

## MANUAL 4

### The Norms set for discharge of its Function

**PTCUL has clearly defined aims & objectives which are as under ;**

- Adopt best practices of Project and Operations & Maintenance Management leading to system efficiency, reliability and commercial viability.
- Create a work environment which motivates & enhances employee performance, value systems and reward contribution.
- Develop and train employees towards upgrading their skills at work, enrich work content to made it more substantive and responsive to Company Goals.
- Imbibe transparency and accountability in all operational areas, be it procurement, construction, operations and maintenance.
- Expand horizons of activities in to contracting and others by leveraging the Company”s available technical and project expertise.
- Build, in essence PTCUL to a Company geared to high standards of Management capabilities and professional performance.

For the achievement of Organizational Objectives, each department has formulated its own norms based on various standards like Engineering, Accounting etc.

**1. In case of Finance & Accounts Department the following standards are set as norms :-**

- (a) Accounting Standards issued by ICAI.
- (b) Income Tax Act to meet the tax obligations as norms.
- (c) Companies Act to meet the Secretarial Rules & Regulations.
- (d) P.F., E.S.I. & Misc. Act to meet the Employees related obligations.

**2 Engineering Standards are used as norms by Operation and Maintenance** department at each sub-station for maintenance of Plants and Machinery and Projects department for various construction activities. Some of these are as follows:-

**A) EXTRACT FROM MANUAL OF ELECTRICITY LAWS  
(Clearance from Power Lines).**

1. BUILDING:

(a) Where a high or extra high voltage over head line passes above or adjacent to any building or part of a building, it shall have on the basis of maximum sag, a vertical clearance above the highest part of the building immediately under such line, of not less than :

(a) for high voltage line upto and including.

33 KV 3.658 mtrs. (12 ft.)

(b) for extra high voltage lines

3.685 mtrs. (12 ft.) plus

0.305 mtrs. (1 ft.) for

every additional

33 KV or part thereof.

(b) The horizontal clearance between the nearest conductor and any part of such building shall on the basis of maximum deflection due to wind pressure, be not less than :

(a) for high voltage line upto and including 11 KV 1.219 mtrs. (4ft.)

(b) for high voltage line above 11 KV and upto

and including 33 KV 1.829 mtrs. (6ft.)

(c) for extra high voltage line 1.829 mtrs. (6 ft.) plus

0:305 mtrs, (1 ft.) for

every additional 33 KV

or part thereof.

2. CLEARANCE ABOVE GROUNDS:

(Clause 77 of Indian Electricity Rules)

m. m.

33 KV

5100

66 KV

5490

132 KV

6100

220 KV

7015

400 KV

8840

3. CLEARANCE OVER RIVERS :

(Above maximum flood level)

Rivers not Navigable 3050 mm above HFL.

Rivers Navigable Suitable clearance in maximum water

level condition, above the tallest mast, in

consultation with Navigational authorities

concerned.

4. CLEARANCE OVER PTCC LINE

m.m

66 KV 2440  
132 KV 2745  
220 KV 3050  
400 KV  
4880

5. MINIMUM CLEARANCE BETWEEN POWER LINES :

Nominal System Voltage of line to be crossed :

KV

11 33 66

132

220

400

11

2.44 2.44 2.44

3.05

4.58

6.10

33

2.44 2.44

3.05

4.58

6.60

66

2.44

3.05

4.58

6.10

132

3.05

4.58

6.10

220

4.58

6.10

400

6.10

Higher voltage line normally be kept over lower voltage line.

6. As per 1SS 162—1961 minimum electrical clearance from live part to earth and safety clearance in case of different voltage must be kept as follows :

VOLTAGE

ELECTRICAL CLEARANCE (mm)

Phase-Earth / Phase-Phase

SAFETY CLEARANCE IN

SIS (mm)

KV

33

381

432

2740

66

658

786

3050

132

1127

1473

3810

220 2082 2388 4570

4000

350

4000

6100

7. CLEARANCE FROM RAILWAY TRACKS :

(As per Regulation for Electrical Crossing of Railway Tracks 1963)

The relevant provisions for the crossings of Railway Tracks by the power lines are as under:

The minimum height above rail level of the lowest portion of any conductor under conditions of maximum sag are as follows in accordance with the Regulations for Electrical Crossings of Railway Tracks, 1963 :

(i) FOR UNELECTRIFIED TRACKS OR TRACKS ELECTRIFIED ON 1500 VOLTS D. C.

Broad Gauge Metar and Narrow Gauge

Inside

station limits

(mm)

Outside

station limits

(mm)

Inside station

limits (mm)

Outside station

limits (mm)

66 KV

10,300 7,900 9,100 6,700

13KV

10,0

8,500

9,800

7,300

220 KV

11,200 8,800 10,000 7,600

440 KV\* 13,600 11,200 12,400 10,000  
(ii) TRACKS ELECTRIFIED ON 25 K.V A.C  
For Broad, Meter and  
Narrow Gauges

Inside  
station  
limits  
(mm)  
Outside  
station  
limits  
(mm)

66 KV 1 3,000 11,000  
132 KV 1 4,000 1 2,000  
220 KV 1 5,300 1 3,300  
440 KV\* 1 6,300 14,300

\* Tentatively assumed.

No conductor of an extra high voltage overhead line crossing a tramway or trolley bus using trolley wires should have a clearance less than 3050 mm. above the trolley line.

The Provisions of the above Regulations must be kept in mind while carrying out the patrolling of Transmission lines. Any deviation noticed should be reported / attended on top-priority.

#### 8. PROVISIONS OF PTCC :

The requisite information as per the questionnaire of PTCC proforma have to be taken care of during patrolling / checking of the line. The copy of the above proforma is also enclosed in the manual at Annexure XVIII An abstract from the "Model Code for Safe Operation and Maintenance of Transmission and Distribution System" as published by the Ministry of Irrigation and power, Central Electricity Board vide No. PMIP-27 / 2000—1979

(DSK II) is also enclosed herewith for general guidance at Annexure XV.

## **B) USEFUL TECHNICAL DATA & INFORMATIONS FOR DAY TO DAY WORKING**

### **(a) The Heart of Electrical Protection System :**

#### **"THE BATTERY"**

#### **1- MOSTLY : Lead Acid Cells**

- a. Cell Voltage : 2.16 Volts.
- b. Battery Voltage : 32.5 Volts for 33 KV S/S.
- c. Electrolyte : Dilute Sulfuric Acid of Sp. Gr. 1.190 initially
- d. Specific Gravity of Electrolyte : 1.210
- e. Capacity of Cells : 40 to 60 Ampere Hours at 10 Hours rate of discharge for 33 KV S/S.
- f. Ist Charge : 100 Hrs. at the current rate 5% of A.H.

#### **2. MAINTENANCE :**

- a. Trickle Charging of cells through Battery Charger.
- b. Addition of distilled water to maintain level & specific gravity of electrolyte.
- c. Application of Petroleum jelly on terminals & links.
- d. Yearly discharge & recharge cycles.
- e. Free air circulation to prevent corrosion from acid fumes

- f. Check battery Voltage after switching – off the charger.
- g. Never keep battery in discharged state. Recharge it immediately.

### **3. ACCESSORIES :**

- a. Hydrometer d. Electrolyte dropper
- b. Plastic containers for acid & water e. Cell voltage tester
- c. Funnel f. Thermometer

### **4. PROTECTION:**

- a. Rubber Apron d. Rubber Gloves
- b. Soda Solution e. Water
- c. Eye Shields, i.e. ,goggles

### **4. NIFE BATTERY :**

- a. Capacity : 10 Ampere Hour d. Electrolyte : KOH Solution
- b. Cells : 25 Nos. of Sp.Gr. 1.200
- c. Cell Voltage : 1.2 Volts e. Periodic topping up with Distilled Water

## **(b) Electrical engineering at a Glance:-**

### **1. B.D.V. OF TRANSFORMER OIL TITE TESTING:**

- (a) Procedure : IS: 6792-1972:
  - (i) 2.5 m.m Gap
  - (ii) Average of 6 shots at 10 minutes interval
- (b) Test values: IS: 335-1983
  - (i) Name unfiltered oil ; 30 KV(rms)
  - (ii) After filtration:50 KV (rms)

### **2. MAIN TESTES FOR 33 KV TRANSFORMER:**

- I.S. 10028 (Part II)-1981 ,etc.:
- (a) Radio Test (e) Dielectric Test
- (b) Phasing Test (f) Magnetic Balance Test
- (c) Short Circuit Test (out of I.S) (g) High pressure Test (out of I.S)
- (d) Insulation Test

### **3. EARTH RESISTANCE :10 ohms (Maximum)**

### **4. EARTH RESISTIVITY : 20 to 70 ohm Meters**

(Maximum in May/June)

### **5. INSULATION RESISTANCE :**

- (a) Below 100 Mega. Ohms : By 1 KV Megger
- (b) 100 mega ohms & above : By 2.5 KV Megger
- (c) For 33 KV Transformer : IR 60 Second = 130 Mega ohms at 40o C
- (d) For 11 KV Transformers : IR 60 Second = 80 Mega ohms at 40o C

### **6. OIL CENTRIFUGING :**

- (a) Maximum Oil Temperature : 80 to 90oC
- (b) I.R. : Constant for 24 Hours.

- (c) Vacuum : 71.12 Gms./28" of Hg.
- (d) Machine : Normally-1000 GPH Capacity Stream Line Filter
- (e) Heater : 2.77 KW each
- (e) Total Load : 105 KW at 3 Phase

## **7. EARTHING ELECTRODES:**

- (a) G.I.Pipe:2.5 mtrs. x 38 mm dia x 3 mm. Thick
- (b) G.I. Rod: 2.5 mtrs. x 20 mm. Dia

## **8. BUCHHOIZ RELAY:**

Identification & Significance of Cases

The nature of the fault could be judge with the help of gas collected in Buchholz Relay.

Following checks should immediately be done after detecting that the gas had been collected in Buchholz Relay.

- (a) **COLOUR OF THE GAS** : This helps in finding materials being decomposed.

### **Colour Identification of gas**

- (i) Colourless : Air
- (ii) White : Gas due to decomposed paper insulation
- (iii) Yellow : Gas due to decomposed wooden insulation
- (iv) Grey : Gas due to decomposed oil due to heating of core.
- (v) Black : Gas due to decomposed oil due to electric arc.

- (b) **Testing of Gases : Trapped in Buchholz Relay to be done.**

### **COMBUSTIBILITY :**

A small quantity of gas may be drawn off through top pet cock of the relay by syringe or in a balloon fitted with nozzle or tube and flame tested. About 2 to 5 c.c of gas is expelled into a flame. If the flame brightened, the gas is combustible.

Incombustible gas indicates decomposed in insulation & oil vapour

## **9. SILICA –GEL BREATHER :**

- (a) Oil Seal : Transformer Oil to be filled-up the marked level.
- (b) Air Passage : The bottom hole shall be Clear.
- (c) Silica-gel : Of dark blue colour.

If it is pinkish, replace or reactivate at once. It should not be in power form.

## **10. PREVENTION OF DISTRIBUTION TRANSFORMERS FROM DAMAGE :**

- (a) Testing, checking & maintenance at regular intervals.
- (b) Testing of body & neutral earthings & their maintenance strictly.
- (c) Only single core L.T. cables to be used from. Transformer to Pillar box and from there to the distribution mains.
- (d) L.T. Line Spacers should be provided on L.T. MAINS.
- (e) The Transformer terminals shall be provided with extensions connectors for terminating the cables, to prevent damage to studs.
- (f) Similarly, terminals of Pillar Boxes also shall be provided with extension connectors.

(g) Maximum loading on a transformer shall be 80 %.

(h) H.T. Side protection shall be provided by an O.C.B. or at least through a D.O. Fuse Set.

(i) Outgoing load shall not be more than 150 Amp. On any circuit.

**(C) Table of Wire Gauges :-**

**SWG No. Dia. mm. Area sq.mm. SWG No. Dia m.m. Area sq.mm**

0  
1  
2  
4  
6  
8  
10  
12  
14  
16  
18  
20  
8.23  
7.62  
7.01  
5.89  
4.88  
4.06  
3.25  
2.64  
2.03  
1.63  
1.22  
0.914  
53.20  
45.60  
38.59  
27.25  
18.70  
12.95  
8.296  
5.474



3.237  
2.087  
1.169  
0.6561  
22  
24  
26  
28  
30  
32  
34  
36  
38  
40  
45  
50  
0.711  
0.559  
0.457  
0.376  
0.315  
0.274  
0.234  
0.193  
0.152  
0.122  
0.0711  
0.0154  
0.3970  
0.2454  
0.1640  
0.1110  
0.07793  
0.05895  
0.04301

**(C) Conductor Catalogue:-**

**1. ALL ALLUMUNUM CONDUCTORS:**

SI  
No  
Code  
Word  
No. of  
Wires  
Dia of  
Wires  
mm  
Dia of  
Conductor  
mm  
Weight  
Kg./Km  
Equivalent  
of Al. Sq  
mm.  
Normal  
Copper  
Area  
sq.mm.  
Current  
Capacity  
in Amps.  
1  
2  
3  
4  
5  
Pansy  
Ant  
Aster  
Wasp  
Peony  
7  
7  
-

7  
-  
2.78  
3.10  
-  
4.39  
-  
8.34  
9.30  
-  
13.17  
-  
116  
144  
184  
290  
417  
32.02  
52.26  
-  
109.8  
-  
25  
30  
-  
65  
-  
-  
189  
232  
295  
400

**2. ACSR CONDUCTOR**

Sl.  
No  
Code  
Word  
No.of

**Wires**  
**Dia of**  
**Wires**  
Dia of  
Conduct  
or mm  
**Weight**  
Kg./Km  
Aluminium  
Are sq. mm  
**Norminal**  
**copper**  
**Area**  
**sq.mm**  
**Current**  
**cpacity**  
**amps 45oc**  
**Al. St Al. st**  
**1 2 3 4 5 6 7 8 9 10 11**  
1  
2  
3  
4  
5  
6  
7  
8  
9  
Weasel  
Rabbit  
Racoon  
Dog  
Panther  
Zebra  
Deer  
Moose  
Trarantulla  
6  
6

6  
6  
30  
-  
-  
54  
-  
1  
1  
1  
7  
7  
-  
-  
7  
-  
2.59  
3.35  
4.09  
4.72  
3.0  
-  
-  
3.53  
-  
2.59  
3.35  
4.09  
4.72  
3.0  
-  
-  
3.53  
-  
7.77  
10.05  
12.27  
14.15

21.0  
28.26  
29.89  
31.77  
36.61  
128  
214  
318  
394  
976  
1623  
1977  
2002  
2198  
31.21  
52.21  
77.83  
103.6  
207.0  
-  
-  
515.7  
-  
20  
30  
48  
65  
130  
-  
-  
325  
-  
139  
193  
250  
300  
482

736  
747  
835  
900

**(E) Fuse Wire Table:-**

**S. No. TIN Alloy Tin Aluminium Wire Fuse  
SWG**

**Copper Wire**

**Fuse SWG**

**Fusing Current**

**Amps.**

**1 2 3 4 5 6**

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
37  
31  
28  
25  
21  
19  
17  
16  
15  
14

13  
11  
10  
8  
7  
35  
29  
27  
25  
19  
18  
16  
15  
14  
13  
11  
10  
8  
7  
6  
46  
42  
37  
36  
30  
28  
25  
24  
23  
21  
20  
19  
18  
17  
16  
47  
43



39  
38  
33  
30  
28  
26  
25  
23  
22  
21  
19  
18  
17  
1  
2  
4  
5  
10  
15  
20  
25  
30  
40  
50  
60  
80  
100  
120

**(F) Manila Rope :-**

**Sl. No. Dia inches Safe Load, Lbs.**

**New Rope After 6 months of Service**

1	2	3	4
1			
2			
3			
4			
5			

6  
7  
8  
3/8  
4/8  
5/8  
6/8  
7/8  
1  
1 1/4  
1 1/2  
270  
530  
880  
1080  
1540  
1800  
2700  
3700

Half strength as in Column No. 3  
here.

**HEXAGONAL BOLTS & NUTS Nos. Per 50 Kgs.**

**Sl. No. Length of Bolt, Dia of Bolts, inches**

**inches 3/8 1/2 5/8 3/4**

**1 2 3 4 5 6**

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12

1  
1<sup>1/2</sup>  
2  
2<sup>1/2</sup>  
3  
4  
5  
6  
7  
8  
9  
10  
1601  
1317  
1119  
972  
860  
699  
590  
510  
450  
401  
362  
330  
705  
602  
525  
467  
419  
349  
298  
261  
232  
209  
189  
173  
386

335  
295  
265  
239  
210  
173  
158  
138  
123  
112  
102  
239  
210  
186  
168  
154  
130  
114  
99  
91  
82  
75  
69

**G. S. STAY WIRE**

**Sl. No. Size of Wires Weight, Kgs./Km.**

1  
2  
3  
4  
5  
7/8  
7/10  
7/12  
7/14  
7/16  
706  
453

299

177

114

**G. I. EARTH WIRE:-**

**Sl. No. Size of Wires Weight, Kgs./Km.**

1

2

3

6

8

10

142

101

65

**(G) Specific Gravities:-**

1 Air (0<sub>o</sub>) C 0.001293 11. Nickel 8.28

2 Aluminium 2.703 12. Phosphor 8.6

Bronz

3 Brass 8.4 to 8.7 13. Platinum 22.10

4 Copper 8.89 14. Silver 10.5

5 Gold 19.30 15. Steel 7.7 to 7.9

6 Gun Metal 8.73 16. Tin 7.29

7 Iron 7.1 to 7.7 17. Transformer

Oil

8.09

8 Ice 0.913 18. Water (0<sub>o</sub>) C 1.0

9 Lead 11.37 19. Zinc 7.1

10 Mercury 13.60

**(H) Weight:-**

**Kgs./Cu. Mtr.**

1 Brick Ballast 1200

2 Cement : OPC 1440

3 Cement Mortar & Plaster 2082

3 Diesel 960

4 Petrol 690

5 Sand (a) Dry 1600 to 1840

6 (b) Wet 1900 to 2000

7 Stone 2515

8 Steel Plate

(i.e. 7.84 Kg./mm of thickness/sq. mtr. Of Plate are)

7840

9 Water (i.e. 1 cft of Water = 28.3 Kgs.) 1000

**(I) 3 PHASE, 415 V, MOTOR PROTECTION:**

**HRC 'T' Fuse Rating**

**Sl. No.**

**H.P.**

**F.L. Amps.**

**D.O.L. Starter Reduced Voltage**

**Starter**

**Thermal Relay**

**Range. Amps.**

**1 2 3 4 5 6**

1 0.5 0.95 4 2 0.63-1.0

2 0.75 1.43 6 2 1.25-2.0

3 1.0 1.9 6 4 1.25-2.0

4 1.5 2.5 10 4 or 6 2.0-3.0

5 2.0 3.4 16 6 2.5-4.0

6 3.0 4.8 16 10 4.0-6.0

7 5.0 7.8 20 16 5.5-8.0

8 7.5 11.6 25 20 8.0-12.0

9 10 14.4 25 20 10.0-16.0

10 60 83 - 100/125 38-63

11 100 136 - 160 50-90

12 120 163 - 200 70-110

13 150 200 - 250 90-135

14 Starting Current 7xFLC for 10 Secs. 3.5xFLC for 20 Secs.

**(J) LT PVC Data:-**

**1.1.1 KV, 3<sup>1/2</sup> CORE, ALUMINIUM, PVC, ARMOURED CABLE**

**IS – 1554 (PT, -1)**

**Current Ratings, Amps**

**Sl.**

**No.**

**Size sq. mm.**

**Overall Dia. mm.**

**Weight Kg/Km. In Ground In Ducts In Air**

**1 2 3 4 5 6 7**

1 35 27 1060 92 77 86  
2 50 31 1340 100 95 105  
3 70 34 1690 135 115 130  
4 95 39 2150 165 140 155  
5 120 42 2570 185 155 180  
6 150 47 3000 210 175 205  
7 185 52 3700 235 200 240  
8 240 58 4660 275 235 280  
9 300 65 5630 305 260 315

**2.1.1 KV, 2 CORE, ALUMINIUM, PVC, UNARMoured CABLE**

**IS – 1554 (PT, -1)**

**1 2 3 4 5 6 7**

1 4 14.0 225 32 27 27  
2 6 15.5 290 40 34 35  
3 10 17.0 33 55 45 47  
4 16 20.0 470 70 58 59  
5 25 23.0 650 90 76 78  
6 35 25.5 790 110 92 99  
7 50 28.5 1010 135 115 125

**3.1.1 KV, 2 CORE, ALUMINIUM, PVC, UNARMoured CABLE**

**IS – 1554 (PT, -1)**

**1 2 3 4 5 6 7**

1 16 25.5 990 60 50 51  
2 25 26.0 1020 76 63 70  
3 35 28.5 1170 92 77 86  
4 50 33.0 1510 110 95 105

**(K) SPECIFIC DATAS:-**

- 1 Distance : Sun of Earth : 93 Million Miles
- 2 Paper Thickness : 0.01"
- 3 Human Body Safe Current : 100 Micro amps.
- 4 Human Body Resistance : 600-2500 ohms.
- 5 Steel corrosion rate in Soil : 0.0508-01524 mm. Per year
- 6 Steel Corrosion rate in Soil : 7000 Kgs.
- 7 Absorption Coefficient of Power Transformer  
Power Transformer

(at 10-30°)

:  $K_{ab} = IR_{60} = 1.3$  (Minimum)

IR 15

8 Transformer No-Load Current : 1-3% of FLA

9 Separation of Neutral & Body Earth :

10 Time constant of Transformer :

11 HV Winding Resistance per phase of 10  
MVA, 33/66 KV T/fr.

:

12 LV Winding – Do-

13 Transformer oil Cracking Test at :

14 Oil Leakage Test at : : Normal Pressure+35 KN/Sq. Mtr.  
Measured at the base of tank for 12  
hours

15 HT Bitumenous Compound Maximum Temp. : 156° C

16 HT Compound shall be poured strictly at : 120-125° C

17 Cable box to be filled up in one stream.

18 Do not apply tap etc. H. T. Compound is  
sufficient

19 Contact Resistance : 36-59 micro ohm

20 Milli Volt Drop : Maximum 7 m V at 100 Amps. D.  
C.

21 OCB operating time : Maximum 0.05 Second on No-load

22 Energy Meter Starting Current : Maximum 1% of F.L.A at U.P.F

### **23 Civil Engineering:**

(a) Standard Brick : 230 x 110 x 70 m.m.

(b) Brick Consumption : 460 Nos. Per Cu. Mtr. Of Masonry

(c) Joint thickness : 9.5 m.m.

(d) OPC Cement : Setting Time : Minimum : 0.5 Hrs.  
Maximum : 10.0 Hrs.

(e) **Ageing of Cement**  
Strength

(i) Fresh : 100%

(ii) 3 months old : 80%

(iii) 6 months old : 75%

(iv) 1 Year old : 70%

(v) 1 1/2 Year old : 60%

(vi) 2 Years old : 50%



**(f) Safe Loads:**

**(i) Cement Concrete, 1 : 2 : 4 :**

**(ii) Brick Work in Cement :**

**Mortar, 1 : 6 : 8 to 12 tons / Sq. Ft.**

**(L) Formulae & Conversions :**

1. Area of Triangle

Where,  $S = \frac{1}{2} (a+b+c)$

=

$S (S-a) (S-b) (S-c)$

2 Area of any Regular Polygon = (Length of one side x distance of it from Centre x No. of side ) x  $\frac{1}{2}$

3 Area of sphere =

4 Volume of sphere =

5  $^{\circ}C = \frac{5}{9} (^{\circ}F - 32)$ .  $^{\circ}F = \frac{9}{5} ^{\circ}C + 32$

6 KW = KVA x Power Factor

7 KW = h.p. x 746

1000 x Efficiency

8 KW = Line Amps x Line Volts x 1.732 x p.f.

1000

9 KVA = KW

p.f.

10 KVA = h.p x 746

1000xEff.x p.f.

11 KVA = Line Amps x Line Volts x 1732

1000

12 Line Amps = KW x 1000 Line Amps

Line Volts x 1.732 x p.f.

= KVA 1000

Line Volts x 1.732

13 Line Lamps = h. p. x 746

Line Volts x 1.732 x Eff. x p.f.

14 h.p. = KW x 1000 x Eff. h.p.

746

= KVA x 1000 x Eff x p. f.

746

15 h.p. = Line Amps x Line Volts x 1.732 x Eff. p.f.

746

16 % Load Factor = Units Consumed x 100  
Mas Demand x Working Hours

**(M) H. T. Cable Dates**

**1.11 KV 3 Core A P I L C D S T Cable IS -892**

**Current Ratings. Amps**

**No.**

**Size**

**Sq. m.m.**

**Overall**

**Dia., m.m.**

**Weight**

**Kg./K.M. In**

**Ground**

**In Ducts In Air**

**1 2 3 4 5 6 4**

1 70 48.7 5,436 130 115 125

2 150 57.6 7,611 190 175 200

3 225 64.4 9,588 240 210 260

4 240 65.8 10,096 250 225 275

5 300 70.0 11,469 280 250 310

**2.33 KV, 3 Core : A P I L C D S T A S Cable : IS - 692**

**1 2 3 4 5 6 7**

1 70 83.7 12,264 130 120 135

2 150 91.2 14,532 190 175 210

3 225 99.8 17,252 235 220 270

4 240 101.3 17,696 245 230 285

5 300 106.8 19,688 270 255 320

**3. 11 KV, 3 Core, AXLPEDESTA, PVC Sheathed Cable IS - 7098 (Pt – 11)**

**Sl. No. Size Sq. m.m. Overall Current Ratings Amps**

**Dia., m.m.**

**Weight**

**Kg./KM In Ground In Air**

**1 2 3 4 5 6**

1 70 54.2 3,616 151 167

2 150 65.9 5,347 227 271

3 225 75.0 6,932 285 330

4 240 76.4 7,340 300 364

5 300 81.7 8,307 341 415

**4. 33 KV, 3 Core, AXLPEDESTA, PVC Sheathed Cable IS -**

**1 2 3 4 5 6**

1 70 74.9 6,660 151 167

2 150 90.0 8,782 227 271

3 225 97.6 10,427 285 330

4 240 99.1 10,688 300 364

5 300 104.0 11,860 341 415

**(N) Important Electricity Rules :**

**(A) IER 1956 : RULE 77 :**

**CLEARANCE ABOVE GROUND OF THE LOWEST CONDUCTOR**

1. No conductor of an over head line, including service lines, erected across street, shall, at any part thereof, be at a height less than:

(a) For Low and Medium Voltage Lines 5.8 Meters

(b) For High Voltage Lines 6.1 Meters

2. ALONG ANY STREET :

(a) For low and medium Voltage lines 5.5 Meters

(b) For high Voltage lines 5.8 Meters

3. ELSE-WHERE THAN ALONG OR ACROSS ANY STREET

(a) For low, medium and high voltage lines

Upto and including 11,000 volts, if bare 4.6 Meters

(b) For low, medium and high voltage 4.0 Meters

Upto and including 11,000 volts, if insulated

(c) For high Voltage Lines above 11,000 Volt 5.2 Meters

(B) IER 1956 RULE 78 :

**CLEARANCE FROM BUILDING OF HIGH AND EXTRA HIGH VOLTAGE LINES:-**

1. Where a high or extra-high voltage over head line passes above or adjacent to any building or part of a building it shall have on the basis of maximum sag a vertical clearance above the highest part of the building immediately under such line, of not less than:

(a) For High Voltage up to and including 33,000 volt 3.7 Meters

(b) For extra-high voltage lines 4.0 Meters

(c) For Med. Voltage 2.4 Meters

plus 0.30 Meters for every additional 33,000 volt or part thereof .

2. HORIZONTAL CLEARANCE:

(a) For high voltage lines up to and including 11,000 volts 1.2 Metres

(b) For high voltage lines above 11,000 volts and up to and

Including 33,000 volts 2.0 Metres

(c) For extra high voltage lines 2.0 Metres  
Plus 0.3 Metres for very additional 33,000 volt or part thereof.

**(C) IER 1956 : RULE 87 :**

**LINES CROSSING OR APPROACHING EACH OTHER:**

Where an over head line crosses another over head line clearance shall be as under :

Minimum clearance in Metres

Nominal  
system

Voltage 22 KV 33 KV 66 KV 110 KV 132 KV 220 KV

250 Volt

650 Volt

11 Kv

22 KV

33 KV

66 Kv

110 Kv

132 Kv

220 Kv

2.44

2.44

2.44

2.44

2.44

2.44

2.75

3.05

4.58

2.44

2.44

2.44

2.44

2.44

2.44

2.75

3.05

4.58

2.44

2.44

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2.44

2.75

3.05

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4. Dimension details of 400 KV, 220 KV and 132 KV towers.
5. Approved weights of towers, Concrete and Excavation volumes.
6. Foundation details of lines.



