

# PANELS

- ◉ An electrical panel (or breaker panel) is where all the breaker switches are located. And that's just what they are; switches that can be flipped.
- ◉ There's likely a "main" circuit breaker that controls the power to the entire house, but you'll also see individual breakers, responsible for providing the electricity to various parts of your home.
- ◉ Each circuit breaker has a lever that can be turned "on" or "off." Each breaker should have its own label so you can identify the area of the house affected.

- ◉ The power to your home comes through an electrical meter located outside and is routed to your electrical panel.
- ◉ It is usually larger than the rest and can be used to shut off the power to the whole house at once.
- ◉ In other words, it “breaks the circuit.” It also tells you the amperage of your electrical panel.
- ◉ This amperage should be no less than 100 and can be 200 or 400 amps.
- ◉ Please note that your home insurance provider will be very interested in the number of amps.
- ◉ If it's less than 100, your system may need updating. This could make it difficult for you to obtain insurance, or you may end up having to pay a higher rate.

# HOW DOES AN ELECTRICAL PANEL WORK

- ⦿ Each circuit breaker is designed to trip when the circuit is overloaded.
- ⦿ This is a definite safety device.
- ⦿ If the breaker didn't trip and shut off the power, there could be trouble.
- ⦿ Each breaker is designed to carry a certain amount of current.
- ⦿ If it carries too much, the wires could overheat and possibly catch fire.

- ◉ A single circuit breaker is normally designed to provide 120 volts.
- ◉ This is the typical amount needed for lights, TVs, etc. Since circuit breaks would make up the bulk of the breakers in your electrical panel.
- ◉ A double circuit breaker is designed to provide 240 volts. This is for the big appliances that draw a lot of power, such as a stove or electric dryer.
- ◉ When the breaker trips, it's a simple matter to just reset it. In older homes, with fuses, the fuse is damaged once it has blown, and needs a replacement.

# PURPOSE OF HAVING AN ELECTRICAL PANEL BOARD

- ⦿ One of the purposes of your panel board is to break up the power supply into sub-circuits depending on your purpose in using a panel board.
- ⦿ This is to ensure that everyone and everything is safe against any accidents like short circuits.
- ⦿ And it can be done with the help of electrical circuits that emerge from your panel boards.
- ⦿ There are many types of panel board that you can use depending on your needs and purpose.
- ⦿ You can ask the help of your trusted panel board supplier for the suggestion on what is the type that is suitable for your needs.
- ⦿ And to help get an idea on what are the types of panel board available in the market.

# TYPES OF ELECTRICAL PANEL BOARD

- ◉ A good power distribution system does not happen overnight.
- ◉ It needs careful engineering to ensure your safety while efficiently supplying adequate electrical services.
- ◉ If you are not an electrician and is not familiar to any types of the electrical distribution system, then you can ask the help of an expert.

# MAIN BREAKER PANEL

- ⦿ This is where the amount of electricity in the entire house or establishment is being controlled.
- ⦿ It is also the most commonly used electrical panels.
- ⦿ This is where you will find the main breaker switch where you can shut on/off the power supply.
- ⦿ Your main breaker is the mother of all your electrical panel boards wherein it ultimately protects the connected circuit in your distribution system. This is also where you can identify the amperage capacity of your panel breaker.
- ⦿ That is why it is very important to have a main breaker panel to your household.



## 2. MAIN LUG PANEL

- ⦿ This type of electrical panel board does not feature the main breaker.
- ⦿ Instead, lugs are used in this panel type wherein line wires run into these lugs.
- ⦿ There is a separate disconnect in the meter wherein you can use in case of a fire or emergency occasion.
- ⦿ This separate disconnects will serve as your main breaker, so if an occasion like a fire happens, you can still cut-off the power supply without the needs to go inside the house.

### 3. SUB PANEL

- ◉ If multiple circuits are required in the same area, sub-panels are more suitable to have.
- ◉ This type of electrical panel is connected to the main panel through a circuit. It also doesn't have a dedicated, unlike the main lug panel.
- ◉ Subpanel allows you to adjust the current distribution throughout your house.

## 4. TRANSFER SWITCH

- ◉ This type of sub-panel is best suited for circuits with a backup power generator.
- ◉ The transfer switch works by transferring the generator power to electrical power with the help of the breaker panel.
- ◉ In areas where weather is unstable and very unpredictable, having a backup power generator is very common.
- ◉ And to help the generators from transferring electrical power transfer switches function as how the main breaker panel works.

## 5. PANEL FUSE BANK

- ⦿ This type of electrical panel board serves as the load center of your distribution system.
- ⦿ It provides electrical safety protection of an over the current electrical circuit. Panel fuse bank is very ideal if you are using a solar panel.
- ⦿ The electrical power will be stored first on your solar panels before heading directly to the fuse box before distributing it to the entire house.

## 6. UNITIZED PANEL

- ◉ Unitized Panel is very unique among the other types of the electrical panel board. It is because this electronic meter displays your electronic parameters.
- ◉ We, at Alciska, provides a unified ideal type of power center that aims to supply and deliver a low voltage of power from a medium voltage line. It is advisable to use in an industrial and commercial establishment.

## 7. INDUSTRIAL LIGHTING PANEL

- ◉ Industrial establishment and commercial facilities often have a large amount of energy consumption.
- ◉ And industrial light panel helps in reducing this energy consumption by programming the lights to turns-off when in the idle period.

# SYNCHRONIZING PANEL :

- ◉ Synchronizing Panel works between two or more different power sources like DG sets to manage power supply.
- ◉ Synchronization helps in making different DG sets behave as a virtual single unit and eliminates subdivision of total load.
- ◉ It helps in transferring load from one unit to another as during service period, so that the unit requiring service can be easily shut off.
- ◉ In this way the critical load need not be interrupted and there is no production loss.
- ◉ During low load we can run any single unit, and synchronize more units as the load increases.
- ◉ This can be manual or automatic.

# LT PANEL AND HT PANEL :

- ◉ LT Panel is an electrical distribution board that receives power from generator or transformer and distributes the same to various electronic devices and distribution boards.
- ◉ Such panels are used in industries both for internal and external use and, therefore, they are quite rugged to withstand different climatic conditions.
- ◉ Our LT panels are designed to work with low electricity consumption that makes them cost effective
- ◉ HT Panel is like LT Panel except that it is used for high tension cables.



# APFC (AUTOMATIC POWER FACTOR CONTROL) PANELS

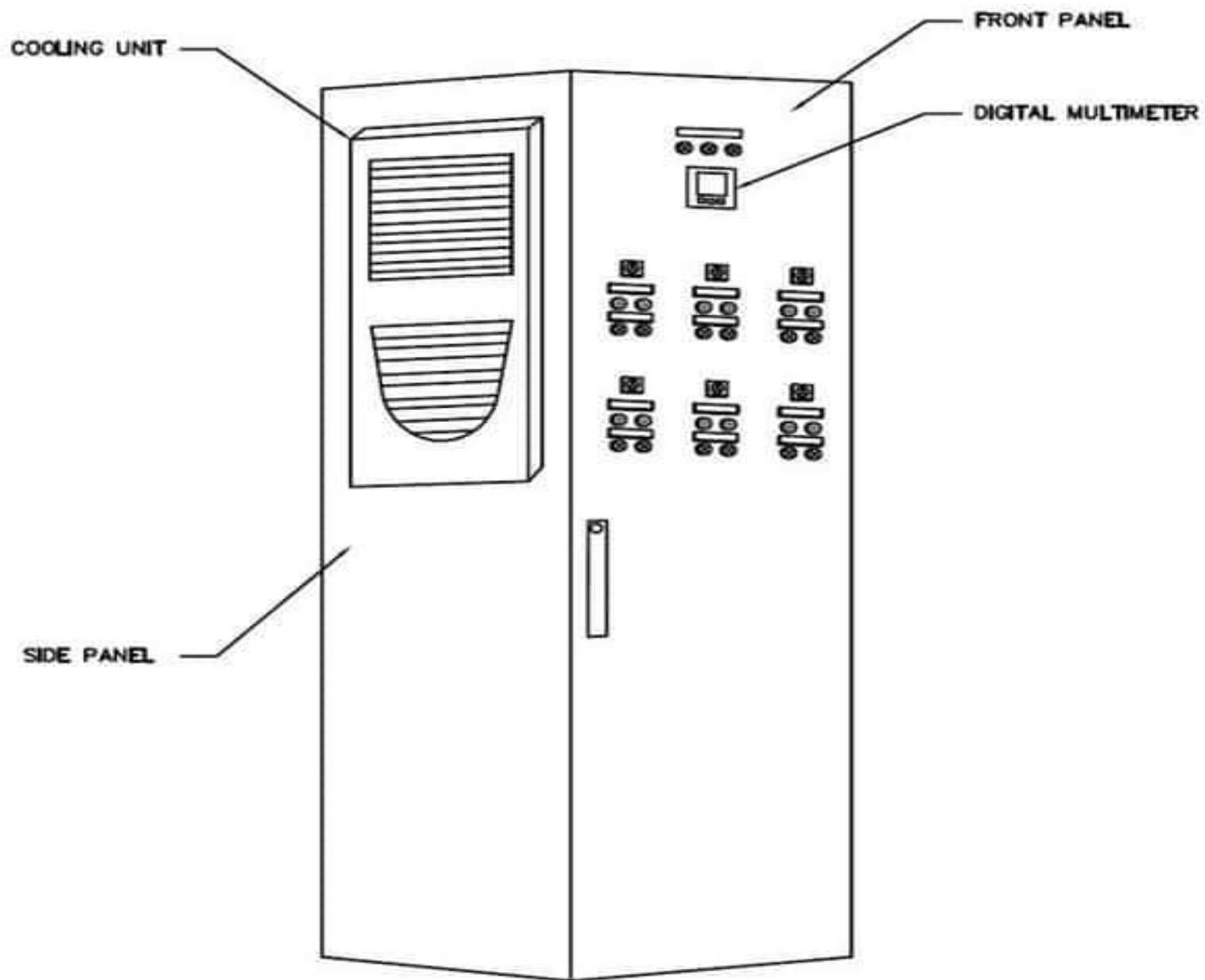
- ◉ These panels are used in commercial buildings and industries where there is fluctuation in voltage and power supply.
- ◉ The electrical load required by a unit depends upon the type of machineries, cooling plants and other devices installed.
- ◉ There is always a possibility of damage of these equipments if power fluctuates.
- ◉ In case of fixed loads they can be safeguarded using capacitors, but in case of varied loads, a mechanism to switch in and switch out the capacitors is required which is basically handled using APFC panels.

# PCC (POWER CONTROL CENTER) PANELS :

- Its basic function is to control power supply to various units and equipments as per their load requirement so that they can work in harmony.

# MCC (MOTOR CONTROL CENTRE) PANEL :

- ⦿ These are effectively used with motors or submersible pumps to provide sufficient protection from overloads and short circuits.
- ⦿ These are high on performance, require low maintenance and can withstand extreme temperature variations.



# WHY DO WE USE THEM?

- ◉ If we have large industrial area where many electrical motors are used these motors need to be protected from abnormal conditions and/or any overload.
- ◉ But controlling and monitoring the operation of each motor from the field requires hundreds of controllers and control panels.
- ◉ However monitor and control is always done from the electrical central room, therefore an Motor control center is located in that room and electrical signals are sent to the motors in fields.

# WHAT ARE THE COMPONENTS?

- ◉ There are many common components among all types of MCCs and some special components that depends on the application.
- ◉ The common components include:
- ◉ Circuit breakers or fuses: We have already discussed the usage of those devices in other articles, but briefly they are used for protection from faults. The used circuit breakers types shall be as follows:
  - Circuit breakers feeding loads up to 0.75kW shall be of the miniature type.
  - Circuit breakers feeding loads 1-7.5kW shall be of the Manual Motor Starter or Motor Circuit Breaker type.
  - Circuit breakers feeding loads greater than 7.5kW shall be of the Moulded case type.
- ◉ Push Buttons and Selector Switches: They are used for start stop operation of the motor either manual or automatic.
- ◉ Indicator lamps: They are used to show the status of operation whether it is start, stop or fault.
- ◉ Digital Multi-meter: To measure voltage, current and frequency.

# TYPES OF MCCS

- ⦿ There are many applications where MCCs are used.
- ⦿ However the most common applications are MCC of HVAC systems and MCC of Fire Fighting Systems.





- ◉ In HVAC systems there are many components in the system that are motorized like cooling tower, heating tower, smoke dumpers, fresh air dampers and all fans.
- ◉ In Fire Fighting systems the motorized component is the pump used in pumping water to the location of fire.
- ◉ In the above applications there are other components that are added to the MCC in addition to the common components like relays and contactors for star/delta operation of motors, soft starters or variable speed drives.
- ◉ Using any of them depends on the scale of project or in other words the rating of motors used.

Motor starters types shall be as follows:

- ◉ Motors up to 0.75kW, 220V, D.O.L.
- ◉ Motors 0.75kW - 5.5kW, 380V, D.O.L.
- ◉ Motors 7.5 kW to 45 kW, 380V, Star Delta
- ◉ Motors > 45 kW Soft Starter:
  - ◉ • The soft starter must be equipped with the following features:
    - Phase sequence
    - Phase loss
    - Over current
    - RS-232 Serial Interface (Modbus RTU)

# LIGHTING CONTROL PANELS :

- ◉ We can design and supply Distribution & Lighting Control Panels, which find application in plants for distributing power in the lighting system, keeping in mind the specific requirements of the clients.

# VFD CONTROL PANELS :

- ◉ These are designed to control the speed of electric motor and feed pump.
- ◉ They are widely used in drilling, pumping and other large machine applications.
- ◉ The VFD panels are widely used in tube mills, paper mills, extruder plants, rolling Mills, cable industry and CTL Lines.
- ◉ They are even installed in hospitals, business houses and other public places.
- ◉ VFD control panel are designed to match variable speed requirements of a process unit and so are vigorously tested on various speed parameters.

# FEEDER PILLAR PANELS :

- ◉ The feeder pillar panels are used to terminate and distribute the control circuits.
- ◉ These are used in almost all the industries, townships and housing societies to put all the cut-outs together.



# TOP BRANDS

- ◉ Naïve engineers
- ◉ Kandi electrical solution
- ◉ Lord technical services
- ◉ Sai power controls
- ◉ Controls instruments india

# CABLE TRAYS



- ◎ Cable Tray is a bridge that allows safe transport of wires across open spans and gives protection against the overheating and fire buildup problems.
- ◎ It is a cable management system that is available in a variety of sizes and styles from the Cable Tray Manufacturers, which ease the work of entering or exiting the new or existing wires in the tray.
- ◎ These are probably used to handle the heavy bundles of web and protect them from any damage. T
- ◎ here are several types of cable trays including Ladder, Galvanized, Perforated, PVC, Stainless Steel etc. available in the market.
- ◎ Before selecting any of them, keep an eye on its configurations that leads you to the right direction.

- ◉ It is a type of material that is used to hold the cables and wires safely inside the buildings and therefore, mostly used in the construction sites.
- ◉ They quickly proved their worth as one of the safest and dependable options to support the open wires.
- ◉ It is a cost-effective solution that lifts the load of handling the web of wires.
- ◉ It even minimizes any damage to them because of their user-friendly design.
- ◉ Moreover, it is also recognized as a time-saving method as you can easily install it and it hardly takes a few minutes.

# TYPE OF CABLE TRAYS:

- ◉ Cable trays are made of either steel, aluminum or fibber reinforced plastic (FRP)
- ◉ they are available in six basic types,
  1. Ladder Type Cable Tray
  2. Solid Bottom Cable Tray
  3. Trough Cable Tray
  4. Channel Cable Tray
  5. Wire Mesh Cable Tray
  6. Single Rail Cable Tray

# (1) LADDER CABLE TRAY

- ◉ Generally used in applications with intermediate to long support spans 12 to 30 feet.
- ◉ Ladder cable tray is used for about 75 percent of the cable tray wiring system installations. It is the predominate cable tray type due to its many desirable features:
- ◉ A ladder cable tray without covers permits the maximum free flow of air across the cables.
- ◉ This allows the heat produced in the cable's conductors to effectively dissipate. Under such conditions, the conductor insulation in the cables of a properly designed cable tray wiring system will not exceed its maximum operating temperature.
- ◉ The cables will not prematurely age due to excessive operating temperatures.

- The rungs of the ladder cable trays provide convenient anchors for tying down the cables in the non-horizontal cable tray runs or where the positions of the cables must be maintained in the horizontal cable tray runs.
- This capability is a must for single conductor cable installations. Under fault conditions (short circuit), the magnetic forces produced by the fault current will force the single conductor cables from the cable tray if they are not securely anchored to the cable tray.
- Cables may exit or enter the ladder cable trays through the top or the bottom of the cable tray.
- Where the cables enter or exit conduit, the conduit to cable tray clamps may be installed upright or inverted to terminate conduits on the top or bottom of the cable tray side rail.
- Moisture can't accumulate in ladder cable trays

# CHARACTERISTICS:

Solid side rail protection and system strength with smooth radius fittings.

- Maximum strength for long span applications
- Standard widths of 6, 12, 18, 24, 30 & 36 inches
- Standard depths of 3, 4, 5 & 6 inches
- Standard lengths of 10, 12, 20 & 24 feet
  - Rung spacing of 6, 9, 12 & 18 inches.



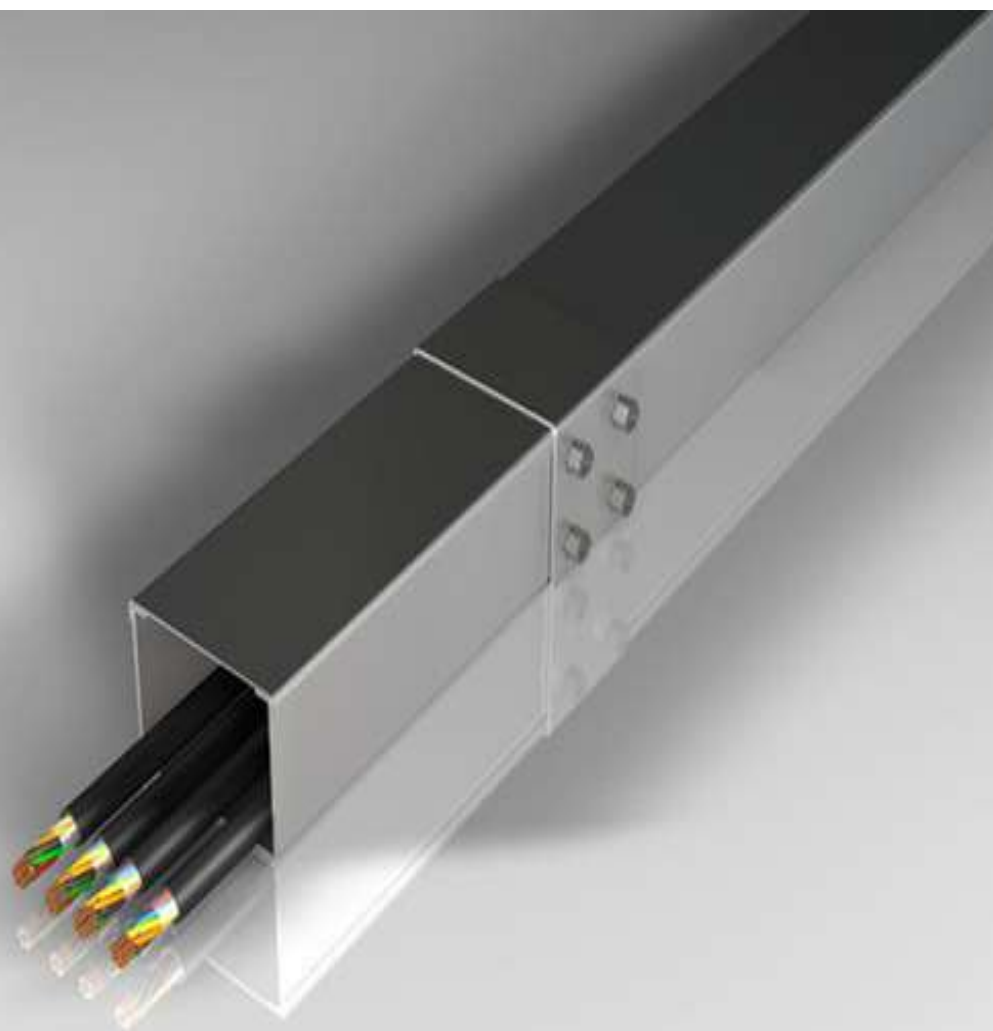


## (2) SOLID BOTTOM CABLE TRAY:

- ◉ Generally used for minimal heat generating electrical or telecommunication applications with short to intermediate support spans 5 to 12 feet.
- ◉ The main reason for selecting solid bottom cable tray (with covers) is the concern of EMI/ RFI shielding protection for very sensitive circuits.
- ◉ A solid bottom steel cable tray with steel covers provides a good degree of shielding if there are no breaks or holes in the completed installation.



- ⦿ The solid bottom cable tray system has a disadvantage in that moisture can build up in the cable trays.
- ⦿ This can be controlled by drilling 1/4 inch drain holes in the bottom of the cable tray at three foot intervals (at the middle and very near the sides) if the cable tray is not being used for EMI/RFI shielding.
- ⦿ Some engineers and designers specify solid bottom cable trays (often with covers) in the belief that all electrical circuits have to be totally enclosed by metal.
- ⦿ The cable trays are just supporting cables that are designed for such installations.
- ⦿ Cable failures in cable tray runs rarely happen.
- ⦿ Cable failures due to cable support problems in cable trays are nonexistent.



# CHARACTERISTICS:

- ◉ Non-ventilated continuous support for delicate cables with added cable protection available in metallic and fiberglass
- ◉ Solid bottom metallic with solid metal covers for non-plenum rated cable in environmental areas
- ◉ Standard widths of 6, 12, 18, 24, 30 & 36 inches
- ◉ Standard depths of 3, 4, 5 & 6 inches
- ◉ Standard lengths of 10, 12, 20 & 24 feet.

### (3) TROUGH CABLE TRAY

- Generally used for moderate heat generating applications with short to intermediate support spans—5 to 12 feet

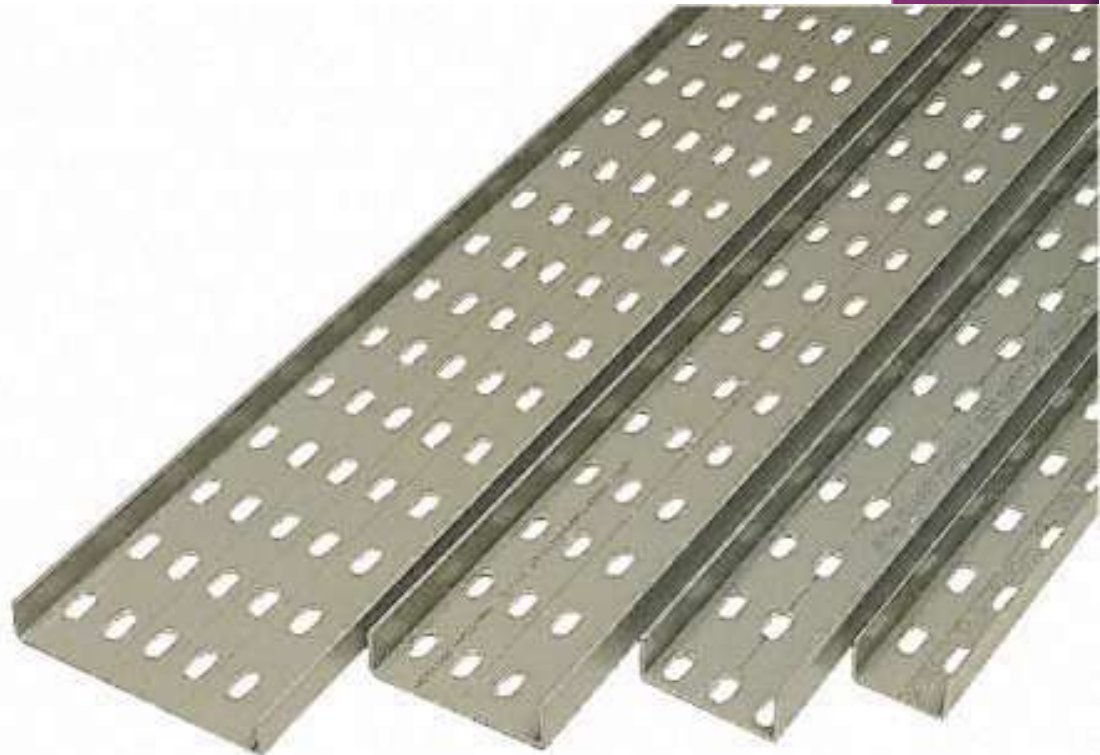


## ▣ CHARACTERISTICS:

- Moderate ventilation with added cable support frequency—with the bottom configuration providing cable support every four inches.
- Available in metal and nonmetallic materials
- Standard widths of 6, 12, 18, 24, 30 & 36 inches
- Standard depths of 3, 4, 5 & 6 inches
- Standard lengths of 10, 12, 20 & 24 feet
- Fixed rung spacing of 4 inches on center.

## (4) CHANNEL CABLE TRAY

- Used for installations with limited numbers of tray cable when conduit is undesirable. Support frequency with short to medium support spans 5 to 10 feet.



## ▣ CHARACTERISTICS:

- ⦿ Economical support for cable drops and branch cable runs from the backbone cable tray system
- ⦿ Standard widths of 3, 4, & 6 inches in metal systems and up to 8 inches in nonmetallic systems
- ⦿ Standard depths of 1 1/4 to 1 3/4 inches in metal systems and 1, 1 1/8, 1 5/8 in nonmetallic systems
- ⦿ Standard length of 10, 12, 20 & 24 feet.



## (5) WIRE MESH CABLE TRAY

- Generally used for telecommunication and fiber optic applications, installed on short support spans—4 to 8 feet



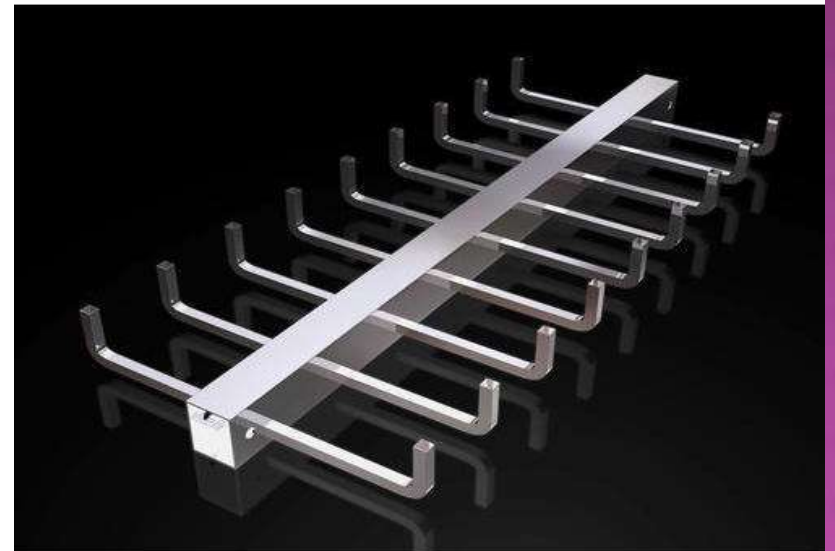
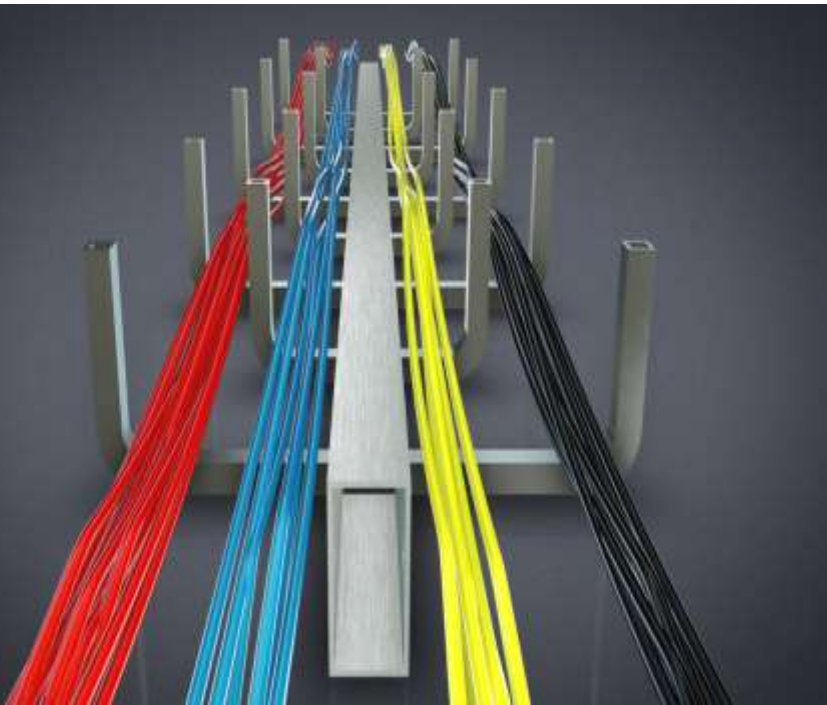


# CHARACTERISTICS

- ◉ A job site, field adaptable support system primarily for low voltage, telecommunication and fiber optic cables.
- ◉ These systems are typically steel wire mesh, zinc plated
- ◉ Standard widths of 2, 4, 6, 8, 12, 16, 18, 20 & 24 inches
- ◉ Standard depths of 1, 2 & 4 inches
- ◉ Standard length of about 10 feet.

## (6) SINGLE RAIL CABLE TRAY

- Generally used for low voltage and power cable installations where maximum cable freedom, side fill and speed to install are factors.



## ▣ CHARACTERISTICS

- These aluminum systems are the fastest systems to install and provide the maximum freedom for cable to enter and exit the system
- Single hung or wall mounted systems in single or multiple tiers
- Standard widths are 6, 9, 12, 18 & 24 inches
- Standard depths are 3, 4 & 6 inches
- Standard lengths are 10 & 12 feet.

# RACEWAY

- ⦿ A raceway (sometimes referred to as a raceway system) is an enclosed conduit that forms a physical pathway for electrical wiring.
- ⦿ Raceways protect wires and cables from heat, humidity, corrosion, water intrusion and general physical threats.
- ⦿ A well-grounded metallic conduit provides RF(radio frequency) shielding that minimizes the risk of trouble with electromagnetic interference (EMI).
- ⦿ In some systems, plastic conduit is sufficient. However, because it offers no electrical grounding or RF shielding, plastic conduit is used mainly to contain coaxial cables or other forms of cable that have their own RF shielding.
- ⦿ Raceways are an important component in the design of complex data centers and blade servers.

- The most common raceways are conduit (both the metallic and nonmetallic) and sheet-metal wireways of various configurations.
- For the convenience of the engineer or designer selecting a raceway type for a particular installation, a brief summary of the types of raceways normally used.



