should be made up of 31mm (+/-1.5mm) thick (18mm + 12mm) MDF board as per IS:12406 + 0.6mm Post laminate as per IS:2046 on top and balancing laminate on bottom surface with PVC banding on straight top side edge and specially designed "T" beading fixed side edge for sleek look.

Finish Epoxy Polyester Powder to the thickness of minimum 50 – 60 microns

Anodizing: Aluminum is immersed in a tank containing an electrolyte



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having a 15% sulphuric acid concentration. Electric current is passed through the electrolyte and the aluminum is made the anode in this electrolytic cell: the tank is the cathode. Voltage applied across the anode and cathode causes negatively charged anions to migrate to the anode where the oxygen in the anions combines with the aluminium to form aluminium oxide ( $Al_2O_3$ ).

**Colour**

The colour of the laminate shall be Pamello Veneer/ Faggio Beech/ American Cherry/ Teak



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**177. Work bench 2000 x1000 x 700 mm with 2" pipe frame. Top with teak slab and fixing  
 With 3/4" good quality rubber sheet.**

Basic Indicative Diagram



177.2 Size 2000(L) x 1000(H) x700(W) mm

Frame Material : 2" MS Square Pipe

Table Top should be made with Teak Slab with 1.5" Thickness

Top Fixed With 3/4 "Good Quality Rubber Sheet

Frame With Powder Coating



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**178. Almira - 195 x 90 x 48 cm, outer sheet 20 SWG inner partition with four shelves of 22 Swg**



**Basic Indicative Diagram**

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.

178.3 Confirming to IS CODE – 513 (2008), 13871 (1993)

Dimensions: Overall size of 900mm (W) X 480mm (D) X 1950mm (H).

**Construction:**

The construction shall be welded construction with 0.7mm thick CRCA for shelf and 0.8mm thick for sides

and back conforming 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





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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.

10.6.2 The clearance around the door between the door flanges and side top and bottom flanges shall not be more than 1.25mm

MS Hinges min.03 nos. made of CRCA with thickness not less than 1.6mm

Lock: The locking and handle of the storage shall be oxidized brass Mazak handle with three waylocking mechanism controlled by lock operated by handle with min 03 duplicate keys of Godrej/ Vijayan orof approved make.

Shelves: The shelf panel (minimum four nos.) shall be height adjustable and should be made of 0.7mm thick CRCA steel conforming 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 andthat 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  $125 \pm 5$ mm in height. 10.11

Finish:

Epoxy Polyester Powder in fire retardant paint coated to the thickness of minimum 40 – 60 microns(+/- 10).



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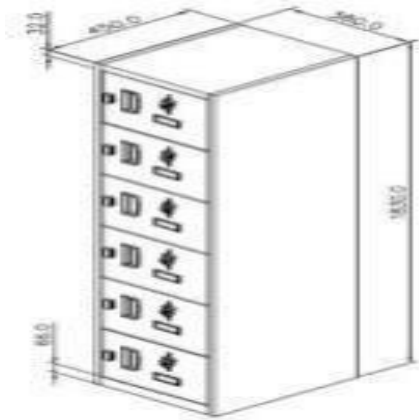
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**179. Lockers - 195 x 90 x 48 set six locker in one structure (Steel Locker)**

Basic Indicative Diagram:



179.2 Confirming to IS CODE – 513 (2008), 13871 (1993)

The overall size of the storage shall be 1950mm (W) x 900mm (H) x 480mm (D).

There shall be 6 units of 6 Door Lockers of equal dimensions.

Combination:

6 Door Base Unit (Size-487.5mmW)- one number

6 Door Add On unit (Size-487.5mmW)- 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.



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**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, phosphate, 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.

17.10.2 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).



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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.

All raw materials for manufacturing process shall be as per relevant IS code.



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**180. Glass board Portable 2.5' X 4' with stand**

Basic Indicative Diagram



180.2 Colour	White
180.3 Mounting Type	Stand Mount
180.4 Material	Tempered Glass
180.5 Brand	Lily pan

180.6 Specifications: Glass Board Size: 48\*36 inch construction

Material: High-grade tempered glass double side

Thickness of the glass: 0.4mm

180.7.3 Glass corner: R10

Aluminium Tray Length: 24 inch

Board Size: 30" \* 48 "



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Polymer Nylon Wheels with Lock –.

DOUBLE-SIDED Each side is printed with light grid patterns

ACCESSORIES INCLUDED – 1 PC Glass white board 4' x 3'. Comes 12dry-erase markers,1 Eraser,6 Strong Cleaner Magnets , 1PC Aluminium accessory tray and 1 x Assembly Tools & Instructions.



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**181. Instructor table 4' X 2' X 2.5' with steel tubular frame & sun-mica Top**

Basic Indicative Diagram



Dimensions: Overall size of 1200mm (W) X 600mm (D) X 735mm (H).

18mm thick pre-laminated board as per IS:12823 of approved shade with 2mm thick PVC edgebanding all over the work surface edges.

Rectangular Frame Fabricated component in 1.2mm thick CRCA (IS: 513)

Leg: 7.4.3.1 Fabricated component in 38mm x 25mm x 1.2mm thick CRCA ERW Tube (IS:7138).

Plastic Cap for Cable travel- Injection Moulded Polypropylene.

Level 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).



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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.

The powder coating treatment shall strictly comply with IS:13871 (1993)

The colour of the PLB shall be Silver Grey / Teak and Core Ash/ Grey for framework.

Size and Weight - Overall Length: 1200 mm , Overall Width: 600 mm , Overall Height: 735 mm

Net Weight: Minimum 40 - 50 Kg.





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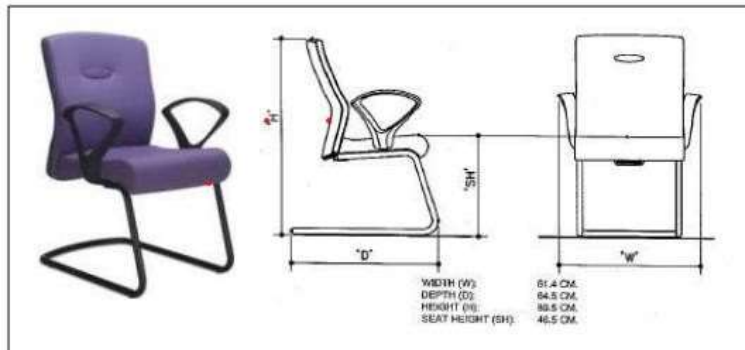
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**182. Instructor chair – Standard.**

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.



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**High Resilience Polyurethane Foam:** The HR Polyurethane foam shall be moulded with density = 45 +/-2 Kg/m<sup>3</sup> 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 moulded from black co-polymer Polypropylene.

Tested to perform 60,000 cycles for a load of 40 Kgs applied at 10Deg.

Under structure Assembly The under structure assembly is a cantilever type powder coated (DFT 50-60microns) tubular mainframe made of dia 25 +/- 3mm X 2 +/- 1.6

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

The powder coating treatment shall strictly comply with IS:13871 (1993).

**Colour:** The colour of the Fabric shall be Carbon Black, Milan Red, Copper Moon

Final colour scheme will be approved by DVET at the time of placement of order. Manufacturer to furnish various colour schemes available with them.



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**183. Computer table – Standard with drawers & self to accommodate UPS & CPU**

Basic Indicative Diagram:



The overall size of the Computer Table shall be 900mm (W) x 600mm (D) X 750mm(H)  
 It is designed such that it looks minimal yet takes care of every little detail. The understructure of this system comprises of leg assemblies and cross connectors. Over this matrix of legs and cross connectors, the work surfaces are fixed

Components

Main Leg Assembly:

The main legs used in the entire system are fabricated by CO2 welded MS tube of section 50.8mm x 50.8mm x 1.2mm thick (as per IS: 7138 ERW). This shall be powder coated with average 50 to 60 micron thickness of epoxy powder coating, as per approved shade. This shall be connected to the cross members & to the work surface with screws. (2 nos. each)

Cross Connector

These are the supporting members which span across the leg assemblies and form the under structure of workstation. These shall be fabricated by CO2 welded MS tube of section 50.8mm x 50.8mm x 1.2mm thick (as per IS: 7138 ERW) with two 100 x 55 x 5mm L-shaped connector brackets (IS: 2062 5mm HR) on either ends, which will have countersunk holes and oblong slots (1nos each)



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**Spacers**

These spacers are used to give the floating effect of worktop. This shall maintain a gap of 20mm between the under structure and the worktop, connected from bottom. These shall be plastic moulded with nylon-6.

**Work surfaces:**

Worktop 25 mm Thick Prelaminated with PVC edge band.

Work top shall be made of 25mm thick pre-laminated particle board interior grade (As per IS: 12823). Bottom shall have a backing laminate of minimum 0.6mm thickness. All the edges of work surface shall be provided with machine pressed 2 mm thick PVC Edge band glued with hot melt EVA glue.

Underside of the work surface shall be screwed to cross connectors and leg assembly.

These worktops shall be provided with the slot for grommet, as per requirement.

CPU Trolley: Size- 230-345 W X 226DX 180H

Metal Tray: Tray is made of 1.0 mm thick MS CRCA Sheet and Side support is made of 0.8 mm thick MS CRCA Sheet

Castor: Lockable/Non-lockable twin wheel castors are injection molded in Black Nylon.

Metal Key board Pullout Tray (KBPT)

**Finish:**

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

**Process:**

The body including understructure, framework, legs, storage pedestal 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 50 – 60 microns (+/-10). The material is then oven baked with a



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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, Erickson 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.

The finishing processes given are generalized. Need to consider wherever it is applicable as per the Specs. of the product.

Colour:

Metal Understructure- Prince Grey/ Bond White.

Final colour combination will be decided by DVET.

183.9.9 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).



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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.

All raw materials for manufacturing process shall be as per relevant IS code.

Size and Weight:

Overall Length: 900 mm

Overall Depth: 600 mm

Overall Height: 750 mm

Net Weight: Minimum 20 Kg



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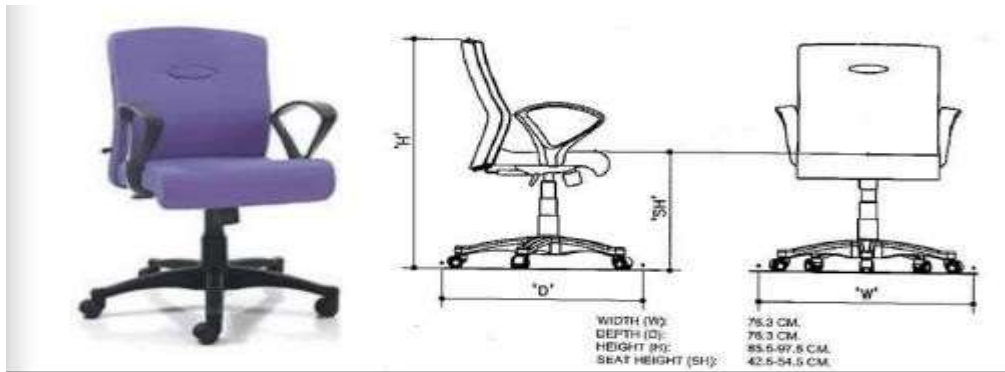
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**184. Computer chair - metal based & metal wheel standard one**

Basic Indicative Diagram



Manufacturing, Supplying and Installation of Mid-back Revolving Chair in the Conference room as per the following design, specification, manufacturing process and tests

Dimensions:

Overall size: 760mm (W) X 760mm (D) X 850 - 975mm (H)

184.3.2 Seat Size: 470mm (W) x 480mm (D) X 425 – 540mm (H)

Mid Back size: 475mm (W) x 580mm (H)

Construction:

Seat and Back Assembly: Seat and back shall be made up of 12mm thick hot-pressed plywood, upholstered with fabric upholstery covers (Fabric colour shall be approved by DVET) and moulded Polyurethane foam.

The seat and back covers are injection moulded in black Co-polymer Polypropylene. The back foam shall be designed with contoured lumbar support for extra comfort. Lumbar support assembly has height adjustment of 50 +/- 5mm. The seat shall have 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.



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**High Resilience Polyurethane Foam:** The HR Polyurethane foam shall be moulded with density = 45 +/-2 Kg/m<sup>3</sup> 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 moulded from black co-polymer Polypropylene Centre tilt Synchronic mechanism 360 degree revolving, upright position locking, tilt tension adjustment, seat and back should tilt in the ratio 1: 3((60 seat tilt/180 back tilt).

The pneumatic height adjustment with stroke up to 125 mm.

**Telescopic Bellow Assembly:** The bellow shall be 3 pieces telescopic type and injection moulded in black Polypropylene.

**Pedestal Assembly:** The pedestal is injection moulded in black 30% glass-filled Nylon and fitted with 5 nos. twin wheel castors. The pedestal pitch-Centre dia. is 68.0cm without castors.

**Twin Wheel Castors**

The twin wheel castors are injection moulded in 30% Glass Filled black Nylon Finish:

Epoxy Polyester Powder coated to the thickness of 40 – 60 microns (+/-10)





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**185. White board - 4'X3' ferrous base sheet to hold magnetic duster with white finish  
 surface.**

Basic Indicative Diagram



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 3 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:



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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.



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**186. Chart stand - 6' X 3' providing with hanging clip top & bottom plate**

Basic Indicative Diagram



Should have high quality and stylish Chrome finish tubes

Should have wheels for easy mobility

Size 6' x 3' With Hanging Clip Top

With Hanging Clip Top and Bottom Plate



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**187. Stool**

Basic Indicative Diagram



Frame Material : Square Pipe 1x1'' MS.

Seat Material type : Sun-mica top and good Quality Plywood 1'' Thickness.

Seat Surface Size: 1.5' x 1.5'

Stool Height : 2'

Rubber Bushes Fitted at Bottom .



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**188. Book Self with glass panel - 6' x 3'**

Basic Indicative Diagram



Manufacturing, Supplying and Installation of Glass Door Book Case having two glass hinge doors and five loading levels as per the following design, specification, manufacturing process and tests.

Confirming to IS CODE – 513 – 2008

Dimensions: Overall size of 6' x3' x1.5'

Construction:

The construction shall be welded construction with Prime Quality CRCA

confirming to IS: 513 -2008 grade.

Steel Top, Back and side are made from 0.7mm thick CRCA. Rest in 0.8mm CRCA

confirming to IS: 513 -2008 grade.

All material should be used of relevant ISI specification.

Configuration (Doors):



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Two door shutters shall be made of 0.8mm thick CRCA sheet with 3mm thick.

Transparent float glass for clear inside vision secured in a metal frame through rubber gasket and all other metal component shall be made of 0.9 mm thick CRCA. 'D' grade conforming to IS: 513 -2008. The glass shall be free of distortion and waves and both the surfaces of the glass shall be perfectly parallel and shall be of Asahi/ Modi/ Pilkington/ Saint Gobain or of approved make. 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.

**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 Door shutter has one 6 lever Cam lock with min. 03 common key of Godrej/ Vijayan or of approved make. Two oxidised brass handle 75mm long shall be provided on each shutter. One oxidized brass 75mm long tower bolt each from inside shall be provided on top and bottom rail of the left hand side shutter.

**188.6.3 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



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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  $125 \pm 5$ mm in height.

**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, Ericson 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.195

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

Manufacturer to furnish various colour schemes available with them.



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**189. Storage rack**

Basic Indicative Diagram



Size :- 06 feet \*03 feet\*12 inches (L\*W\*D)

Material :- Slotted Angle frame made from 2''\*18 SWG MS material.

No. of Shelves :- 05 or 06 Nos.

Shelf Material :-22 SWG thick CRCA sheet .

Colour :- Industrial grey. Power Coated.

Fitting :- Nut Bolt Type fitting.





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**190. Storage shelf**

Basic Indicative Diagram



Size :- 06 feet \*03 feet\*12 inches (L\*W\*D)

Material :- Slotted Angle frame with powder coating

No. of Shelves :- 05 or 06 Nos.[Adjustable]

Shelf Material :-22 SWG thick CRCA sheet .

Colour :- Industrial grey. Power Coated.

Fitting :- Nut Bolt Type fitting.



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ADDITIONAL LIST OF TOOLS AND EQUIPMENT SUGGESTED BY MR. A. R Thampi .  
Associated chief manager(Retired) Godrej & Boyce Appliances division vikhroli  
Mumbai .

- 1) Thermostatic expansion valve,
- 2) **Electronic expansion valves (EEV):**
- 3) **Capillary Cutter,**
- 4) **Wire Stripper,**
- 5) **AHU**
- 6) **Infra Red Thermometer,**
- 7) **Different types of cut compressors**
  
- 8) **Test Jigs for testing AC working parameters & fault finding,**



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**प्रमाणपत्र**

प्रमाणित करण्यात येते की वरील **SPECIFICATION FOR TRADE- CENTRAL AIR  
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 सुधारीत अभ्यासक्रमानुसार तयार करण्यात आली आहे व तपशील (Specification) हे सर्वसमावेशक  
 (Generic) तयार करण्यात आलेले आहे.

समीती अध्यक्ष

समीती सदस्य १

समीती सदस्य २

समीती सदस्य 3

1. श्री.के.एम.मोटघरे उपसंचालक प्रा.का.नागपुर - समीती अध्यक्ष
2. श्री. नितीन चौधरी प्राचार्य औ.प्र.संस्था पनवेल - समीती सदस्य १
3. श्री.एम.जे.गवंडी शि.निदेशक आरएसीटी औ.प्र.संस्था औध पुणे - समीती सदस्य 2
4. श्री.एम.ए.बालमवार शि.निदेशक आरएसीटी औ.प्र.संस्था आमगांव - समीती सदस्य 3



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1) Thermostatic expansion valve,

Basic Indicative Diagram



<b>Material</b>	Brass
<b>Maximum working pressure (Bar)</b>	34
<b>Pressure equalization</b>	1/4 inch, 6mm
<b>Capillary tube</b>	1.5 meter
<b>Rated capacity in tons (TR)</b>	8
<b>Maximum operating pressure (bar)</b>	5.5
<b>Connection (Inlet outlet), inch</b>	5/8 7/8
<b>Type</b>	T2



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2 ) Electronic expansion valve  
 Basic Indicative Diagram



Rated voltage: 12V DC ( $\pm 10\%$ ), rectangular wave • Actuating mode: 4-phase 8-step permanent magnet stepping motor of direct-acting type • Excitation mode: 1 ~ 2 phase excitation, unipolar actuation • Excitation rate: - Seat  $\varnothing$  1,3 to 3,2 mm: 30 to 90pps - Seat  $\varnothing$  4,0 to 6,5 mm: 30 to 40pps • Activation of self-holding ...



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**3) Capillary Cutter,**  
 Basic Indicative Diagram



Material mild steel

- SUPERIOR QUALITY will not collapse the tube and provides a smooth, clean cut
- CUTS ALL SIZES of capillary tubes
- HARDENED STEEL CONSTRUCTION provides years of reliable service
- RUBBER GRIP HANDLE for ease of use



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#### 4) Wire Stripper,

Basic Indicative Diagram



- **Usage:** Precision wire stripping and cutting
- **Handle:** Ergonomic for comfortable grip
- **Blades:** Sharp, durable for clean cuts
- Made from high grade chrome vanadium steel. Wire Stripping Pliers 6" (Econ)
- Available in 5-inch and 6-inch sizes and used extensively for stripping electrical wires



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## 5) Air Handling Units



### 1. DOUBLE SKIN CASING:

- Outer Skin 0.6 to 0.8 mm Pre- Coated GI
- Inner Skin 0.6 to 0.8 mm Plain GI
- FrameWork Hollow Extruded AL Profile or Thermal Break AL Profile with Thermal Barrier.
- Thickness of Insulated Panels 25 mm thick, 43 mm thick to 46 mm thick, CFC Free PUF injected (Density: 40 kg / Cu. m.)
- Material of Drain Pan 18 G to 20 G SS-304 Tray duly insulated with 13 mm closed cell Nitrile insulation. Sometimes Drain pan can be made in two stages 18 G SS-304 as primary Tray and 24 GI as secondary tray duly insulated with 25 mm closed cell PUF insulation.
- Unit Base G.S.S Base Channel

### 2. COIL Section:

- Coil Casing / Blank offs GI
- Material Of Tube Copper
- Tube Diameter (mm / inch) 12.7 mm / ½" O.D.
- Thickness of tube (SWG / mm) 27 SWG / 0.41 mm to 25 SWG / 0.5 mm
- Header Material MS
- Thickness & Material of fins 0.15 mm Plain Aluminum fins
- Number of Fins in one inch (FPI) 11 / 12

### 3. FILTERS:

- Filters Make - Spectrum / Thermadyne / Mechmaark / Puramatic
- Media of Filters Synthetic (non-woven type)
- Efficiency of Pre-filters (EU-4) 90 % down to 10 micron.
- Additional filters such as Bag/Fine filter, HEPA filters can be chosen.

### 4. FAN & MOTOR:

- Fan make Kruger / Nicotra / Equivalent
- Motor make ABB / BHARAT BIJLEE





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### 6) Infra Red Thermometer,



- **【How to Measure】** Take it 10 cm away from the forehead/person. Click the start button, reading complete after a short beep. Note down the temperature.
- **【Non-contact Measurement】** Infrared technology ensures temperature measurement without touching, minimizing cross-infection risks. Measurement distance ranges from 0.4 to 1.96 inches.
- **【Instant Precision】** Advanced infrared technology and high precision sensor provide accurate readings in just 1 second, with temperature measurement accuracy within  $\pm 0.4^{\circ}\text{F}$ .
- **【Intelligent Alerts & Silent Mode】** Large LCD backlight displays temperature with 3 color indicators and warns of abnormal readings with sound alerts. Silent mode allows clear readings in darkness without disturbing sleep.
- **【Versatile Modes】** Measures body temperature, object, or liquid temperatures, suitable for all ages. Switch between  $^{\circ}\text{C}$  and  $^{\circ}\text{F}$  modes easily. Stores up to 50 readings for continuous tracking.
- **【Rapid & Patient-Friendly】** Forehead readings are acquired within 0.5 seconds, ensuring minimal disruption during rest. CE and RoHS approved with a response time of less than 0.5 seconds. Utilizes a German-imported medical-grade sensor for high accuracy.



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7) Different types of cut compressors,

Rotary compressor



Capacity 1.5, 2 TR

Phase Single and Two phase

Cutaway model of Actual Compressor will be provided for study of parts of compressor.

Reciprocating compressors

Scroll compressor

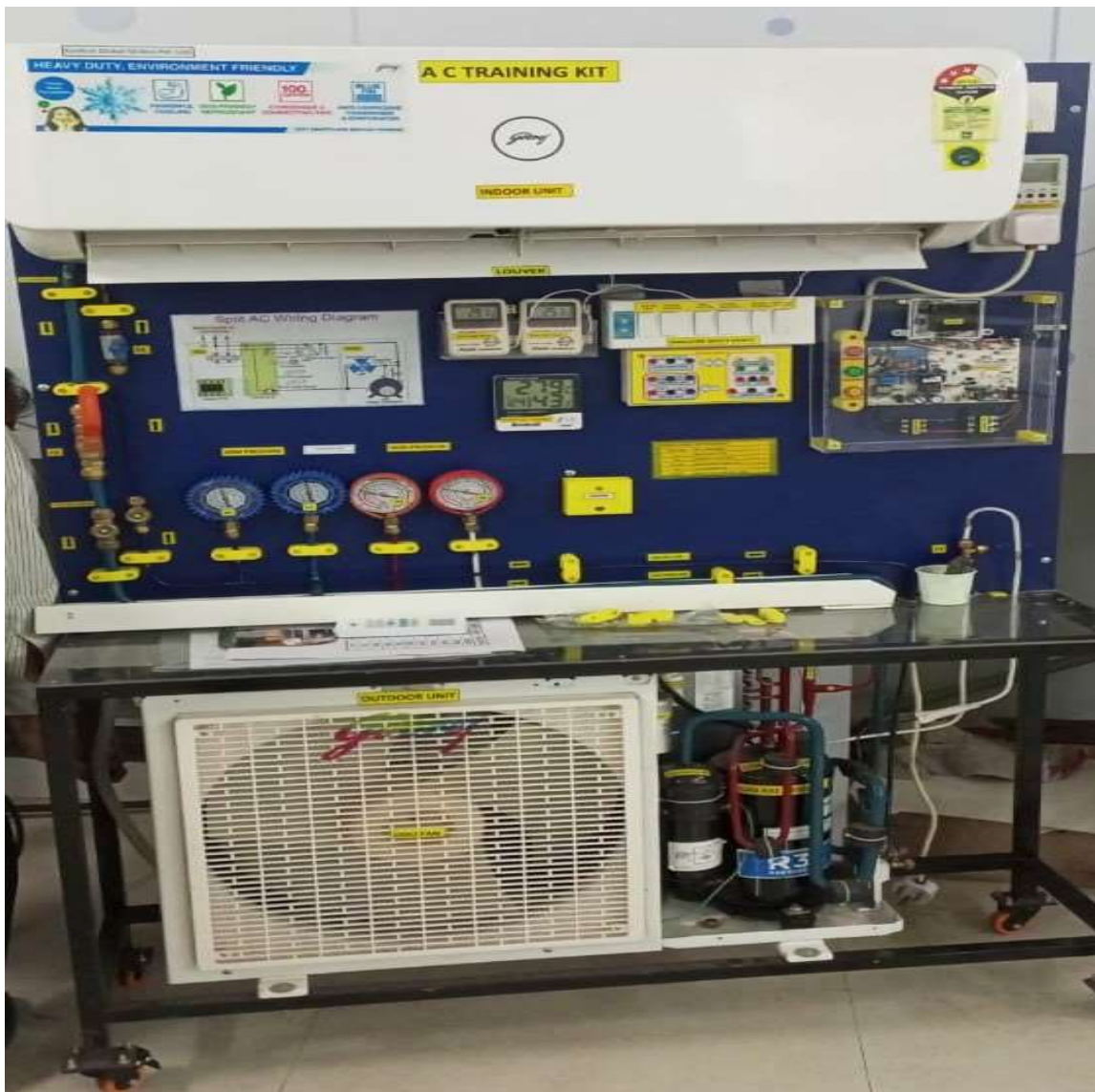




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**8) Test Jigs for testing AC working parameters & fault finding,**





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- 1) Control valve
- 2) Hand shut off valve
- 3) current meter Digital
- 4) Watt meter Digital
- 5) Volt meter Digital
- 6) Thermometer Digital
- 7) Compound gauge
- 8) Pressure gauge
- 9) Inverter PCB
- 10) IdU Test point ODU
- 11) Room sensor
- 12) Simulated defect point (Single pole switch)
- 13) Split ac 1.5 Ton