Types of Wiring

- **Conduit wiring:**

This system uses steel, iron, or PVC pipes to carry wires. The pipes can be run over walls or concealed. Metal conduits are considered safer and provide better protection. Conduit wiring is the use of a tube, or conduit, to protect and route electrical wires through a building or structure. Conduits are typically used in exposed areas like attics, basements, crawlspaces, and exterior walls to protect electrical wires from damage and fire hazards. This method involves running conduits under the wall plaster.





Advantage of Conduit Wiring Systems

- It is the safest wiring system (Concealed conduit wring)
- Appearance is very beautiful (in case of concealed conduit wiring)
- No risk of mechanical wear & tear and fire in case of metallic pipes.
- Customization can be easily done according to the future needs.
- Repairing and maintenance is easy.
- There is no risk of damage the cables insulation.
- it is safe from corrosion (in case of PVC conduit) and risk of fire.
- It can be used even in humidity, chemical effect and smoky areas.
- No risk of electric shock (In case of proper earthling and grounding of metallic pipes).
- It is reliable and popular wiring system.
- Sustainable and long-lasting wiring system.

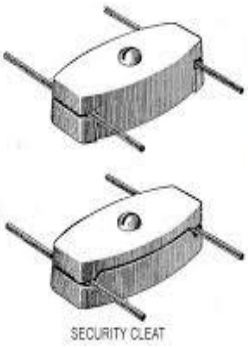
Disadvantages of Conduit Wiring Systems

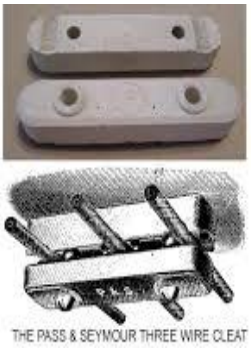
- It is expensive wiring system (Due to PVC and Metallic pipes, Additional earthing for metallic pipes Tee(s) and elbows etc.
- Very hard to find the defects in the wiring.
- Installation is not easy and simple.
- Risk of electric shock (In case of metallic pipes without proper earthing & grounding system)
- Very complicated to manage additional connection in the future.

- **Cleat wiring:**

This wiring uses PVC or VIR insulated wires that are braided and compounded on walls and ceilings with porcelain cleats. Cleat wiring is a temporary electrical wiring system that uses cleats to secure insulated wires to walls or ceilings. Easy to install, low cost, quick upgrades and extensions, easy access for inspections and repairs







Advantages of Cleat Wiring:

- It is simple and cheap wiring system
- Most suitable for temporary use i.e. under construction building or army camping
- As the cables and wires of cleat wiring system is in open air, Therefore fault in cables can be seen and repair easily.
- Cleat wiring system installation is easy and simple.
- Customization can be easily done in this wiring system e.g. alteration and addition.
- Inspection is easy and simple.

Disadvantages of Cleat Wiring:

- Appearance is not so good.
- Cleat wiring can't be used for permanent use because, Sag may be occur after sometime of the usage.
- In this wiring system, the cables and wiring is in open air, therefore, oil, Steam, humidity, smoke, rain, chemical and acidic effect may damage the cables and wires.
- It is not lasting wire system because of the weather effect, risk of fire and wear & tear.
- It can be only used on 250/440 Volts on low temperature.
- There is always a risk of fire and electric shock.
- It can't be used in important and sensitive location and places.

- **Casing and capping wiring:**

This system uses wooden or plastic enclosures to conceal insulated cables. It's an electrical wiring method where PVC insulated wires are placed in plastic casings and covered with a cap. The casing and capping system is often used for household wiring, wire distribution, protection to other wiring systems, offices, and devices with low voltage use





Advantages of Casing Capping Wiring:

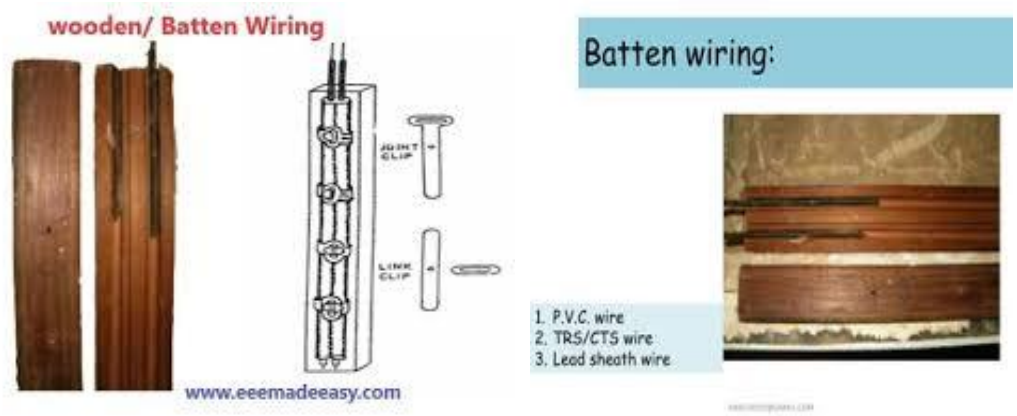
- It is cheap wiring system as compared to sheathed and conduit wiring systems.
- It is strong and long-lasting wiring system.
- Customization can be easily done in this wiring system.
- If Phase and Neutral wire is installed in separate slots, then repairing is easy.
- Stay for long time in the field due to strong insulation of capping and casing..
- It stays safe from oil, Steam, smoke and rain.
- No risk of electric shock due to covered wires and cables in casing & capping.

Disadvantages Casing Capping Wiring:

- There is a high risk of fire in casing & capping wiring system.
- Not suitable in the acidic, alkalies and humidity conditions
- Costly repairing and need more material.
- Material can’t be found easily in the contemporary
- White ants may damage the casing & capping of wood.

- **Batten wiring:**

This wiring involves laying wires or a bundle of wire over wooden batten. The electrical wiring where the wires or a bundle of wire is laid over the wooden batten is known as batten wiring. These wires are held to the batten for using a brass clip and spaced at an interval of 10 cm for horizontal runs and 15 cm for vertical runs. Advantages of Batten wiring: This is a simple wiring system. CTS or TRS or PVC sheathed wiring, lead sheathed or metal sheathed wiring are types of batten wiring. This wiring installation is simple and cheap as compared to other electrical wiring systems also takes less time to install. These are mainly used for indoor installations.



Advantages of Batten Wiring

- Wiring installation is simple and easy
- cheap as compared to other electrical wiring systems
- Paraphrase is good and beautiful
- Repairing is easy
- strong and long-lasting
- Customization can be easily done in this wiring system.
- less chance of leakage current in batten wiring system

Disadvantages of Batten Wiring

- Can’t be install in the humidity, Chemical effects, open and outdoor areas.
- High risk of firs
- Not safe from external wear & tear and weather effects (because, the wires are openly visible to heat, dust, steam and smoke.
- Heavy wires can’t be used in batten wiring system.
- Only suitable below then 250V.
- Need more cables and wire

- **Lead sheathed wiring:**

This wiring uses electrical conductors encased in an aluminium alloy that is 95% lead. The coating protects the cables from atmospheric corrosion and damage caused by moisture and mechanical stress. Lead sheathed wiring is a type of electrical wiring that uses an outer sheath of lead-aluminium alloy to protect electrical conductors from moisture, mechanical damage, and atmospheric corrosion. Lead sheathed wiring is often used in wet locations and underground ducts





Advantages of Lead sheathed wiring

- Protection against the entry of hydrocarbons.
- Protection against moisture ingress.
- Can be used as an earthing or grounding system.
- Excellent corrosion resistance.

Disadvantages of Lead sheathed wiring

- This system of wiring is not recommended in situations
- exposed to sun and rain, unless preventive steps are taken.
- It cannot be used in damp places.
- Good work man ship is required to make a sound job.
- Only suitable below then 250V.

- **Metallic sheathed cable:**

This cable has a metallic protection over the insulated conductors. The conductors are separately insulated with plastic layer which is surrounded by a metallic sheath. In lead sheathed or metal sheathed wiring the cables used are insulated wires, TRS or PVC, with metal outer covering of about 1 mm. thick. The metal covering is known as sheathing and is made of lead – aluminium alloy containing about 95% of lead. The metal sheathed cables are run on wooden batten and are fixed to it by link – clips. The whole metal sheathing efficiently earthed as per IS 732-1983



Advantages

- It provides protection against mechanical injury.
- It can be used in damp situations.
- It can be used in situations exposed to-sun, and rain provided no joint is exposed.
- It has longer life.

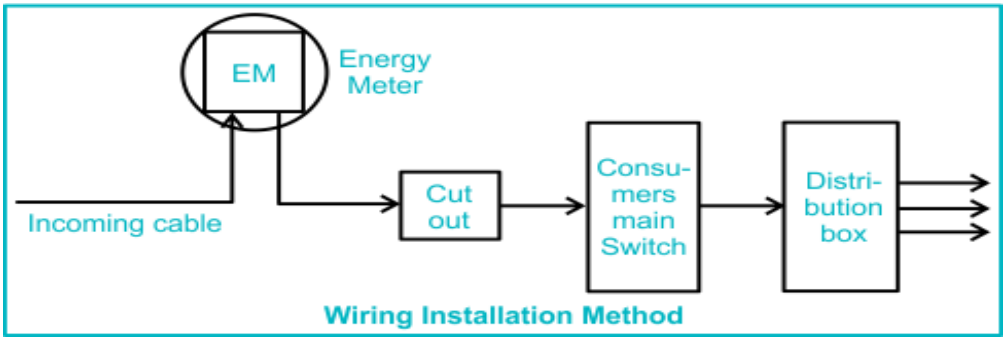
Disadvantages

- It is costly system of wiring.
- It is not suitable where chemical (acids and alkalis) corrosion may occur.
- In case of insulation damage, the metal sheath become alive and gives shock.

Electrical wiring

Electrical wiring is an electrical installation of caballing and associated devices such as switches, distribution boards, sockets, and light fittings in a structure.

Wires and cables are rated by the circuit voltage, temperature rating and environmental conditions (moisture, sunlight, oil, chemicals) in which they can be used. A wire or cable has a voltage (to neutral) rating and a maximum conductor surface temperature rating. The amount of current a cable or wire can safely carry depends on the installation conditions.



Factors Affecting the Selection of Wiring

- **Cable rating**:

Cables have specific voltage and amperage capacities. Exceeding these ratings can damage the cable and be a safety hazard.

- **Electrical load:**

Calculate the total amount of power that each circuit will use. Consider the number of outlets, appliances, and lighting fixtures that will be connected to each circuit.

- **Compliance with standards:**

Check that the wiring duct you choose meets relevant standards and regulations, such as those set by the National Electrical Code (NEC) or the International Electrotechnical Commission (IEC).

- **Colour of the wire:**

Colour coding helps distinguish between different types of wiring and keep the electric system consistent.

- **Safety:**

Consider safety against common hazards, like fire, electrical shocks, and moisture.

- **Type of load:**

Consider the type of load, such as motors, HVAC, or light.

- **Cost:**

Consider the cost of the wiring system.

- **Termination methods:**

The two main types of wire terminations are crimp and solder.

- **Appearance:**

Consider how the wiring will look. If the cables and wiring are in open air, they may be damaged by oil, steam, humidity, smoke, rain, chemicals, and acidic effects.

General Rules for Wiring:

- A cut-out is essential at the consumer's premises.
- Meters, maximum demand indicators, and related equipment must be installed on the consumer's premises.
- Weatherproof wiring with sufficient current capacity is necessary for the service connection.
- All conductors/wires should match voltage ratings and possess proper insulation.
- An appropriately rated fuse should safeguard each line or phase.
- In metal conduit wiring, the conduit pipe should be continuously grounded.
- Every load point and appliance should have an independent control switch.
- Building wiring installations must have distinct sub-circuits for light/fan/3-pin socket loads and 3-pin socket 15 Ampere power loads.
- The number of load points connected in any light/fan sub-circuit should not exceed ten.
- Power sub-circuits should not exceed 3000 watts and have a maximum of two power points.
- Fuse ratings should not be less than half the lowest cable size capacity in any circuit and should not exceed 5 amps in any sub-circuit.
- Earth terminals of all 3-pin socket outlets and plugs must be permanently connected to the earth wire.
- Adequate 3-pin socket outlets should be strategically placed in all building rooms.
- In bathrooms, 3-pin sockets should be installed at a height not less than 1.5 meters.
- Ceiling fans should be hung at a height of 2.75 meters above the floor level, following IS:4648-1968.

- A 14 SWG GI earth wire is required for domestic wiring for single-phase supply, while a 3-phase supply system mandates an 8 SWG GI earth wire.
- If the load on a domestic wiring installation surpasses 6.0 kW, a 3-phase, 415 V, 50 Hz, 4-wire supply is necessary, with proper load balance.