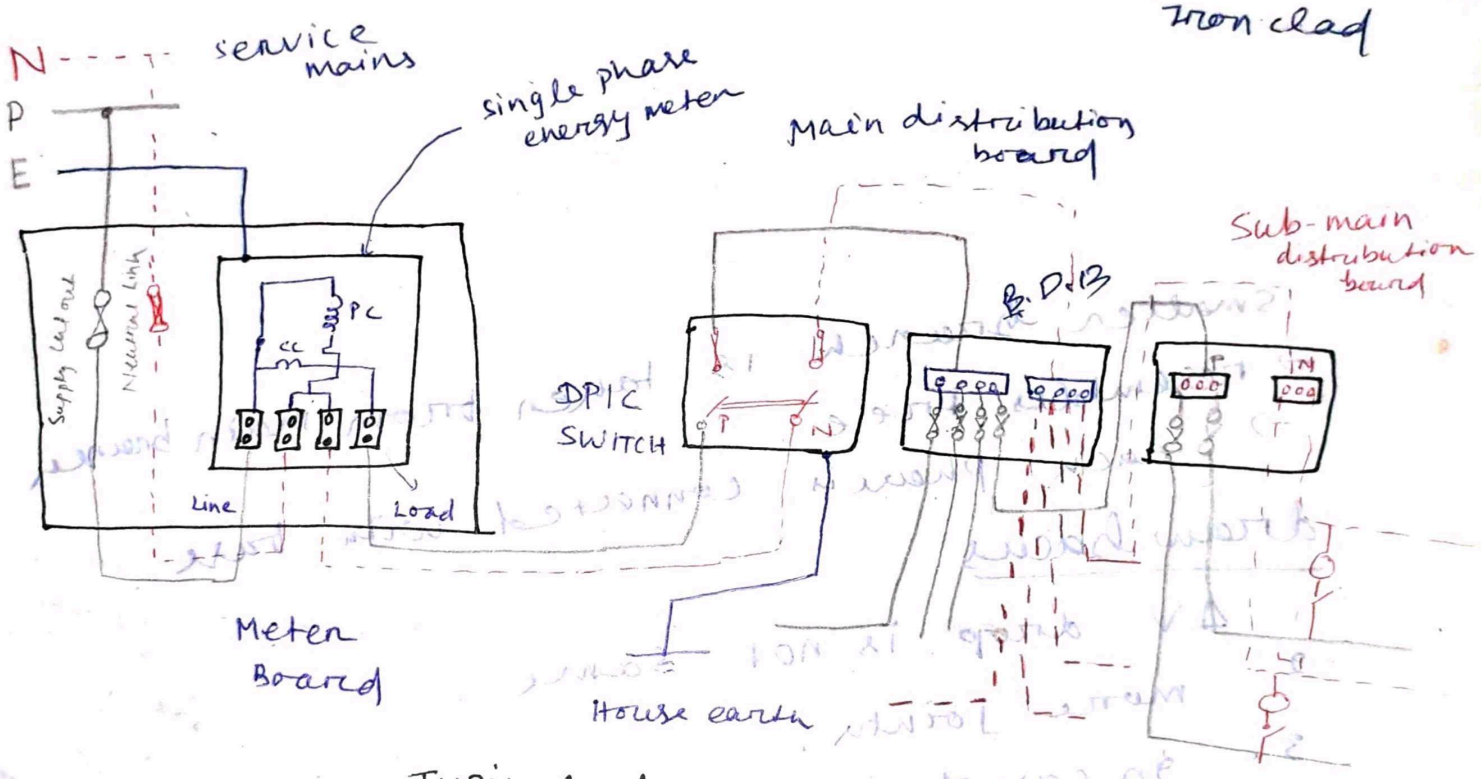
Wiring Systems

Introduction

A network wires connecting various accessories for distribution of electrical energy from the supplier meter board to the different electrical energy consuming ~~dev~~ devices such as lamps, fans and other domestic appliances through controlling and safety devices is known as a wiring system.

DPIC → double pole iron clad



Typical house-wiring ckt

Internal distribution of electrical Energy

As per the Indian standard

1) maximum no. of points of light, fan and 5A socket-outlet that can be connected in one ckt is 10

2) max^m load is 800 watt.

Distribution Board system

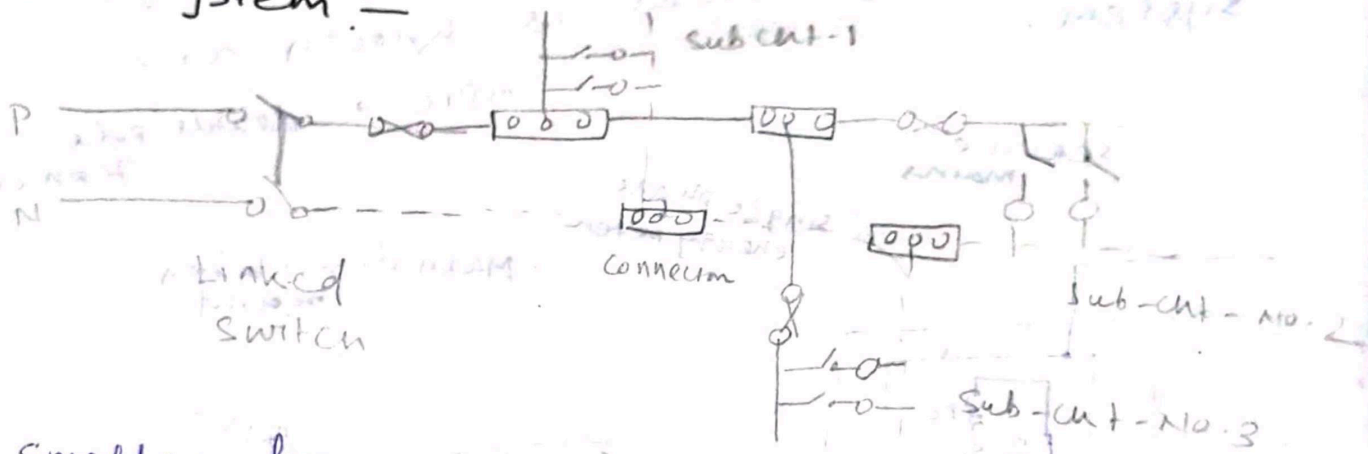
→ In distribution board the loads are connected in such a way that expenditure incurred is minimum.

i) Flarescent lamps - 50watt

ii) Incadescent lamps, fans & socket → 60watt

iii) Power socket outlet - 100watt

Tree system :-



Smaller branch is taken from main branch

→ resembles tree

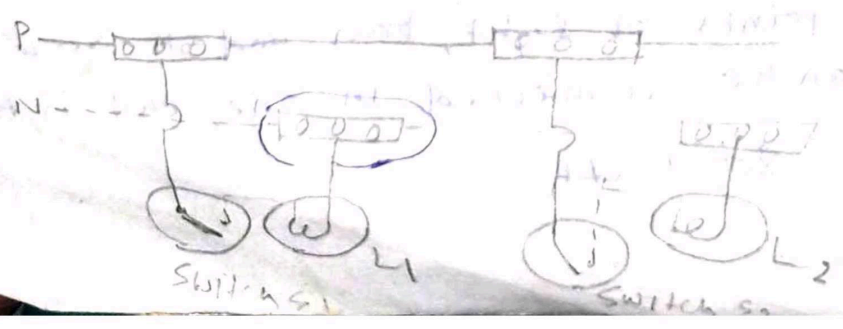
→ each phase is connected with fuse

draw backs

1. ΔV drop is not same
2. more joints
3. In case of fault, a lot of difficult Hearance

Methods wiring

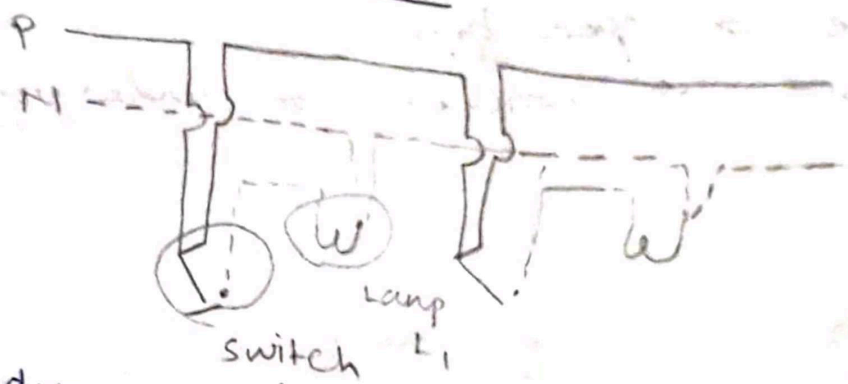
Joint box on Tee system :-



the connection to the lamp are made through joints, made in joints boxes, by means of suitable connectors or joints cutout

→ cable saved
→ extra joint box cost
→ wean the system

Loop-in system

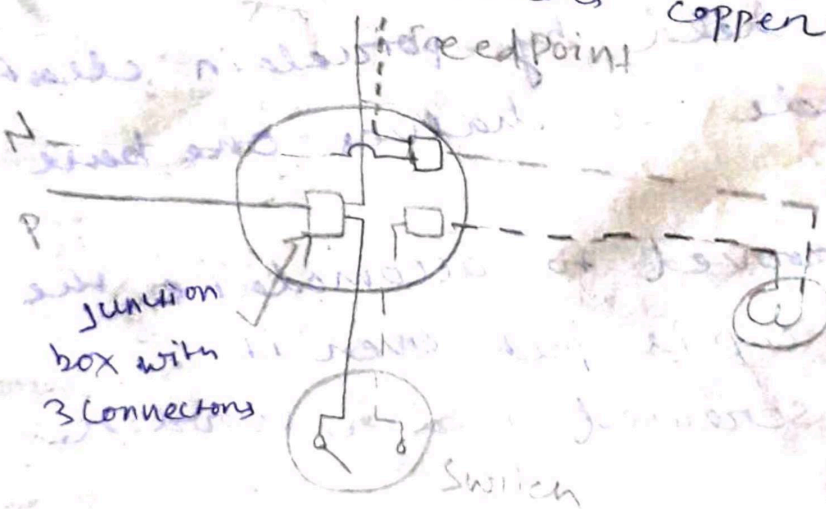


advantage

- joint box are not needed
- no joint box concealed beneath floor repain is easy

disadvantage

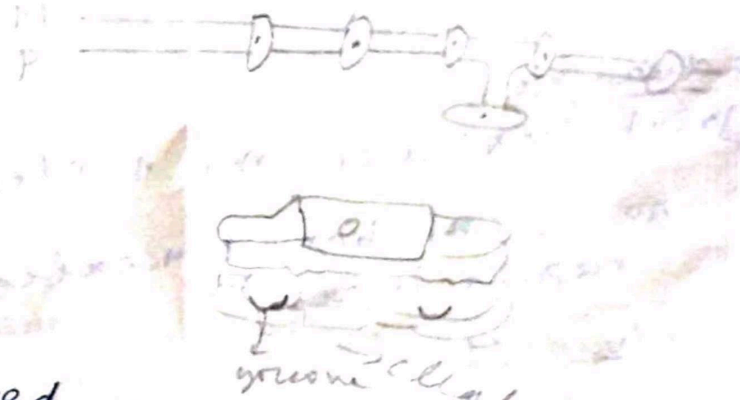
Length of wire of cable more, voltage drop more more ~~loss~~ copper loss



System of wiring

1. cleat wiring
2. wooden casing & capping wiring
3. CTS on TRS on PVC sheathed wiring
4. Lead sheathed on metal sheathed wiring
5. Conduit wiring
   a) surface on open type
   b) Recessed on concealed on underground type.

cleat wiring



1. In this system of internal wiring the cable used are either VIR (vulcanized indian Rubber) or PVC (poly vinayle chloride).
   → The cable are held by porcelain cleat
   → cleat are made two halves one base and other cap.
   → The base is grooved to accomodate the cables, and cap is put over it and whole is screwed under wooden plugs (gutties).

Advantage

→ It is cheapest system of wiring
→ Skill required is less

disadvantage

→ It is not good looking
→ The wire are exposed to mechanical injury.

Fields of Application:- Suitable for temporary installation.

Precaution

1. Proper type of cleat should be used
2. cable must be laid stretch between the cleat so that there is no contact with wall

Wooden casing capping wiring :-

The cables used in this type of wiring are either VIR or PVC type.

→ The cables are carried through the wooden casing ~~enclosures~~ enclosures
→ The casing consist of V-shaped groove (usually to hold the cable in different groves ~~of~~ of opposite polarity)
→ covered at the top by means of rectangular strip of wood known as capping of same width as that of casing.

Advantage

1. Easy to install and rewire
2. provide good insulation as conductors are good distance apart.

Disadvantage

1. there is a risk of fire
2. labour cost is higher
3. this type of wiring can't be concealed in plaster.

Field of application

used in low voltage domestic installations.

precautions to be taken

→ In no case cables of opposite polarity should reen in one groove

→

CTS or TRS wiring :-

(Cab tyre sheathed) (Tough Rubber sheathed)

→ In this type of wiring the cables used may be single core, twin core etc

→ TRS cables are circular

→ cables are sufficiently chemical proof, water proof.

→ TRS cables are reen on well seasoned, perfectly straight and well varnished, (on all sides) teak wood batten of thickness 10mm at least.

→ The width of the batten depends upon the number and size of cables to be carried by it.

→ The width of the battens are 13, 19 mm

for guidance the number of copper conductor cables of size 3/0.736

A.L → 2/1.40 mm

Advantage

1. life is sufficiently long
2. within certain limits it is fire proof

disadvantage

hard ~~workman~~ workmanship is required to make a sound job in TRS wiring

Field of Application

TRS wiring is suitable for low voltage installation

Precaution to be observed

→ The batten should be well varnished
→ The end of the cable must be sealed with compound in damp situation.

Lead sheathed or Metal sheathed wiring :-

→ In this system of wiring, the cables used are insulated wires, TRS or PVC with an outer covering of sheath of lead aluminium alloy containing about 95-1. lead.

→ it gives protection to the cable from mechanical injury, dampness and atmospheric corrosion.

→ ~~run~~ on straight teak wood batten of thickness not less than 10mm

Advantage

→ protection against mechanical injury
→ can be used in situation exposed to rain & sun provided no joints are exposed.

disadvantages

- costlier than TRS wiring
- ~~it is not~~

field of application :-

The wiring suitable for low voltage application.

precaution to be observed :-

The support employed must not be such a material that may react chemically with the seals

Conduit wiring :-

In this system of wiring steel tubes, known are conduits, are installed on the surface of walls by means of saddles or pipe hooks or buried under plaster and VIR or PVC cables are drawn afterwards by means of GI wire of size of about 18 SWG

Advantage

→ It provide protection against mechanical damage
→ The whole system is water proof

Disadvantage

↳ costly system of wiring

→ experienced and highly skilled labour is required.

Field of application :-

- in workshops for lighting and motor wiring

precaution to be observed

↳ special care should be taken that no moisture can enter junction boxes.

→ over crowding of cables should be avoided in conduits.

WIRING MATERIAL AND ACCESSORIES

16.10.13

Wire

single wire may be bare or covered with insulation, is known as wire.

Cable

Several wires standard together is known as a cable.

Conductor Materials used in cables

→ The function of conductor is to carry current.

1. copper.

1. The conductivity of copper is high.
2. The Resistivity of pure copper at 20°C is $1.786 \times 10^{-8} \Omega\text{-m}$.
3. It is mechanically strong, hard, extreamly tough, durable and ductile → material ability to stretched into wire
4. It is highly resistive to corrosion, oxidation and pitting → is a form of extreamly localized corrosion that leads to creation of small holes

gradual destruction of material by chemical reaction with its environment

Aluminium :-

→ The electrical conductivity of aluminium is about 60% of that copper

→ Resistivity = $2.87 \times 10^{-8} \Omega\text{-m}$ at 20°C

→ Al conductor is cheaper.

→ used in "continous bus-bar" system of distribution

INSULATING MATERIALS

The conductor is covered with insulating material so that it may prevent leakage of current from the conductor.

The insulating material used in electric cables must posses following properties

1. Highly Resistive
2. High flexibility
3. high dielectric strength
4. Non- inflammability
5. Non- hygroscopic
6. High Resistive to moisture, acid or alkalies

dielectric Strength

An insulator or dielectric is a substance within which there are no mobile electrons necessary for electric conduction.

however, when the voltage applied to such an insulator exceeds a certain value, then it breakdown and allow a heavy electric current.

dielectric strength of an insulator or dielectric medium is given by the max^m potential difference which a unit thickness of medium can withstand without breaking down.

Rubber :-

Rubber may be natural or

Synthetic

→ Its relative permitivity is between 2 and 3

permitivity
↓
a certain property of the medium (ε_r)

measure w.r.t absolute permitivity of vaccum.

→ Its dielectric Strength is 30kV/mm.

→ soften when heated to temp of 60°C or more

vulcanized Indian Rubber (VIR) :-

→ good insulator

↳ doesn't absorb moisture

↳ water proof

drawback :- owing to sulphur content it attack copper

sometimes a layer of pure rubber is also given on the conductor to protect it from sulphation.

Impregnated paper :-

↳ quite cheap

↳ has low capacitance

The property of capacitor to store electricity may be called its capacitance

capacitor essentially consist of two conductive surface separated by a layer of an insulating medium called dielectric

→ high insulation resistivity

→ The main advantage of paper insulation is that it is superior in heat conductivity. and capable of withstand high temp.

dis advantage :— 1. It is hygroscopic

Polyvinyl chloride (PVC) :—

It is inert to oxygen and almost inert to oils and to many alkalies and acids, and therefore, its use is preferred over VIR in extream environment, e.g cement factory, chemical factory

→ used in low and medium voltage application

Silk and cotton :—

↳ used in low voltage cables

↳ may be single layer or double layer

↳ It is usually used for instrument and motor winding.

Mechanical protection

Mechanical protection is usually provided to power cables laid direct in the ground by providing two layer of steel tape in such a way that upper layer covers the joint in the lower layer.

Types of cables used in internal wiring

The wires employed for internal wiring of building may be divided into different groups according to

i) conductor used

↳ e.g. copper conductor

Al conductor

ii) number of cores used

↳ according to no of cores the cable ~~consist of~~ may be divided into classes known as single core

twin core

three core

(two core with earth continuity conductor) cable

↳ The conductor which connects the common earthing terminal of many (?) whole of metal parts of metal ...

iii) According to voltage grading the cable may be divided into two classes

i) 250/440 V cable ii) 650/1100 V cable

iv) according to type of insulation the cables are following type

A) Vulcanized Indian Rubber (VIR) cable

→ VIR cables are available in 240/415 volt as well as in 650/1100 volt grades

→ VIR cable consist of either tinned copper conductor covered with a layer of

Vulcanised Indian Rubber (VIR) insulation

Over the rubber insulation cotton tape sheathed covering is providing with moisture resistant compound bitumen wax

(a) Single strand

(b) Seven strand

Single core VIR cable

2) Tough Rubber sheathed (TRS) or cab Tyre sheathed (CTS) cables :-

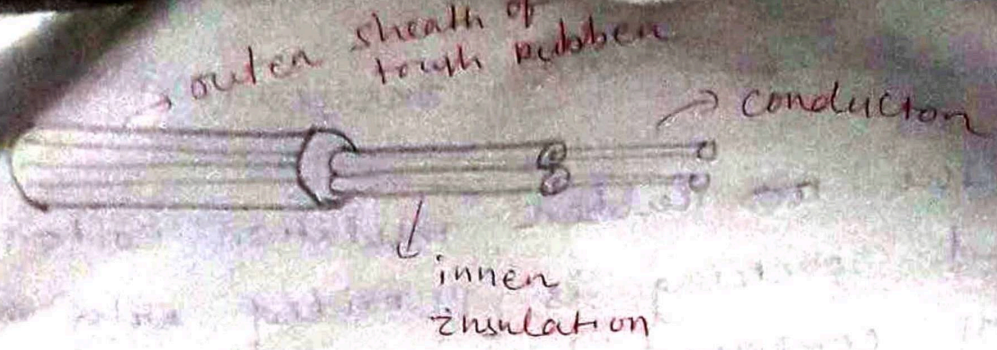
→ These cables are available in 250/440 volts and 650/1100 volts and used in CTS (or TRS) wiring

→ TRS construction

In TRS cable the inner insulation i.e VIR outer cover is tough rubber

→ These cables are water proof

Single core single strand TRS wire)



Twin core single strand TRS cable

(The voltage grade is commonly expressed in the following form V_0/V

V_0 → power frequency voltage between phase and earth (V_{rms})

V → power frequency voltage between two phase conductor (V_{rms})

for e.g 0.6/1 kv voltage grade cable can be operated for any phase to earth and phase to phase voltage not exceeding 0.6 kv & 1 kv respectively

Lead sheathed cables :-

→ The lead sheathed cable is a VIR insulated conductor covered with continuous sheath of lead.

→ It can be used without casing & conduit.

Polyvinyl chloride (PVC) insulated cables

→ conductor is insulated with PVC insulation

→ used in casing - capping & conduit wiring

Weather proof cables :-

These cables are either PVC insulated or VIR conductors being suitably taped braided and then compounded with weather resisting material.

Flexible cords and cables :-

The flexible cords consist of wires silk/cotton/plastic covered.

XLPE Cables :-

PVC and XLPE cables are built of insulation made of polymen

MULTI- STRAND CABLES

Multi-strand cables have got the following advantage with respect to single solid conductor

i) The multi-strand cables are more flexible and durable

ii) The surface area of multi-strand cable is more as compared to the surface area of equivalent single solid conductor.

iii) Skin effect is better as the conductor are tubular, specially in case of high frequency

Voltage grading of cables

This specifies the safe voltage which the insulation of cable can withstand.

General Specification of cable

i) size of the cable in metric system
(e.g 19/2.24, 7/1.70)
- 19 → no. of strand
- 2.24 → diameter of each strand / area of cross section of conductor used.

ii) Types of conductor used in cables
(copper, Al)

iii) no. of cores that cable consist of
e.g single core, twin core, twin core with ECC

iv) voltage grade (240/415, or 650/1100 V)

v) Types of cable with clear description regarding insulation, shielding, armouring
- armouring → external cover which give mechanical protection
- braiding → is a complex structure or pattern formed by interwining of three or more strand of flexible material

e.g

22 ACCESSORIES

Main switch and distribution board :-

As per Indian electricity rule 50 a suitable linked switch is to be provided immediately after the meter board

→ A suitable cut out must be provided just after the linked switch to protect the ckt against excessive current.

1. DPIC (Double pole Iron clad)
   ↳ controlling 1-φ 2-wire ckt

   TPIC (Triple pole iron clad)
   ↳ for controlling 3-φ 3-wire ckt

   TPNIC (Triple pole with neutral link Iron clad)
   → for controlling 3-φ 4-wire ckt

The specifications of IC switch fuse units are given below as samples.

1. For 2-wire DC ckt or 1-φ AC ckt :- 240 V, 16 A, DPIC switch fuse of any make approved by IS
2. For 3-wire DC ckt :- 500 V, 32 A (63/100/150 or higher amperes), IS approved TPIC switch fuse.
3. For 3-φ Balanced load ckt :- 415 V, 32 A (63/100/150 or higher amperes), IS approved TPIC Switch fuse.

4. For three-phase 4-wire cut → 415 V, 32 A (63/100/150 or higher ampers) IS approved TPIC switch fuse with neutral link.

Distribution board :-

The distribution ~~of~~ board is an assembly of parts, including one or more fuses or cut breaker, arranged for the distribution of electrical ~~ener~~ energy to various cut or other distribution board.

Fuse/Distribution Board - General Requirement

Distribution board have similar requirements as switch fuse units except that the metallic enclosure must have a locking arrangement

The specifications of fuse board are given below

For Medium size Residential building.

6-way 16 A, 240 V ICDB of any make approved by IS.

For Motor Installations,

6- way, 415 V, 300 A, Triple pole with (or without) neutral link ICDB of any make approved by IS

Earthing system

earthing

Earthing means connections of the neutral points of a supply system or the non-current carrying parts of electrical appercatus such as metallic frame work, metallic covering of cables, earth terminal of socket outlet, stay wires etc, to the general mass of earth in such a manner that all time an immediate discharge of electrical energy takes place without danger.

earthing is provided

1. to ensure that no current carrying conductor rises to a potential with respect to general mass of earth than its designed insulation.
2. to avoid electric shock
3. to avoid risk of fire due to earth leakage current through unwanted path.

IS Specifications Regarding earthing of Electrical Installation

1. Distance of earth from building shall not be situated with in a distance of 1.5m from the building.
2. The cross-section of earth continuity conductors should not be either less than 2.9 mm^2 (14SWG) or half of installation conductor size
3. The earth resistance should be very low

4. The earth wire & earth electrode will be of same material

5. The earth wire shall be taken through GI pipe of 13 mm diameter for at least 30 cm length above & below ground surface to the earth electrode to protect it against mechanical damage.

6. The earthing electrode shall always be placed in vertical position.

points to be earthed

→ Earth pin of 3-pin lighting plug socket and 4-pin power plug socket should be permanently earth.

→ All metal casing or metallic covering containing or protecting any electrical supply line or apparatus, such as iron clad switches, GI pipes and conduits enclosing VIR or PVC cables should be connected to earth.

→ The neutral conductor of 3-φ, 4-wire system and middle conductor of a 2-φ, 3-wire system should be earth.

→ The frame of every generator, stationary motor, and metallic parts of all transformers should be earth.

Determination of Et. size of earth wire and earth plate for domestic & Motor Installation

→ For low voltage supply 02 or copper wire of no 8 SWG will be required to run from main distribution board to sub main distribution board.

→ From sub-main distribution board copper no 14 SWG wire will be required to run to 3-pin socket outlets and connected to their earth sleeve.

→ ~~From station~~ The figure regarding size of earth wire for various capacity motors for guidance are given in Table 4-2.

INTERNAL WIRING ESTIMATION

1. A switch board is to be installed so that its bottom lies 1.25 meter above the floor.

2. a) only 3-pin, 5A socket-outlets are to be used in all light & fan sub-ckt. only 3pin, 15A socket outlets are to be used in all power sub-ckt.

b) For 5A socket-outlets, if installed at a height of 25cm above the floor level, the switch may, if desired be installed at a height 1.30 meter above the floor level.

c) No socket outlet is to be

8(a) All incadescent lamps, unless otherwise required, are to be hung at a height of 2.5m above floor and fans are at height 2.75m from floor

9(b) The load on power sub-ckt is to be normally restricted to 3000 watt, in no case more than two socket outlet are to be in one power sub-ckt

12. Every circuit or apparatus is to be provided with a separate means of isolation such as switch

13. In any building light & fan wiring and power wiring are kept separate

14. In 3-ϕ, 4-wire installation the load is to be distributed equally on all the phase

Electrical Installation for power circuits

→ The load refferced above are restricted to 3000 watt.

Important considerations Regarding Motors installation wiring.

1. All equipment used in power wiring shall be of iron clad construction and wiring shall be of the armoured cable or conduit type.
2. Looping of conducton & use of joints shall not be done.
3. The length of flexible conduit shall not be exceed 1.25 m.
4. Every motor should provide with 1. switch-fuse.
5. every motor should provide with 1 starter. (for limiting the current)
6. laying of ~~conduits~~ cables must be in separate conduits for separate motors

I. The minimum cross-section of conducton ~~should not be~~ should not be less than $2.5 mm^2$ for Al & $1.25 mm^2$ for copper.

8) The current rating of cables for supply to motor may be based on the normal full-load current of the motor. But fuse rating should be based on starting current.
on no case should the rating of the fuse be greater than twice the rating of the cable.

a) For motors of capacity above 12kW having starting current lower than twice normal full-load, the current rating of the cables is to be based on normal full-load current of motors and current-rating of fuses on motor starting current

b) For motors of capacity below 12kW, which have a very large starting current fuse should be of current rating to carry starting current safely and cables of current rating not lower than half the current rating of the fuse

9. The conduit should be electrically continuous throughout & connected to the frame of the motor. The frame of the motor shall be earthed.

10. While deciding the current rating of main switch controlling a group of motors, starting current of one motor (highest rating) plus full load current of remaining motors shall be considered

Determination of I/p power

$$\eta = \frac{O/P}{I/P} \Rightarrow I/P = \frac{O/P}{\eta}$$

$$= \frac{\text{Rated h.p} \times 735.5}{\eta}$$

1 h.p = 735.5 watt

For DC motor

$$I/P \text{ current} = \frac{\text{Rated bhp} \times 735.5}{\eta_m \times V}$$

For 1-φ A.C motor (P = VI cosφ)

$$I/P \text{ current} = \frac{\text{Rated bhp} \times 735.5}{\eta_m \times V \cos\phi}$$

For 3-φ AC motor

$$I/P \text{ current} = \frac{\text{Rated bhp} \times 735.5}{\eta_m \times \sqrt{3} V \cos\phi}$$

Determination of size of conduit

The no. of cables of different sizes that can be accommodated in various sizes of conduit are given in table 2.3.

Determination of size of Main switch

→ The no. of ways, voltage rating and current rating of distribution board is decided from the no. of ckt to be fed from it; voltage rating of

→ The current rating of the main switch is ~~decided keeping in~~ the starting current of one motor plus full load current of remaining motor to be controlled from it.

determination type of starter

up to 0.75 KW → direct online starter

0.75 KW to 11 KW = star delta starter

above 11 KW = auto transformer starter

Guarding of overhead lines

A guarding is provided for the safety of life,

→ The guarding for 11KV line is provided at road crossing, canal crossing, railway crossing, crossing over LT lines or communication lines.

→ every guardwire shall be connected with earth at each point at which electrical continuity is broken.

cradle guarding is provided when the conductors are in horizontal or delta formation

cage guarding is provided on LT lines with vertical formation.

cage guarding is provided on LT lines with vertical formation.

TEE - OFFS :-

The Tee-off from a line should be taken only from a pole and not in the middle of the span.

1. Single pole - Tee off Arrangement.
2. H- pole Tee- off arrangement.
3. A- pole Tee-off arrangement
4. Parallel groove (PG) clamps).

Jumpers

In a straight run, one a terminal pole is provided after every 2 KM so as to facilitate sagging.

→ The short length of the conductor used to connect the line conductor on one side of the terminal pole to the line conductor on the other side of the terminal pole is known as the jumper.

→ Jumpers are fixed to the line conductor with suitable clamps.

→ For HV lines the jumpers are arranged in such a way that under maximum deflection condition there is a minimum clearance of 0.3 m between the line jumpers and other metallic part.

Beads of jumpers

Bird guards

These are in form of wooden piece of size 10 cm x 12.5 cm x 15 cm., in case of Metal poles.

→ The insulators are fitted over the wooden pieces known as 'bird guard'.

→ to avoid short cut.

→ In case of towers these are galvanised steel & such shape that birds can't sit on there.

→ These are fitted on the top of the cross-arm, just above strain insulator

Anti climbing devices :-

Various type of insulators :-

PIN Type insulator :-

These insulators can be used up to 33kV.

Shackle Insulators :-

This type of insulator is used at the end of the span of the aerial wire of service connection to a house or factory where there is a considerable mechanical stress on when the angle of distribution lines changes.

→ It is used for Low voltage distribution lines.

Suspension type insulator

used for voltage up to 400kV

Strain insulator

used at the dead end of the line or at the sharp curve,

→ The strain insulators are also used when the line is made to cross the river. used for high voltage lines.

5. Stay Insulators or Egg Insulator

The stay insulators are used on stay wire to create insulation between pole & stay clamp.

over head line insulators

The line conductors are supported by the structures by means of insulating fixtures, called insulators.

→ in order that there is no current leakage to the earth through the support

The important properties of

↳ High mechanical strength
↳ high relative permitivity, so
↳ high insulation resistance.

conductor configuration

There are 3 configurations

1. horizontal configuration
2. vertical configuration
3. Triangular or delta configuration

(transposed)

Conductor Spacing :-

$$\text{Spacing} = \sqrt{S} + \frac{V}{150} \text{ meters}$$

S = Sag. table 10.5

Conductor clearance :-
(table 10.6)

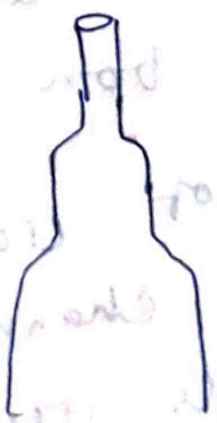
Span Lengths

a) with wooden poles → 40–50m
b) with steel tubular poles → 50–80m
c) with RCC poles 80–200m
d) with steel towers → 200–400m or above

for river-crossing etc exceptionally long span upto 500m.

(19) Guys and Stays :-

It becomes essential to stay over head line support at angle and terminal position, as the pole tends the pull due to conductors



Stay set consist of MS rod of 19mm dia, stay bow, cheek nut, thimble, stay wire ($\frac{7}{8}$, $\frac{7}{10}$ SWG GI wire) stay clamp and CI anchor plate 450 x 450 mm having 18 mm hole in the centre.

→ Stay rod is embedded in the cement concrete 1:3:6 to a depth of not less than 1.67 m 46cm of the rod projected above ground level.

Pole bracket and clamps

clamps are made of flat iron and are used for fixing or holding service line stay wire, earth wire, shacked insulator, cross-arm etc.

cross - arms

cross-arm is a cross - piece fitted to the pole top end portion by means of brackets, known as pole bracket for supporting insulator

→ Types of cross arm

1. MS channel.
2. angle iron or wooden (11KV & 33KV)
3.

Wooden cross arm

1.5 m × 125 mm × 125 mm
for 11kV line

2.1 m × 125 mm × 125 m → 33kV

Steel cross-arms

50 mm × 50 mm × 6.4 mm,

determination of size of conductor for overhead Transmission line.

→ Conductor material

→ Factors governing height of pole

→ Line supports

Wooden poles → used for 22kV

Span 60 m, A pole, H pole,

Steel poles :- Span (50-60m)

RCC poles :- Made of reinforced cement concrete up to 33kV

Lattice steel Towers :- used for 11kV & 33kV

→ dimensions ⇒ 25cm × 25cm at bottom
& 13cm × 13cm at the top.

Span :- 80-240 m

a) Tubular pole

b) Rail pole

c) Rolled steel joist pole

d) H-type RS joist pole

Estimates for L.T Line, Sub-station & Service connection for power

→ normally ACSR conductors is used for this transmission line,

↳ The 8 SWG or 10SWG → earth wire

↳ normal span 100m, at road, rail, bridge crossing the span may be 50 to 60m,

↳ pin type & disc insulators are used to support the conductor.

↳ for straight reen of line, pin type insulators, are used, but at diversion, or at termination of line, disc insulators are used

→ on 2km line or 11kV, every 4th pole should be earthed,

11/0.4kV Sub-station

pole mounted type substation

→ The transformer is mounted on two or four poles.

→ The H.T side is protected is protected by installing T.P.M.O (Triple pole mechanically operated)

Switch on double pole on four pole
Structure;

→ The H.T fuse set is also installed

→ L.T line 3-Φ 4 wire line run direct from the same pole. (no under ground connection).

→ Transformer capacity → 125kV

↳ mounted on concrete foundation

01

Skin effect

Conductors, typically in the form of wires, may be used to transmit electrical energy or signal using an alternating current flowing through that conductor.

→ The charge carriers constituting that current, usually electrons, are driven by an electric field due to source of electrical energy.

→ An alternating current in a conductor produces an alternating magnetic field in and around the conductor.

→ When the intensity of current in a conductor changes, the magnetic field also changes.

→ The change in magnetic field, in turn creates an electric field which opposes the change in current intensity

→ This opposing electric field is called back emf.

→ The back emf is strongest at the center of the conductor, and forces the conducting electrons to the outside of the conductor,

→ The current density is found to be greatest at the conductor surface, with a reduced magnitude deeper in the conductor. That decline in current density is known as the skin effect.

$R \uparrow$

Diversity factor = $\frac{\text{Sum of Individual Max. demand}}{\text{Max. Demand on power station}}$

→ diversity factor is usually more than one. (since the sum of individual max. demand > max. demand

e.g feeder 1 has max^m demand = 10MW at 10: am

feeder - 2 = 12MW at 7: PM

feeder - 3 at max^m = 15MW at 9: PM

37

while max^m demand of all 3 feeders is 33MW at 8:

diversity factor = $37/33 = 1.12$