Electrical and Allied Installations in Building

BUILDING SERVICES ENGINEERING'13

DOMESTIC ELECTRICAL INSTALLATIONS

- Most domestic premises receive a single-phase supply of electricity from an area electricity board at a rating of **220 volts and frequency of 50 hertz.**
- The area electricity board's cable, from which the domestic supply is taken, consists of four lines, three lines each carrying a 220 volt supply and the fourth is the common return line or neutral

- Neutral is connected to earth at the transformer or substation as a safety precaution should a fault occur on the electrical appliance.
- Each line or phase is tapped in turn together with the neutral to provide the single-phase 220 V supply

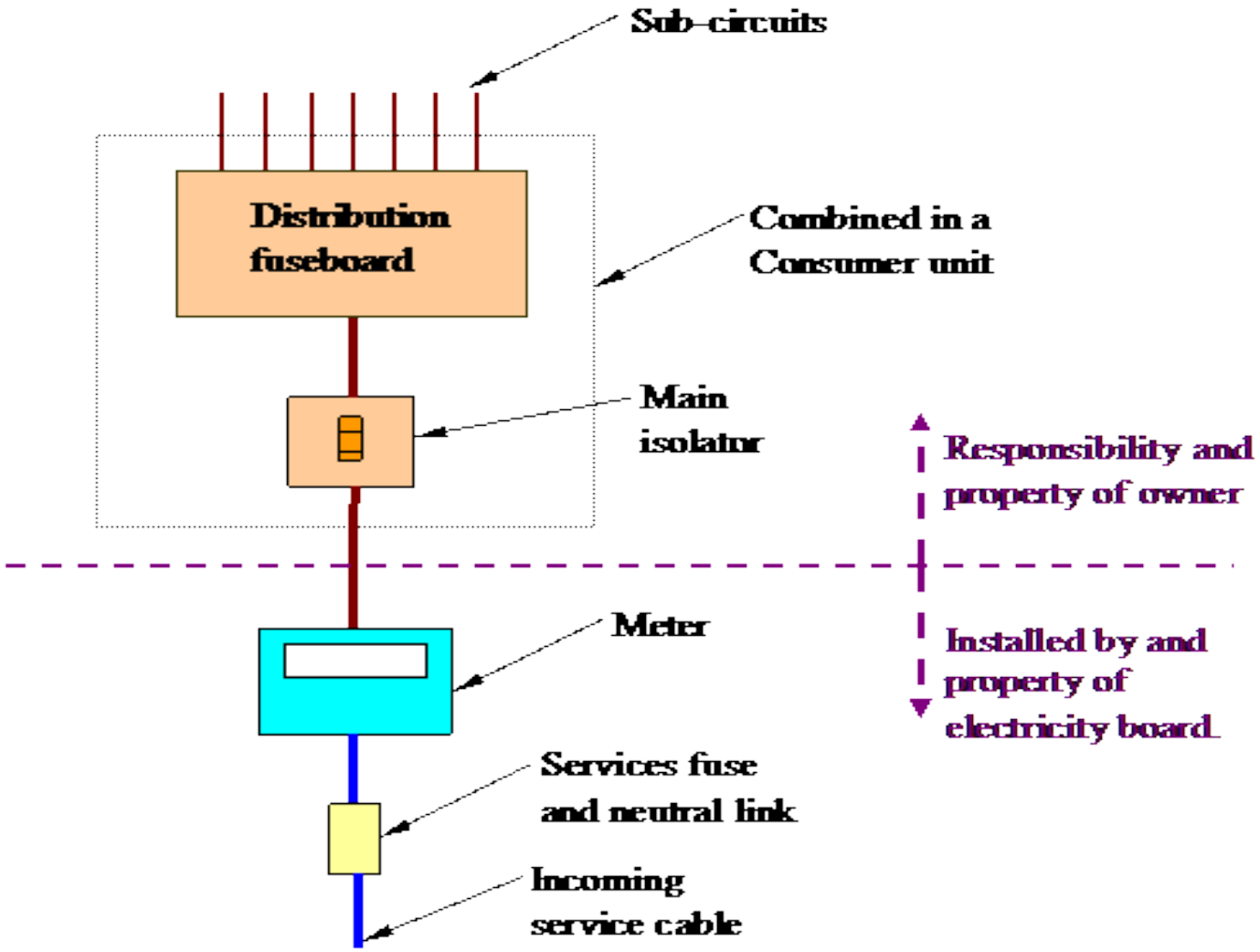
ELECTRICITY BOARD INTAKE

- The supply or intake cable may enter building in two ways

I. Underground duct

II. Overhead supply.

- An underground supply is preferred since all of the electrical service is hidden.

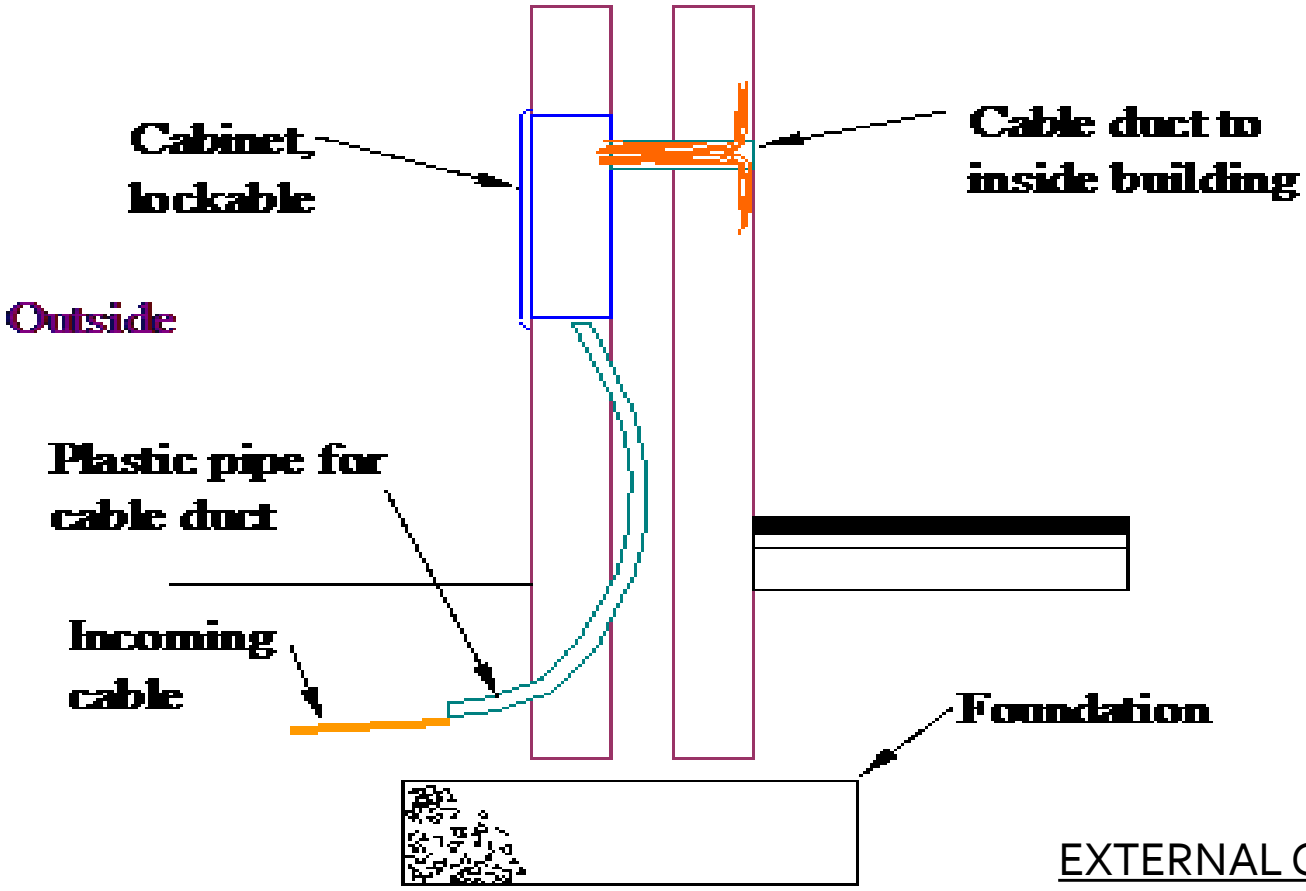


SCHEMATIC DIAGRAM OF DOMESTIC INCOMING ELECTRICAL SERVICE

- From the sealing chamber the **supply** passes through the **meter**, which records the electricity consumed in units of **kilowatt/hours**, to the consumer unit which has a **switch** controlling the supply to the **circuit breakers** or **circuit fuses**
- These fuses are a protection against excess current or overload, the fuse or circuit breaker will isolate the circuit from the source of the problem.

- The consumer unit should be fitted close to the point of **service entry** and from here the service is divided into a number of **sub-circuits.**
- It is normal in a domestic installation to separate power circuits and lighting circuits so that if a fault occurs then not all socket outlets or lights are isolated.

- Sometimes an external cabinet is used for easy meter reading. This is located in an outside wall as shown below.

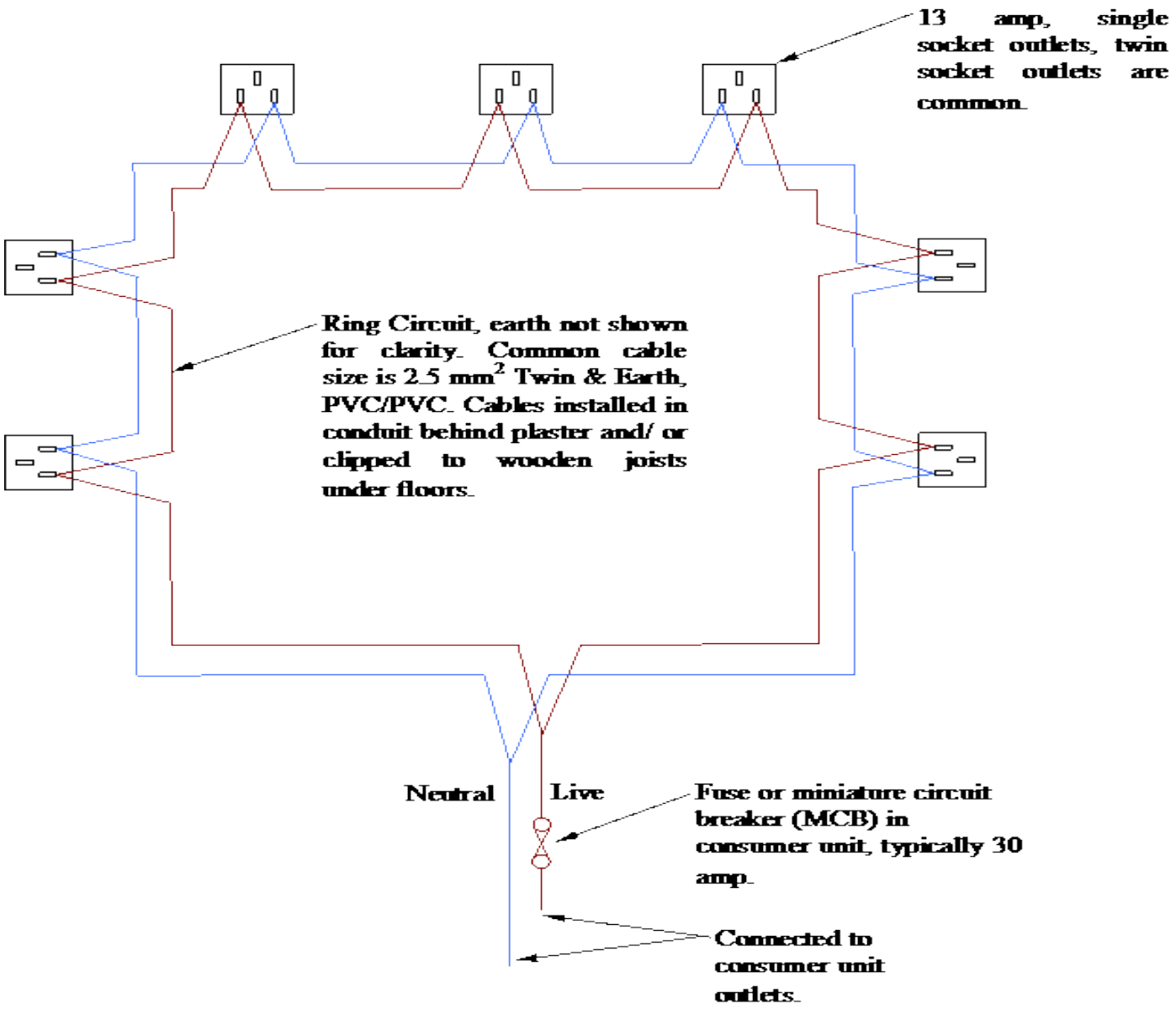


EXTERNAL CABINET

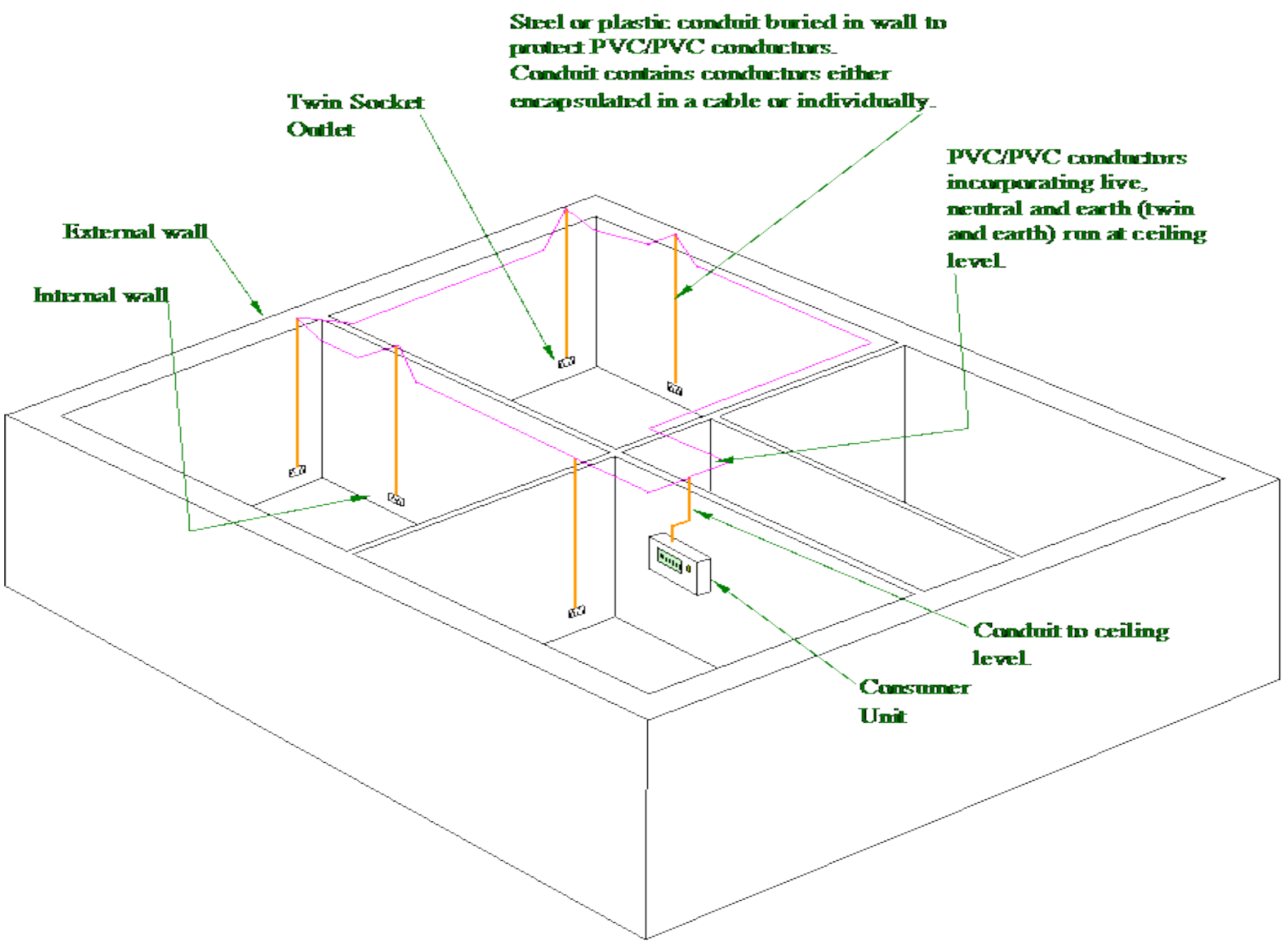
POWER CIRCUITS

- When deciding on the number of circuits for a house, a useful rule is; one power circuit for every **100m² of floor area**.
- In larger houses this means that two circuits can be used for power socket outlets, in a two-storey house this would be one circuit for upstairs and one for downstairs.
- In some larger houses a separate power circuit is also installed for the garage / utility area

- In all domestic installations a separate power circuit is required for the cooker since the electrical demand is likely to be high. The immersion heater in the hot water cylinder can also be supplied from a separate circuit since a 3kW load is quite high.
- **Ring circuits** are used as a safe and economic method of distribution of electricity to socket outlets.
- Many consumer unit manufacturers produce 8 way and 12 way units.



TYPICAL DOMESTIC RING CIRCUIT LAYOUT



RING CIRCUIT LAYOUT IN SMALL BUILDING

Electrical Building Protection

- Protection against electric shock is provided by insulating and placing live parts out of reach in suitable enclosures, earthing and bonding metal work and providing fuses or circuit breakers.
- A fuse or miniature circuit breaker (MCB) will disconnect the supply automatically before the overload current can cause a rise in temperature which would damage the installation.

- An isolator is a mechanical device, which is opened manually and is provided so that the whole of the installation, one circuit or one piece of equipment may be cut off from the live supply.
- In addition, a means of switching off for maintenance or emergency switching must also be provided.
- In practice it is the aim to bring the Electrical supply to the appliance with as small a loss of voltage through the conductor as possible.
- This means that the wiring must have the smallest resistance that is economical

Distribution in High Rise Buildings

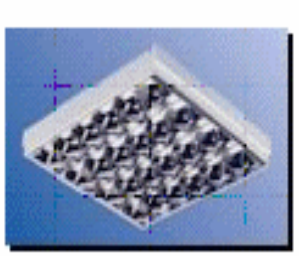
- The electrical distribution system in high rise flats and office buildings uses a busbar system.
- A busbar is a **solid copper bar** that carries the electrical current.
- The busbars run vertically inside trunking and are supported by insulated bars across the trunking chamber.
- The electrical supply to each floor is connected to the rising main by means of tap-off units.

- To balance electrical distribution across the phases, connections at each floor should be spread between the phase bars.
- To prevent the spread of fire and smoke, fire barriers are incorporated with the busbar chamber at each compartment floor level.
- The chamber must also be fire stopped to the full depth of the floor.

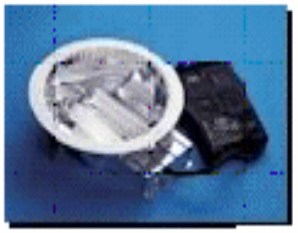
Types of Light Fitting

- The types of light fitting that we use in modern buildings can be divided into five sections.

1. **Decorative lighting**
2. **Commercial lighting**
3. **Industrial lighting**
4. **Outdoor lighting**
5. **Emergency lighting**



Recessed pack



Downlight

Halogen Flood Light

Lighting Design

Quantity of light

- The amount of light emitted from a light fitting is given in **lumens (lm).**
- A **lumen** is the unit of luminous flux.
- The amount of light falling on a surface is measured in **lux**.
- One **lux** is equal to **1 lumen** per square metre ..... 1 lux = 1 lm/m^2.

Illuminance (lux)	Activity	Area
100	Casual seeing	Corridors, changing rooms, stores
150	Some perception of detail	Loading bays, switch rooms, plant rooms
200	Continuously occupied	Foyers, entrance halls, dining rooms
300	Visual tasks moderately easy	Libraries, sports halls, lecture theatres.
500	Visual tasks moderately difficult	General offices, kitchens, laboratories, retail shops.
750	Visual tasks difficult	Drawing offices, meat inspection, chain stores.
1000	Visual tasks very difficult	General inspection, electronic assembly, paintwork, supermarkets.
1500	Visual tasks extremely difficult	Fine work and inspection, precision assembly.
2000	Visual tasks exceptionally difficult	Assembly of minute items, finished fabric inspection.

QUESTIONS.???