

5.1 DOMESTIC UTILIZATION OF ELECTRICAL ENERGY

HOUSE WIRING

Different colour types of wires

- ✚ The electric power line enters our house through three wires- namely the live wire, the neutral wire and the earth wire.
- ✚ To avoid confusion, we follow a colour code for insulating these wires.
- ✚ The red wire is the live wire, and the black wire is neutral.
- ✚ The earth wire is given green plastic insulation.

5 Different Types of Electrical House Wiring Systems

- Cleat Wiring. This wiring comprises of PVC insulated wires or ordinary VIR that are braided and compounded
- Casing and Capping Wiring
- Batten Wiring
- Lead Sheathed Wiring
- Conduit Wiring

Different Types of Electrical Wires and Cables

- ❖ Communications Cable. Coaxial Cable. Hard line Coaxial or Heliac Cable. ...
- ❖ Direct-Buried Cable (DBC)
- ❖ Non-Metallic Sheathed Cable (NM, NM-B)
- ❖ Metallic Sheathed Cable (Armored Cable, AC or BX, MC) Armored Cable (AC) Metal Clad (MC) Cable.
- ❖ Multi-Conductor or Multicore Cable:
- ❖ Paired Cable.
- ❖ Portable or Extension Cord.
- ❖ Ribbon Cable.

WIRING MATERIALS

Electrical wire is made of materials like copper, aluminium and silver. As silver is expensive, mostly copper and aluminium are used in wiring. Copper is a metal that is well-known for its excellent electrical conductivity and ductility. Unlike aluminum, copper is a more stable and reliable material to use for electrical wiring. It allows for

smaller conductors to be utilized for transmission of power loads, thereby reducing wiring expenses.

How to choose wire for house wiring?

To determine what gauge wire you need, consider the carrying capacity and the amount of current the wire needs to conduct (measured in amperage or amps). Wire gauge is directly related to how many amps you need to run through it. The distance you need the wire to go can also impact the gauge of wire you need. Most homes have three-wire service—two hot wires and one neutral. Throughout the house, one hot wire and one neutral wire power conventional 120-volt lights and appliances. Both hot **wires** and the neutral wire make a 240-volt circuit for large appliances such as air conditioners and electric furnaces.

MAIN FEEDER WIRES

Main Feeder Wires: Main power feeder wires are the wires that connect the service weather head to the house. They're made with stranded or solid THHN wire and the cable installed is 25% more than the load required.

Panel Feed Wires: Panel feed cables are generally black insulated THHN wire.

SIZING A WIRE

Wire is sized by the American Wire Gauge (AWG) system. Wire gauge refers the physical size of the wire, rated with a numerical designation that runs opposite to the diameter of the conductors - in other words, the smaller the wire gauge number, the larger the wire diameter. The wire gauge indicates the electrical wire sizing, as defined by the American Wire (AWG) system. The most common gauges are 10, 12 or 14. The gauge and diameter of the wire are inversely related. In other words, as the gauge number gets higher, the diameter of the wire gets smaller.

Wire size is measured in AWG (American Wire Gauge) as

- a) The AWG number identifies the size of the conductors the smaller the number the larger the diameter (AWG 0000 – 0.46 in, AWG 18 –0.04 in)
- b) NEC defines process for calculating wire size based on Current, Voltage and length of wire.
- c) Changes in routing may require a change in the wire used to cabinets or field elements.

- d) Most household wiring is usually 12 or 14 AWG Wire Size
- e) DOT Signal, Lighting and ITS wires range from 18 AWG for communications interconnect to 00+ for power service.
- f) AWG # wire can be either solid or stranded.

NUMBER OF CIRCUITS IN A HOUSE

Fifty years ago, a kitchen might have been served by a single electrical circuit, but today, a newly installed kitchen with standard appliances requires at least seven circuits and often more. Kitchens must have at least two 20-amp 120-volt "small appliance" circuits serving the receptacles in the countertop areas.

INSULATION AND JACKETING IDENTIFIED IN STANDARD SPECIFICATIONS

- XLP or XLPE (Crosslinked Polyethylene) – moisture resistant, flexible, use in wet environments (pull boxes and conduits)
- THHN or THHW (Thermoplastic high heat resistant Nylon, heat and water resistant Nylon) – Suitable for dry or wet locations, high thermal stability, high strength.
- PVC (Poly-Vinyl Chloride) – Low heat resistance, not resistant to sunlight, Not appropriate for wet locations, low flexibility. Rated for Wet location in accordance with NEC 310.104(A)

REQUIREMENTS OF WIRE

1. Type USE-2 or RHH or RHW-2 copper conductors are suitable for use in raceways installed underground in wet locations
2. Type UF-B (Underground Feeder Cable) has a broad range of usage as defined in Article 340 of the National Electrical Code (NEC). Type UF-B may be installed as interior wiring in wet, dry, or corrosive locations at temperatures not to exceed 90°C
3. Stranded or Solid – Requirements vary by application

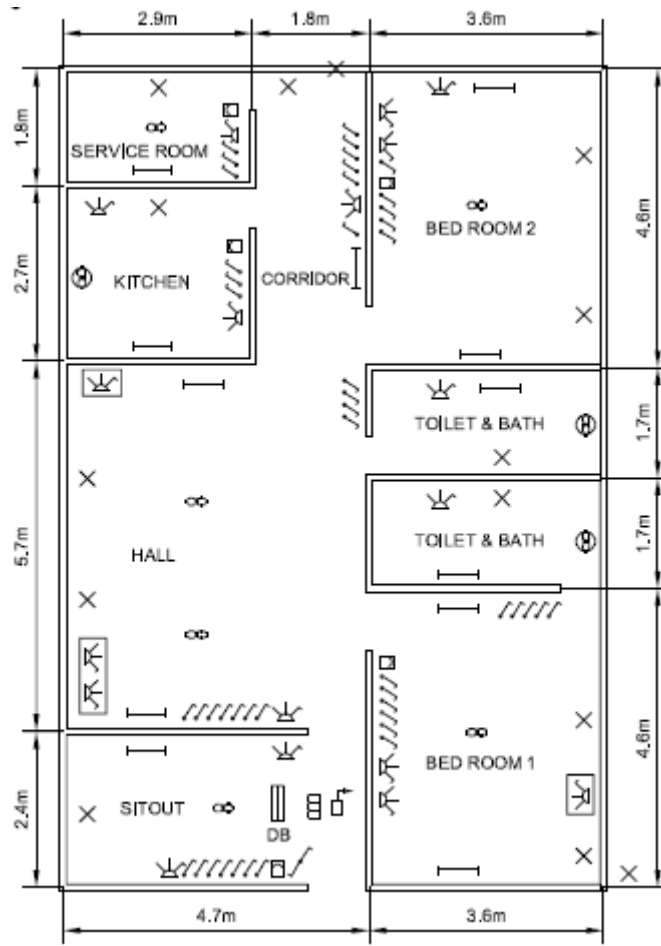


Figure 5.1.1 Accessories position diagram

[Source: “Electrician (NSQF Level-5)”, National Instructional Media Institute, Page:102]