BUREAU OF INDIAN STANDARDS

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Preliminary Draft Indian Standard

GUIDE FOR ELECTRICAL LAYOUT IN RESIDENTIAL BUILDINGS

(ICS 91.140.50)

Electrical Installation
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FOREWORD

(Formal clause will be added later)

Use of electrical appliances, both portable and fixed, has now become very common and popular. The optimum benefits from the use of electricity can be obtained only if the installation is of sufficient capacity and affords flexibility in the use of electrical fittings and appliances. The necessity, therefore, of providing adequate number of socket-outlets should be fully appreciated.
An important consideration in planning any electrical layout is safety. However, besides safety, other considerations, such as efficiency, convenience and provision for future increase in load should also be kept in mind while planning the electrical layout in any building.

The rise in annual consumption of electrical energy in residential buildings along with the trends in the development of use of new electrical appliances has been kept in mind while preparing this guide. Although this guide has been written to apply to new installations, it would be equally applicable to electrical modernization of existing residences.

Proper level of illumination is an important factor to be considered while planning electrical layout for a building. This guide gives recommendations on illumination levels in different parts of a residential building. The illumination data given are based on SP 72: 2010, National Lighting Code.

This standard was first published in 1968.

This edition includes the following significant technical changes with respect to the previous edition:

a) Definitions for motor-operated appliances, combined appliances, high-rise buildings, etc., have been included;

b) Requirements related to the design and construction of common infrastructure for electric supply have been added;
c) Requirements related to the design of electrical layouts and drawings have been added;
d) Requirements for the selection and installation of accessories and appliances have been included.

This guide is intended to be of assistance to architects, engineers, builders, electrical contractors and the owners of the residences in planning and designing a residence in such a way as to obtain maximum advantage of electricity.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results of a test, shall be rounded off in accordance with IS 2:2022 'Rules for rounding off numerical values (*second revision*)' . The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

INDIAN STANDARD

GUIDE FOR ELECTRICAL LAYOUTS IN RESIDENTIAL BUILDINGS

(First Revision)

1 SCOPE

This standard is intended to provide guidelines for preparation of layouts of electrical installation in residential building(s), compiled from the perspective of users' needs with due consideration for current and future requirements, functionality, ergonomics / ease of operation, emergency needs, and safety compliances. Consideration is also given to interior design and aesthetics along with the aspects related to other building services*. The guidelines stated in this standard are specific to the residential premises of single / group of dwellings / apartment houses and shall be considered in addition to the requirements given under IS 732.

This guide is applicable for low voltage systems up to 1000 V a.c. and 1500 V d.c.

This guide does not include methods of installing the prescribed electrical facilities.

Guidelines under this standard are, from the perspective of users of all age classes, and uninstructed person, not expected to have any technical knowledge.

The guidelines cover electrical distribution layouts within residential buildings with due consideration for the supply integrity required for evacuation operations emergency conditions like fire, natural disasters.

NOTE* – Other building services like points for television, telephone, computer network, have been considered in preparation of internal electrical to the extent of layouts as conduits and cable work from integrated part of wiring installation.

2 REFERNCES

The standards listed in **Annex C** contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

3 TERMINOLOGY

For the purpose of this guide, the following definitions shall apply.

3.1 Apparatus

Electrical apparatus including all machines, appliances and fittings in which conductors are used or of which they form a part.

3.2 Appliance

An energy-consuming device or equipment (other than a lamp) fixed or portable, in which the electrical energy is converted into light, heat generation / extraction, motion or any other form of energy or substantially changed in its electrical character.

3.2.1 *Building-in Appliance* — An appliance intended to be installed in a cupboard, fitment or sink unit, in a prepared recess in a wall, or in a similar situation.

3.2.2 *Hand-Held Appliance* — An appliance held in the hand or carried on any part of the body during normal use.

3.2.3 *Heating Appliance* — Appliance incorporating heating elements but without motor.
Add *Motor operated Appliance* – Appliance incorporating motor but without heating elements
Add Combined Appliance – Appliance incorporating heating elements and motor

3.2.4 *Stationary Appliance* — An appliance intended to be fixed to its supporting surface or used in one place.

3.2.5 *Portable Appliance* — An appliance which is intended to be carried by a person from one place to another while in operation and can be connected to electric supply through a flexible cable and plug top which can be plugged in to a socket of the power outlet point.

3.3 Cable

A length of single-insulated conductor (solid or stranded) or two or more such conductors, each provided with its own insulation, which are laid up together. The insulated conductor or conductors may or may not be provided with an overall mechanical protective covering.

3.3.1. *Flexible Cable* — A cable containing one or more cores, each formed of a group of wires, the diameters of the cores and of the wires being of class 5 or class 6 to afford flexibility.

3.3.2 *Flexible Cord* — A sheathed flexible cable, having two to five cores usually between the appliance and plug top used to feed electric supply to an appliance

3.4 Cut-Out

A device in wiring system for automatically interrupting the transmission of energy through any conductor when the current rises above a predetermined amount and shall also include fusible cut-out.

3.5 Earthing System

Arrangement of connections and devices necessary to earth equipment or a system separately or jointly.

3.5.1 *Earth Electrode* — A conductor or group of conductors in intimate contact with and providing an electrical connection to earth.

3.5.2 *Main Earthing Terminal* — The terminal or bar (which is the equipotential bonding conductor, meant for Electrical connection putting various exposed conductive parts and extraneous conductive parts at a substantially equal potential.) provided for the connection of protective conductors and the conductors of functional earthing, if any, to the means of earthing.

3.5.3 *Protective Conductor* — A conductor used as a measure of protection against electric shock and intended for connecting any of the following parts:

a) Exposed conductive parts,
b) Extraneous conductive parts,
c) Main earthing terminal, and
d) Earthed point of the source or an artificial neutral.

Add High-rise building

A building 15 m or above in height measured vertically from average level of ground around and contagious to the building.

3.6 Insulated

Insulated shall mean separated from adjacent conducting material or protected from personal contact by a non-conducting substance or an air space, in either case offering permanently sufficient resistance to the passage of current or to disruptive discharges through or over the surface of the substance or space, to obviate danger or shock or injurious leakage of current.

3.7 Rated Input

The power input assigned to the appliance by the manufacturer and marked on it. It is understood that the rated input refers to the input in watts or kilowatts at normal operating conditions.

3.8 Fuse

A device that, by the fusion of one or more of its specially designed and proportioned components, opens the circuit in which it is inserted when the current through it exceeds a given value for a sufficient time. The fuse comprises all the parts that form the complete device.

3.9 Live

An object is said to be ' live ' when a difference of potential exists between it and earth.

3.10 Switch

A manually operated device for closing and opening or for changing the connection of a circuit.
3.10.1 *Double-Pole Switch* — A switch with two poles, the poles being mechanically coupled together.

3.10.3 *One-Way Switch* — A switch capable of making and breaking a single circuit only.

3.10.4 *Single-Pole Switch* — A switch with one pole.

3.10.5 *Two-Way Switch* — A switch having three terminals per pole or phase and commonly used to control a load from two positions.

3.11 Switch Box

A box intended to contain a switch and to be recessed into or mounted on a wall.

3.12 Plug

Accessory intended for frequent use by ordinary persons, having pins designed to engage with the contacts of a socket-outlet, also incorporating means for the electrical connection and mechanical retention of flexible cable(s).

3.13 Socket Outlet

Accessory intended for frequent use by ordinary persons having socket- contacts designed to engage with the pins of a plug and having terminals or terminations for the connection of cable.

3.14 Shuttered Socket-Outlet

A socket-outlet having provision for screening its line and neutral socket contacts automatically with a shutter when the plug is withdrawn.

3.15 Socket Contact

Metallic contacts in the socket-outlet which engage with the pins of the plug.

3.16 Usable Wall Space

All portions of a wall, except that occupied by a door in its normal open position, or occupied by a fireplace opening, but excluding wall spaces which are less than 1 m in extent measured along the wall at the floor line.

4 EXCHANGE OF INFORMATION

Before preparation of drawings, of layouts electrical installation, there shall be an exchange of information between the architect, MEP consultant comprising team of electrical design consultant, electrical contractor and other service providers and also the user in respect of common infrastructure and individual wiring installation.

4.1 Common Infrastructure

Design and construction of common infrastructure relating to electric supply requires consideration at the planning stage, so that the required locations and spaces for the apparatus routes for distribution network can be reserved in the architectural plans.

4.1.1 *Permanent Source of Electric Supply* — Depending on the exchange of information between the owner, architect, electrical consultant and electrical contractor, the electrical contractor shall consult electric supply company in respect of following requirements:

a) Connected Load – aggregate load of domestic dwellings, electrical load of building services (see *Clause* **5.3** for assessment of connected load of this standard).

b) Contract Demand based on diversity of total connected load or standardized minimum load per m^2 decided by supply company, whichever is higher (see *Clause* **7** of this standard for assessment of contract load).

As per the electric supply company requirements, to install their service network comprising apparatus, equipment, like transformer, switchgears, Ring Main Units, meters, etc., location and space shall be decided and marked on the approved architectural layout plans.

4.1.2 *Standby Source of Electric Supply* **—** Supply integrity is one of the most crucial requirements for systems like fire prevention and life safety to run under emergency conditions. For allocation of space(s) for installation of standby supply equipment there shall be provision in the layout drawings of architect, *see* **5.3**.

NOTE — For high-rise buildings and where requirements of Fire Prevention and Life Safety apply, integrity of supply for critical, emergency services is necessary, this requirement shall be carefully observed at planning stage.

4.1.3 *Other services* — Location and space requirement for fire pumping stations, domestic water pumps, STPs, security systems, control rooms, routing of electrical supply and cabling related to other services.

4.2 Individual Wiring Installation

For wiring installation after the point of supply, the following points shall be considered.

a) Interior layouts individual dwelling units and common areas

b) Electrical points and power outlets correlating to the interior layouts.

c) User specific requirements related to number and location of points.

d) Anticipated use of electrical appliances, systems, their locations, and rated capacities.

e) Due consideration for future requirements.

f) Requirements and locations related to TV cable socket outlets, Intercom, Internet, Data network, WiFi, Router/Modem/Repeater/Booster devices, locations of CCTV system devices, Sound System devices

NOTE – Exchange of information is important as it mitigates post possession possibilities of additions alterations in wiring installation, which a user is tempted to do due to shortfalls in layout designs. Such second stage modifications often lead to substandard work, compromising safety.

5 LAYOUTS – ELECTRICAL INSTALLATION

5.1 Mutual Coordination

Architect, electrical consultant, electrical contractor, MEP consultant shall discuss requirements of building services and the information exchanged. An architect shall compile the requirements and check if there are conflicts over routes and spaces. Electrical drawings shall be finalized jointly with mutual consent on the following points.

a) Requirement of dedicated spaces with provision of mandatory clearances for electrical equipment, distribution network and allied part of electrical installation, post installation maintenance facilities as required for Electric Supply Company up to the meter room.

b) Allocation of routes of electrical distribution network from meter room to individual dwelling, system.

c) Routes of wiring and locations of switchboards, distribution boxes, fixture, appliances within individual dwelling unit. Drawings of conduits and draw-in / junction boxes to be concealed in RCC work.

d) In case of false-ceiling, minimum requirement of clearances above and below fan blades.

e) Where exhaust fans are to be installed, to achieve cross-ventilation, provision for fresh air inlet, which shall preferably be diagonally opposite to the location of exhaust fan.

f) Site specific Lightning Protection System if applicable based on risk assessment. And if yes, locations of air-terminations and routes of down conductors.

g) Requirements of building services other than electrical; concerning routes, spaces, in coordinated manner.

h) Structural and Civil constructional requirements, e.g., earthing system linked with structural steel work, static and dynamic load of electrical apparatus specifically for the apparatus proposed to be installed on upper floors.

i) Earth electrode(s), MET, routes of protective and equipotential bonding conductors.

j) Compliance of regulatory requirements*.

NOTE — Conformation of requirements of various regulatory authorities concerning layouts of electrical installation shall be checked by the electrical consultant / contractor with necessary communication / consultation with respective department.

5.2 Site – Clearances of Buildings or Structures from Electrical Lines

Proposed construction work shall comply with the requirements stating mandatory clearances from electrical lines as specified in *CEA* (Measures relating to Safety and Electric Supply) *Regulations* as amended to date.

NOTE — This issue comes under the purview of the Electrical Inspector jointly with the owners of distribution and transmission lines (Ref. Reg. 65 of *CEA* measures relating to safety and electric supply *regulations*, 2023). If an electrical line, whether overhead or underground, is in vicinity (also within the right of way as stated under IS 5613), condition of NOC may apply. Apart from physical safety, its effects like electric surges, EMI, may be the point of consideration.

5.3 Layouts for Electrical Apparatus / Systems in Building(s) / Premises

Following points shall be taken into consideration for deciding locations, routes, and spaces for infrastructural requirements used for common purpose.

5.3.1 *Transformer sub-station* — In the initial planning phase, the provision of suitable space at an appropriate location forms an important requirement in the preparation of sub-station layouts. Accordingly, for preparation of layouts of sub-station and allied equipment, following factors shall be considered:

a) Evaluating the need for distribution transformer(s), including determining the number and capacity of transformers based on the estimated contract demand and requirement of the electric supply company

b) Deciding whether the substation will be outdoor or indoor, and if indoor, whether it will be located within main building or in a separate building.

c) Dry type or liquid filled transformer(s)

d) Planning the arrangement of incoming and outgoing cable ducts or bus trunking within the substation area.

e) In cases where substations are to be installed on upper floors, ensuring that separate ducts are provided for incoming cables, outgoing cables or bus trunking up to the meter(s), with necessary adequate access for maintenance personnel.

NOTE 1 — The location, and the clearances to be maintained differ, depending on dry-type or liquid filled transformer. And if liquid filled, with ‘O’ class mineral oil or ‘K’ class ester. For preparation of layouts, references shall be taken from IS-IEC 61936-1.

NOTE 2 — When the location of transformer(s) is/are on upper floor(s), the building plans shall facilitate vertical and horizontal transportation, installation of heavy equipment and further maintenance.

NOTE 3 – While deciding layouts of transformer sub-station consideration shall also be given to energy efficiency aspects as stated in 6.3, 6.4 of IS-IEC 16996, as additional requirements.

5.3.2 *Genset* — In layouts location and space requirement shall be decided considering following points:

a) Capacity and number of Gensets shall be based on assessment of emergency load, its profile and expected supply restoration time*

b) Location of its installation shall be such that its operation during emergency will not get affected due to potential risks like fire and ensure integrity of electric supply.

c) Pollution Control Board norms.

NOTE — References shall be taken from IS-ISO 8528-1, 8528-12 in selection of Genset(s), its specifications. There shall also be consideration for the norms of Central/State Pollution Control Board concerning dB level and stack height which relates to a building height and its vicinity.

5.3.3 *UPS and Batteries* — A dedicated room (applicable when used as backup system for common utilities having higher capacity. Elsewhere a segregated space may be accepted) with ventilation being one of the important requirements, its location shall be decided accordingly.

5.3.4 *Lifts* — From the perspective of layouts there are requirements relating to civil construction and electrical installation.

5.3.4.1 *Civil Construction* — Lift shaft/well, pit, overhead, machine*, pulley room, lift lobbies; require some aspects to be seen particularly from the perspective of civil construction**, e.g., spaces, location, structural strength of walls, floors, ceilings; ventilation, openings, trap door, landing sill, door lintel, hoisting arrangement, access to lift pit and machine room, arrangement for fixing buffer springs in pit, etc. For high-rise buildings (>15m height), provisions as mentioned under 5.12.5 of IS 17900-1 shall be followed.

NOTE* — In case of machine room less (MRL) lift, location of control panel shall be decided in consultation with the OEM.

NOTE** — IS 17900-1 shall be referred for details. For Machinery Spaces and Access **Annex D**, for Building Interfaces like support of guide rails, ventilation of car, well and machine rooms **Annex E**, for Pit Access **Annex F** of the said IS provides necessary information. For dimensions and other civil details of well enclosure, **National Building Code** shall be referred to.

5.3.4.2 *Electrical Installation* — A passage/route/duct for an independent circuit from main electrical panel to machine, through lift well needs to be confirmed. There shall be consideration for standby supply with predetermined back-up time, location of battery backup system for Auto Rescue Device (ARD), lighting in machine, pulley room, lift well, area specific recommended lux levels, control of supply, main switch, and other switches, their location, power socket outlets.

NOTE – The electric supply arrangement for lifts, references shall be taken from related *Clauses* under **5.10** of IS 17900-1.

5.3.5 *Other Systems (HVAC, Fire Prevention and Life Safety, Domestic Water Supply Pumps / Hydro pneumatic System, Control Rooms, etc.)* — The internal layouts of machinery placement within allotted area/room may be as per the requirements of system provider. But the upstream portion of electrical supply up to the electrical panel, cable routing within the room, clearances in front of the panels needs to be taken care of while preparing electrical layouts. This portion of work shall include necessary protections covering upstream portion and supply redundancy/integrity related aspects. Where Fire Prevention and Life Safety Measures require pressurization system on exit approaches, e.g., lift lobbies, staircases; the requirements shall be taken into consideration from the system provider in respect of spaces, and electrical installation with supply backup.

5.3.6 *Lightning Protection System (LPS)* — Whether a building requires a Lightning Protection System (LPS) should be determined through a risk assessment conducted in accordance with IS-IEC 62305-2. If it

is determined that an LPS is necessary, the selection of the system, as well as the placement of air terminals, routing of down conductors, their isolation, and the installation of earth electrodes, should all adhere to the provisions outlined in IS-IEC 62305.

5.3.7 *Sewage Treatment Plant / Water Treatment Plant* — Where such system is part of building services, its supply cable routes up to the metering and after metering up to the plant shall be specifically marked in the layout plans.

5.3.8 *Underground cable works* — In respect of layouts of underground cable work, its depth below ground, mechanical protection, bending radia, clearances in between power cables or other services shall be observed. References shall be taken from IS 1255 (Applicable up to 33kV).

5.3.9 *Solar PV system* — Where solar PV system is going to be a part of electrical installation, its capacity, design, requirement of shadowless area in m^2/kWp, its integration with the supply system whether on-grid / off-grid, shall have consideration in preparation of layouts. References shall be taken from IS 16997.

5.4 Layouts for Wiring Installations in Common / Public Areas

This section covers requirements of locations and spaces for meter-room(s), components of wiring installations and the routes of electrical wiring distribution network. There is also consideration to have a coordination with other systems like surveillance / security, fire detection, P.A., common area lighting, EV charging, etc., in common areas of the building(s).

5.4.1 *Meter rooms* — In preparation of layouts of meter-room(s), following points shall be taken into consideration.

a) It shall always be accessible to the authorities of the electric supply company.

b) It shall be free from possibilities of water logging, seepages.

c) Location shall be adjacent to the vertical cable shaft of respective building wing.

d) It shall not be located below the staircase where sufficient headroom is not available.

e) The area of the meter room shall be adequate to accommodate the supplier’s control equipment, fire switch where applicable and placement of the meters in readable position without help of any tool / tackle. The meter board shall maintain minimum 0.5 m clearance above floor level and 1 m clear space measured in front of meters and switchgears.

f) The meter room shall have sufficient ventilation.

g) There shall be a provision of light point(s) and luminaires to achieve average lux level of 150. If the natural cross ventilation is not available, provision of exhaust fans shall be made. All these provisions shall be shown on wiring layout.

h) For high-rise buildings where bus trunking is mandatory, there shall be sufficient space to install meters on each floor in compliance with the points mentioned above.

5.4.2 *Vertical shaft/duct for cables / bus trunking* — Independent duct shall be marked on the layout drawing with the details of cross-section. This cross section shall be sufficient to accommodate the required number of cables as per the approved method of construction. In the case where bus trunking is mandatory in place of cables, its size shall be suitable to erect tap off unit on bus-trunking to feed the supply to the meters installed floor wise. Suppliers, being responsible for maintaining the safety of installation up to the point of supply, their requirements in this regard shall be taken into consideration subject to no deviation from the regulations.

NOTE 1 – It is mandatory to provide independent duct for electrical cables / bus trunking for all high-rise buildings. No other service shall be laid through this duct.

NOTE 2 – This duct shall not be used to erect down conductors of Lightning Protection System.

NOTE 3 – From the perspective of fire prevention, the duct is required to be sealed at every floor level after the erection of distribution cables. Duct along with its doors, floor wise sealing arrangement / enclosures shall have a fire resistance of minimum 2 h.

NOTE 4 – Location of cable duct and its openings shall be compliant with the requirements mandated under Fire Prevention and Life Safety rules / regulations / NBC Part IV, Part VIII.

NOTE 5 – Where DSS are proposed to be located on upper floors, there shall be separate duct / segregation for routing HT cable.

5.4.3 *Lighting and Signages of common areas* — Common areas like passages/corridors, lobbies, staircases, parking lots shall be illuminated with luminaires at suitable locations having required luminance to achieve average lux level as given under NBC Part 8 Section I, specific to that area. The lighting circuits, luminaires and the ‘exit’ signages in all escape routes shall be specifically designed to withstand fire for a minimum period as required by the fire authority. These circuits and signages shall have a back-up supply facility. The layouts and single line diagrams shall be explicitly marked along with the location of switches at the entry point(s).

5.4.4 *Power outlets for EV charging* — In parking lots there shall be provision of charging points for electrical vehicles. The number, capacity and locations of the charging points, charging units shall follow the respective norms given under *CEA Regulations*, IS 17017 series, and Building Regulations of local bodies.

5.4.5 *Routes of electrical distribution network* — Routes of electrical distribution network connecting all equipment / apparatus within the building and complex premises shall be marked considering requirements of spacing / clearances in between power cables and between other building system networks including underground cable network. Usually, these routes shall be along passages, so as to have an easy access to authorised persons, with proper junction / pull-in boxes placed at suitable intervals where necessary. There shall be provision to facilitate maintenance or modification / augmentation as and when needed.

5.5 Layouts for Internal Electrical Installation within Individual Dwelling Unit(s)

5.5.1 *Point wiring [light/fan/bell/TV/telephone/computer]* — While preparing layouts of light points it is recommended that the consideration should be given to the following points. It shall be noted that the

number of points mentioned are as per functional requirement only. From the point of any specific or aesthetic requirements as per interior design there will be addition in the numbers.

a) For light points, generally the recommended illumination levels given under SP 72 National Lighting Code shall be followed. Table 1 shows typical values of lux levels which may be followed as guidelines.

Table 1 Recommended levels of illumination for different parts of residential buildings

Sl. No.	Location	Illumination Level Lux
1	Entrances, hallways	100
2	Living room	300
3	Dining room	150
4	Bedroom - general	300
5	Bedroom Dressing tables, bed heads	200
6	Games / Recreation room	100
7	Table games	300
8	Kirchen	200
9	Kitchen sink	300
10	Laundry	200
11	Bathroom	100
12	Bathroom mirror	300
13	Sewing	700
14	Workshop	200
15	Stairs	100
16	Garage	70
17	Study	300

c) Location of light points on wall for general purpose may be at average 2.4m height from flooring.

d) It shall be seen that locations of fan points shall be such that fan when erected, its blades do not obstruct the light of the luminaires fitted on ceiling /in false ceiling.

e) Light points in furniture shall be with double insulated / shielded cables. The cables shall be further suitably protected against damage and securely fixed to the furniture.

c) Minimum number of points as per functional requirements shall be as per Table 2

Table 2 – Recommended minimum number of the points for Light, Fan, Bell, TV, Telephone, Computer

Portion of dwelling unit	Light point per 10-12 m^2 or part	Fan/ex fan point per 10-12m^2 or part	Bell point	Cable TV	Telephone/ Intercom/ modem/router	Computer data / information outlet
Hall / Living room	4	1		1	2*	1

kitchen / dining	2	1+1	1		1*	
Bedroom	5	1		1	1*	1
Bath / toilet	2	1			1*	
Passage /verandah	1				1*	
Balcony / terrace	1	1*				
Entrance	1		1			
Servant room / garage	2	1	1	1*	1*	
Dry balcony	1					
* Optional provision						
NOTE 1 – Above recommendations shall be treated as a bare minimum and depending on the increase in the number of the rooms / area of rooms there shall be a proportional rise in number of points. NOTE 2 – Based on interior layouts number of points may increase.						

5.5.2 *Power outlet points [6A/16A]* — There shall be enough power outlets considering future needs. Under consideration may lead to cable sizes not suitable to carry current of the respective load of the appliance and hence subsequent overloading which is most undesirable. Minimum* recommended number of points shall be considered as per Table 3:

Table 3 – Recommended Power Outlets Depending on Anticipated Use of Appliance

Portion of Dwelling Unit	6A Power socket Outlet Per 10-12 m^2 or Part	6/16A Power socket Outlet Per 10-12 m^2 or Part	20/25 A Power Outlet
Hall/Living room	8[a]	1[b]	1[g]
kitchen/dining	4[c]	4[d]	
Bedroom	7[e]	1[f]	1[g]
bath/toilet	1[h]	1[i]	
passage/verandah	2[j]		
balcony/terrace	1[k]		
Entrance	1[l]		
servant room/garage	2[l]	1[l]	
Dry balcony or available space		2[m]	

[a] TV, set top box, music system/DVD, mobile charging, movable/portable gadgets, general purpose.
[b] General purpose, vacuum cleaner, room heater
[c] Water purifier, kitchen hood, kitchen hob, small mixer/toaster, general purpose
[d] Fridge, Microwave/OTG, Air-fryer, Induction, Mixer/grinder
[e] Two bedside tables, TV, Set top box, computer, printer, Router
[f] General purpose- room heater
[g] A.C.
[h] General purpose-shaver/drier
[i] Water heater
[j] General purpose, Router
[k] General purpose, Festive lighting
[l] General purpose,
[m] Washing machine, dishwasher

NOTE 1 — Under the category of Low-Income Group (LIG) housing, parameters may be applied judiciously, and number of points assigned for appliances may be reduced up to 50%.

NOTE 2 — Above table does not include point(s) required for EV charging from individual electrical installation. Its provision shall be made in the individual parking area complying with the requirements stated in IS 17017-, and CEA Regulations 2023. Its location shall be safe from environmental effects.

5.5.3 *Location of switch-boards*

a) *Switch boards - lighting*
Location of general light and fan switch boards shall be positioned close to door frame and on opposite side of hinged edge of door, so that a person while entering can have immediate access to switch board. If a room has two doors; lighting control shall be provided on switch boards located near both doors. For the purpose use of two-way switches may be made. Generally, the height of switch board shall at an average of 1.3m above ground level.

NOTE — It is recommended to provide a onboard 6A plug socket outlet on every lighting switchboard which insures availability of neutral and earth. This facilitates additional board/extension if needed in future. Such addition shall be subject to limit of allowable load and number of points on that circuit.

b) *Switch boards — power outlets*
Plug outlet boards for the appliances shall be located as near as possible from its proposed / anticipated location. This is to avoid a mess of loose hanging / coiled / suspended cords. If the position of an appliance to be used is on table/platform; it shall be 150 mm above the surface of table/platform top to avoid sharp bending of gromet / cord. Plug outlets, if required at lower level, shall be 300 mm above finished floor level and such plug sockets must be shuttered type. For wall mounted A.C. units, the board shall be adjacent to the indoor unit and an additional switch if so required to control the circuit may be in an accessible position.

c) *Switch boards — specific to utility area*
Additional points may be considered in respect of switchboard installation depending on use of room/area as suggested below:

1) *Hall/living room* – Apart from the location near doors, additional switchboards for fixtures or power outlets may be provided to suit ergonomic requirements, e.g., a mobile phone charging point at the side table adjacent to sitting. Consideration may be given to providing two-way control for light, fan points operating from the switch board at entrance.

2) *Kitchen* — For the devices to be operated on kitchen platforms, the location of power outlets shall be at least 150mm above working platform and adjacent to the anticipated position of appliance (shall not be behind the appliance). Special care shall be taken that the switchboards are at a safe distance from heat sources.

3) *Bedrooms* — Switchboards with two-way controls for light and fan shall be provided near entrance door and adjacent to bed location. Such boards shall not be behind the head position and shall be accessible from both sides of double bed. There shall be points near the bed for night lamp/path light, reading lights and plug outlet for general purposes like mobile phone/laptop charging. A switchboard shall also be provided near the dressing mirror for light and plug outlets portable appliances like hair dryer.

4) *Passages/staircase* — Location shall be at entry/start point. Switchboards with two-way control may be provided at both ends depending on distance/convenience.

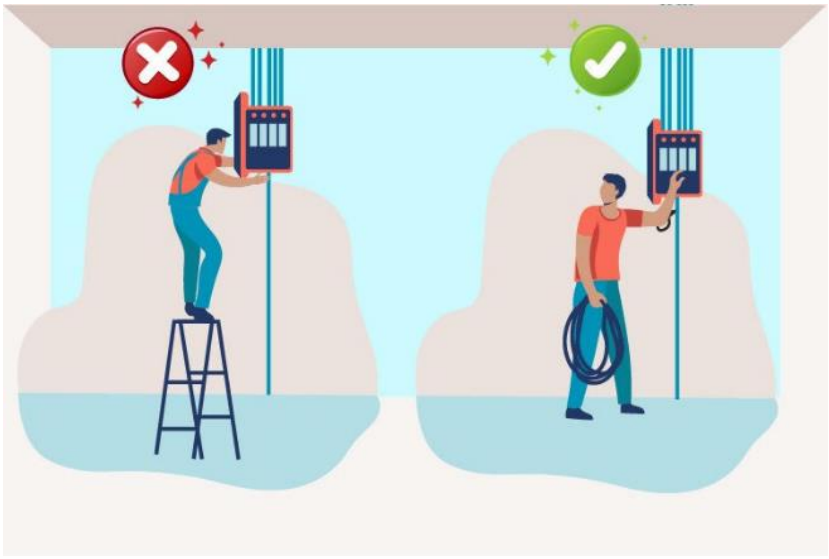
5) *Terrace/balcony* — If there is sitting arrangement, plug outlets shall be provided adjacent to sitting area. For festive lamps / lighting decoration, provisions of plug outlets at suitable location but safe from weather effects shall be made.

6) *Wet areas - bathrooms/toilets* — Classification of such areas shall be done into Zone 0, Zone 1, Zone 2 in relation to external influences like presence of water (AD) and high humidity (AB). Boards shall be located as recommended away from areas where there is a chance of splashing water and in accordance with IEC 60364-7-701. Preference shall be given to providing a switchboard immediately outside the door so that the switch can be operated before entering and at the time of leaving, considering the difficulty in locating switchboards in the dark. A switchboard for mirror light above washbasin and plug outlet for appliance like electric razor shall be on wall adjacent to mirror subject to the compliance of conditions applicable to respective zone. It shall also be noted that if the switchboard is to be installed on the wall adjacent to such area, the remaining thickness of wall behind the back of switchboard (where concealed) shall not be less than 6 cm.

NOTE — See Annexure A for suggested electrical layouts.

5.5.4 *Location of Distribution Boards* — Location of distribution boards shall be in common areas like passages/lobby where entry is not restricted by lockable door. It shall be observed that, for easy operation and control during urgency/emergency, its position shall be within reach to an adult person without the aid of any tackle. Easy accessibility is also a mandatory requirement as per *CEA safety regulations*.

NOTE — It shall be noted that where the distribution boxes are to be installed flush to the wall surface, the thickness of wall shall be sufficient to allow such installation.



Accessibility of Distribution Box

5.6 Layouts Distribution Cables, Conduits

Routing of conduits/trunking shall be near and parallel to the edges of wall. There shall be separate enclosure for each phase (in case of three phase supply and single-phase distribution). Cables of building services other than power; for example, extra low voltage systems, like telephone, data, sound system, CCTV, control cables of automation, shall be in separate enclosures. There shall be adequate spacing in between. Especially in kitchen areas, electrical cable routes shall at safe distance gas pipelines/heat generating devices like hobs.

6 ELECTRICAL DISTRIBUTION LAYOUTS (SLDs)

Electrical distribution layout drawings of electrical installation shall be such that all the components of Single Line Diagram shall have sufficient rating for power, insulation, and estimated fault current and of sufficient mechanical strength, for the duty cycle which they may be required to perform under the environmental conditions of installation, protect the installation under all possible undesirable conditions, and maintain redundancy. SLD shall show design load, conductor size and corresponding protection for each incoming, outgoing of primary, secondary, final branch circuit of distribution. It shall include DB details, aggregate design load on each DB. Energy efficiency related guidelines IS-IEC 16996 shall have consideration while designing the distribution.

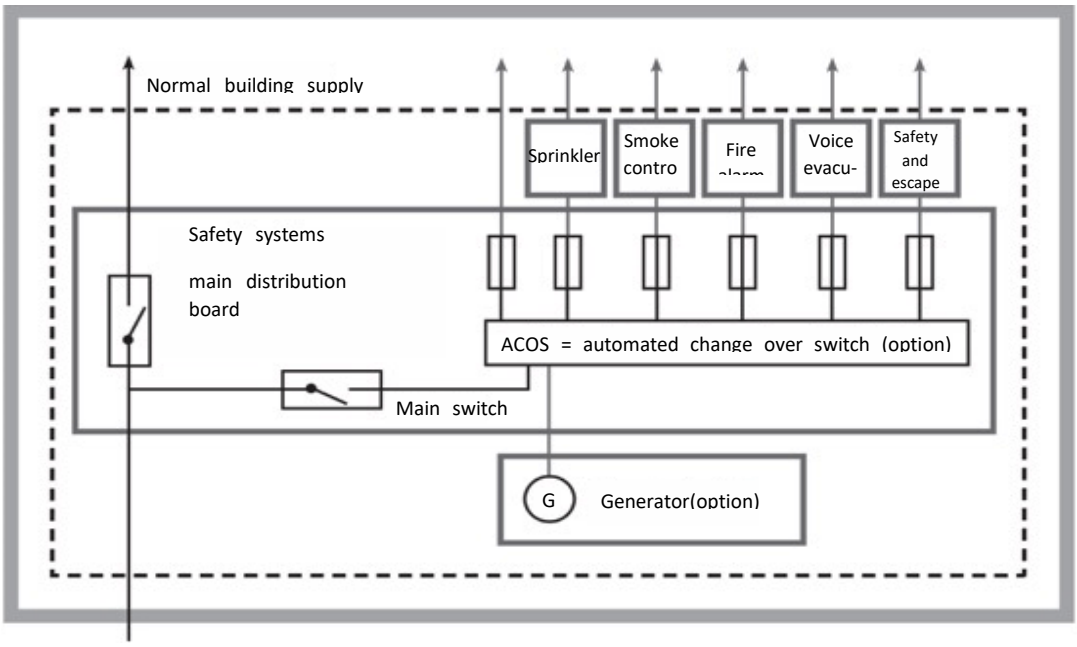
7.1 Common / Public Utility Areas

Detailed SLDs shall be prepared for the individual systems as enlisted in **5.3** above.

6..1 *Cables and Switchgears* — Selection of cables and switchgears / protective devices shall be in accordance with the behavior of the load and in reference to IS 732.

6..2 *Load requiring supply integrity* – There shall be separation of general and emergency / critical load. Provision of Fire Switch shall be made as per the diagram given below, so that during emergency like building fires, electrical supply can be switched off to mitigate the risk of aggravation of fire due to short-circuits,

and dangers related to leakages. This switch shall be specifically marked and be easily accessible for the fire personnel. Location of such switch shall be close to the point where service cable is terminated for further distribution of supply to the individual consumer. Considering requirement of supply integrity, downstream cable(s) from fire switch shall be in accordance with **Annex A** of IS 17505.



Fire switch

A schematic diagram showing the installation of a fire switch [As per **Annex D** of IEC 60364-5-56:2018] used to disconnect all circuits except for circuits supplying the equipment whose operation during a fire is necessary.

NOTES — The provision of a device to isolate complete supply, is mandated under Reg. 38 (3) (i) of *CEA* (Measures relating to safety and Electric Supply) *Regulations 2023*, for buildings above 15m height. For interpretation following points may be considered.

1. Complete isolation of supply shall not include electric supply of critical services operated during emergency for the purpose of Fire Prevention and Life Safety.
2. Its purpose is aimed at restricting further danger of short circuits due to fire and spread of fire and shock hazard, restriction on use of lifts other than fire lift and any other activity running on electrical supply which may aggravate the situation.
3. However, supply to emergency services like rescue operation; firefighting shall not get affected with the operation of this isolating switch. So, in accordance suitable arrangement shall be done at the point of supply to separate supply of emergency services with identification marking and instructions conspicuously.
4. Definition of 'point of commencement of supply' may be checked in Electricity Regulatory Commission's Supply Code Regulations. Which usually is 'incoming terminal of consumer's switch' placed meter of the supplier.
5. When there are number of consumers having individual meter&, switch and also if such meters are located at different floors of multi-storeyed building, then providing such switch shall be at termination point of supplier's cable in building at ground floor, from where distribution to individual meter(s) at one or more locations of meter(s) of consumer(s) starts.
6. As per the regulations, it is obligatory to comply with this requirement for supplier or owner. But considering point 5 above the location of isolating switch comes within the purview of supplier.

6.1.3 *Electrical distribution to individual consumer* — From meter room to individual consumer on each floor distribution shall be through vertical shaft. Protective devices installed at both ends shall have precise

rating and proper discrimination so that in case of fault, first tripping shall occur in main distribution board installed in consumers residential unit. In case of high-rise buildings where busbar trunking is mandatory, care shall be taken to avoid termination of copper cable on aluminium bus.

7.1 Within Individual Dwelling Unit

6.2.1 *Circuits for lighting load* — Lighting load comprising lights, fans, 6A plug on boards shall be separated from power load at the main distribution board. Lighting circuit shall further be divided into final branch circuits as below:

a) Independent circuit for each room, (attached balcony/terrace may be included within the circuit of room);

b) Common areas, for example, passages, verandah, lobby,

c) Bathrooms / toilets,

d) External lighting, in case of bungalows.

NOTE — Maximum points on any lighting circuit shall not exceed 8 or load shall not exceed 1 000 W. Provision of separate circuit shall be done if the number of points ot the load exceeds. Refer Table 5 under *Clause* **7** for consideration of load.

6.2.2 *Circuits for power load* —

There shall be independent circuit for:

a) Air-conditioner,
b) Water heater,
c) Kitchen appliance having rated capacity 2 kW or above,
d) Washing machine/dishwasher having rated capacity 2 kW or above,
e) Water pump,
f) EV charging.

Maximum points of 16A shall not exceed 2 or total load on individual power circuit shall not exceed 3000 W. Provision of separate circuit shall be done if the load exceeds.

6.2.3 *Circuits for Inverter/UPS used as standby electrical supply* — There shall be a separate circuit(s) comprising phase and neutral for the points to be provided with an alternate option of Inverter/UPS supply. Depending on the load to be supplied on such system, a provision of separate DB for load on invertor may be necessary. Colour coding of such wires shall be brown/grey to identify the circuits easily. The neutral of such circuits must not be looped with any other part of wiring not forming part of inverter/UPS supply. Invertor/UPS shall be capable of isolating both line and neutral at invertor output as well as at bypass circuit.

6.2.4 *Cables-size* — Additions and alterations in existing wiring installation must be anticipated in future. This is mostly due to addition of new gadgets at subsequent stages, and changes in interior layouts. Anticipating additions in primarily considered design loads, an uninstructed user opting for modifications in existing installation, it is desirable to consider one size higher for cables. For guidance, Table 4 may be referred for considering minimum cross section of conductor.

Table 4 – Recommended Minimum Nominal Cross-sectional Areas of Conductor

(*Clause* 5.4.1)

Use	Size (2 + E) copper
Point wiring for light/fan/bell/independent plug 6A	1.5 mm^2
Branch circuit (DB to switch board)	2.5 mm^2
Branch circuit (DB to 6/16A power outlets 2 Nos.) for general use or 1 No. independent point for Water heater/Microwave/OTG/Induction, total max. load 3 kW/circuit	2.5 mm^2
Branch circuit (DB to 16/25A power point 1 No.) e.g., A.C. 2TR/3TR total max. load 5kW/circuit.	4.0 mm^2
Mains/sub-mains for total connected load up to 5 kW	4 mm^2
Mains/sub-mains for total connected load > 5 kW and < 7 kW	6 mm^2
Mains/sub-mains for total connected load > 7 kW and < 10 kW	10 mm^2/4 mm^2 or 6 mm^2 (4 + E)*

* For 3-ph supply and load un-balance within 10 percent use 4 mm^2, if load un-balance likely to exceed, use 6 mm^2 (4+E)

NOTE — Mains for connected load equal to or above 10 kW; apply diversity factor, work out required current carrying capacity, find out suitable size from **Annex T** of IS 732 with further derating factors and choose one size higher cable in anticipation of future additions.

6.2.5 *Neutral* — Neutral may be looped within respective circuit only. The size of neutral shall not be less than the phase conductor. Neutral shall not get isolated anywhere except at linked switch with line conductor like single phase, SPN or DP and in three phase TPN or FP switches/MCBs. In case of predominant non-linear load size of neutral shall be decided as per Annex V of IS 732.

6.2.6 *Marking/identification* — Ferruling shall be done with a mark of identification of circuit at every termination point of cable which shall correspond to the marking on DB. For each DB corresponding SLD shall be pasted on / in DB.

6.2.7 *Provision of DB(s)* — Distribution Board shall be of suitable type and size having required ways to accommodate number of circuits. Depending on area of distribution, provision of sub-distribution board/separate distribution board for lighting circuits and power circuits shall be made. In case of three phase supply and single-phase distribution a DB with per phase isolation facility shall be preferred.

6.2.8 *Protective Devices against Over-currents – MCBs* — Lighting circuits having light, fan, on board plug socket points shall be protected with MCB of B class not more than 6A. Circuits providing supply to more than two 6A socket outlets may be protected with MCB of up to 10A. Circuits providing supply to 16 A power socket outlets up to two numbers, shall be protected with 16A MCB. Circuits providing supply to 20-25A power outlet shall be protected with 20/25A MCB. MCBs for circuits of power outlets shall be B or C series depending on anticipated type of load of the appliance on that point. For example, motors, Air-Conditioners shall be provided C series MCBs. For resistive load C type MCB shall not be used.

NOTES — 1. Above recommendations are of generic nature, however for precise rating refer *Clauses* **4.4.4** and **4.4.5** of IS 732.
2. Use of old conventional Fuse/Kit-kat based DBs are not recommended for Domestic Dwellings from the point of view of safety and possible interference of uninstructed person,

6.2.9 *Protective Devices against Electrical Shock – Residual Current Devices (RCD) / Residual Current Circuit Breakers (RCCB)* — It is mandatory to provide RCD of 30 mA sensitivity to every electrical installation to protect person from electrical shock as stipulated in the regulations. To maintain supply redundancy, avoid blackouts, provision of additional number of RCDs may be made suitably on each phase/each DB or particular appliance. RCD not exceeding 300 mA sensitivity shall additionally be installed at point of supply depending on the circuit length from metering box to main DB to prevent possibility of fire arising out of leakages. Precise selection of type of RCD shall be in accordance with *Clause* **4.2** of IS 732, IS 12640 to maintain supply redundancy eliminating nuisance tripping, adequate provision of RCDs may be on different circuits.

NOTE — 1. RCDs are also known as RCCBs.

6.2.10 *Protective Devices against Over-voltages – Surge Protective Devices (SPD)* — Depending on site / situation / vulnerability of the appliance / system connected to supply to withstand possible over voltages such as switching over voltages, transient over voltages, transmitted via supply distribution system of atmospheric origin / direct lightning, provision of SPDs shall be done in accordance with *Clause* **5.3.5** of IS 732.

6.2.11 *Protective Devices – Arc Fault Detection Device (AFDD)*

To mitigate the risk of initiation of electrical fires in final circuits of fixed installation imposed by arc fault currents due to series or parallel arc fault in live conductors, provision of AFDD shall be considered. It shall be a normative requirement for buildings falling under high-risk category like high-rise buildings where evacuation during emergency is difficult. Its provision can be made as an individual or integrated device of required current rating in accordance with IS-IEC 17121.

NOTE — See **Annexure B** for typical Single Line Diagram for 2 BHK apartment.

7 LOAD CONSIDERATION

In reference to 4.2 at planning stage assessment of load is one of the important requirements in deciding layouts of electrical supply related infrastructure. Load can either be decided as custom requirement or anticipated general requirement. Following guidelines may be considered as baseline in this regard.

7.1 Common Requirements of Building(s)

Depending on the approved Electric Supply Code, Conditions of Supply, Tariff categories; there may be requirement of one or more than one service connection(s) of electric supply for different purposes used as common service to the occupants of building. In accordance requirement of electrical load shall be worked out for following uses.

a) Lighting
b) Lift(s)

c) Water Supply (pump)
d) Fire Prevention and Life Safety (fire pumps, detection, PA, Forced Ventilation, etc.)
e) eV charging
f) Any other

The load at actuals shall be taken into consideration.

7.2 Individual requirement of owner

Data of custom requirement of owner is usually not at the time of planning. So, under the circumstances when there is no such data, load may be considered based on watts per m^2 of carpet area. For design purposes, load for domestic dwellings shall be considered as $75W/m^{2*}$. To work out the load on custom requirement basis the values from Table 5, 6 may be referred as guidelines.

*NOTE – The value 75W/m2 as stated shall be considered as minimum requirement. If the custom requirement differs, higher wattage per m^2 shall be considered.

Table 5 Determination of Load of Lighting Points

Connected Device on the Outlet of Point Wiring	Load Consideration*
Light point	50 W
Fan point	75 W
Power outlet 6A	100 W
*NOTES	
1 Load of light point is in anticipation of use of maximum wattage out of a conventional incandescent lamp/tube light with ballast or single/group of LED lighting fixtures.	
2 Fan includes all types/sweeps/exhaust.	
3 For plug **socket outlets** actual rating of appliance if known, may be taken into consideration, but not less than the value shown.	

Table 6 Determination of Load on Power Points

Commonly Connected Devices on the Outlet of Power Point	Load Consideration in W
Bathroom	
Storage type water heater	2000
Instant hot water geyser	3000
Dry balcony	
Washing Machine	2000
Dish washer	1500
Kitchen	
Electric Hot Plate	2000
Induction hot plate	2000
Electric oven	2000
Microwave	2000
Mixer/grinder	500
Fridge	500
Toaster/kettle	800

Air fryer	1500
Kitchen exhaust hood	350
Other	
A.C 1TR/1.5 TR/2 TR	1250/1500/2000
Room heater	1000
Computer	150
TV	100
Iron	800

NOTE – Under sizing design load is most undesirable as it leads to further under sizing of cables resulting into overloading and further consequences. Hence the load shown on per m^2 basis shall be treated as baseline.

8 EARTHING ARRANGEMENT / SYSTEM

Earthing arrangements shall be designed and constructed as per related clauses from IS 3043 and *Clause* **5.4** of IS 732. It is mandatory to observe provisions from *CEA Regulations*. Special attention shall be given to requirements given below.

a) Independent protective conductor shall be run along with each circuit from DB.

b) Up to 16 mm^2 size material and cross section of protective conductor shall be same as that of line conductor. Above 16mm^2 size of protective conductor may be half the size of line conductor.

c) Colour of insulated protective conductor shall be green-yellow.

d) For point wiring where light fitting / fan to be connected is having earth terminal / categorized as class 1, a protective conductor shall be provided up to the termination of point. Considering the unpredictability about the type of fan / fitting, which is going to be selected by user, it is recommended that all point wiring shall be done with protective conductor for which termination shall be 3-plate ceiling rose / 3 pole connector.

e) Equipotential bonding shall be observed by interconnecting exposed and extraneous conducting parts at substantially equal potential [Ref. IS 732 *Clause* **4.2.11**]. In building installation, equipotential bonding conductors shall interconnect protective conductor, earth continuity conductor, risers of HVAC system if any. [Ref. IS 3043:2018 *Clause* **3.15**]

NOTE — Regarding operation of protective devices, there is important role of type of earthing system, TNC / TNC-S / TT. As per the Reg. 18 of *CEA* (Measures relating to Safety and Electric Supply) *Regulations, 2023*, provision of 'earth terminal' to be made by the supplier at the point of supply is mandatory. And in case of a consumer having 3-ph 415V supply, consumer requires his own earthing electrode which is to be interlinked with the supplier's earth terminal. Regulations also require the supplier to earth the neutral at consumer's premises [Ref. Reg. 43(ii)]. Precise enforcement of these regulatory provisions conforms TNC-S system of earthing. Where reliance on this is not practicable TT system shall be adopted.

9 SELECTION & INSTALLATION OF FANS, LIGHT FITTINGS, APPLIANCES

After completion of fixed wiring installation luminaires, fans and other domestic appliances become part of electrical installation. Wrong selection and installation can be a source of danger. It shall be noted that all household or similar fixtures, appliances shall be of class 1 / class 2 / class 3 and compliant with the

provisions stated under respective part of the standards as given under **Annex A**.

NOTE — Appliances are mostly an addition to the fixed wiring installation and are selected by the individual owner after taking possession. Under such conditions monitoring compliances with the standards, at the time of initial verification is not possible. It can happen only under periodic verification. Reference shall be taken from *Clause* **6** of IS 732 and the related Annexes.

9.1 Lighting Fixtures/Luminaries

For selection of lighting fixtures their lead wires and layouts showing locations, points to be considered are:

a) Functionality / Purpose, e.g., general lighting, reading, spot lighting, indirect lighting, aesthetic and other aspects such as aspects glare index, Colour Rendering Index (CRI), Correlated Colour Temperature (CCT).

b) Lighting fixtures and their integrated parts shall conform IS 10322.

c) As far as possible, the installation of fitting shall be near to the fixed outlet point so that the length of supply lead wires shall be as minimum as possible but not exceeding 1m.

d) While selecting location, e.g., portion of flush type / concealed fitting above false ceiling there shall be consideration for external influences like rodents.

e) Location shall be such that the sweep of fan blade shall not cut light of the fitting.

f) Consideration regarding Energy Conservation related guidelines, e.g. efficacy, p.f.

g) Heat emittance* from the fixture.

*NOTE — In case of light fittings mounted on wooden furniture or material susceptible to the heat, utmost precaution against possible harm due to heat dissipation of the fitting / its integral part like heat sink / driver shall be taken**.**

9.2 Ceiling Fans

For selection, erection of Ceiling Fans and their location layouts, points to be considered shall be:

a) Shall conform to IS 374, IS 302-2-80.

b) Technical parameters shall be considered such as Sweep, Air delivery in m^3/min, Maximum power input in W, Service value in m^3/min/W.

c) For proper ventilation there shall be provision of adequate number of fans at appropriate locations depending upon area. Table 13 of Part IV Section 1 of NBC may be referred.

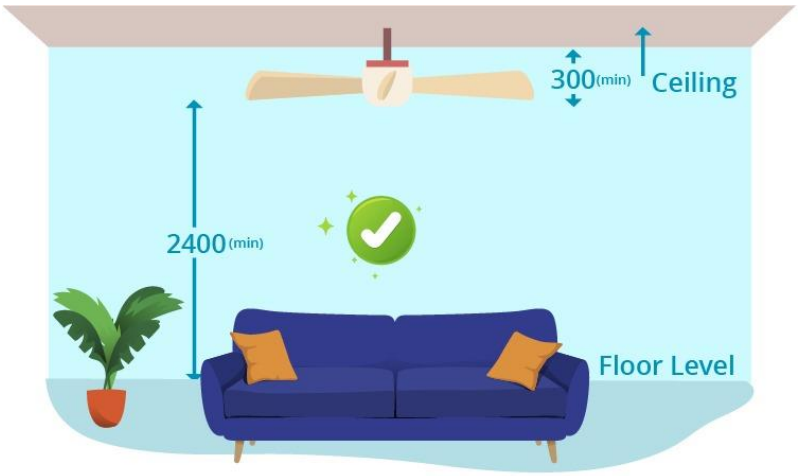
d) Hanging provision, fan hook, shall be securely entangled in RCC of ceiling / clamped to the frame of ceiling structure so as to sustain the static and dynamic load.

e) Down rods wherewith extra lengths shall be continuous without joint and shall carry same

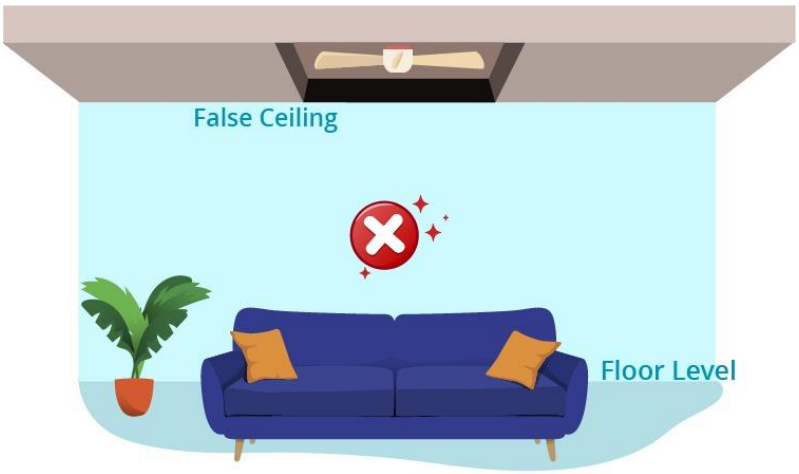
mechanical properties.

f) Installation shall be done by skilled person.

Clearance of fan blades from finished level of flooring and ceiling shall not be less than 2400 mm and 300 mm respectively.



Clearance of fan blades from ceiling and flooring



Incorrect fan location in false ceiling

9.3 Exhaust Fans

For selection of exhaust fans and their location layouts, points to be considered shall be:

a) Where air changes are required to maintain fresh air flow to maintain air quality, provision of exhaust Fans shall be made.

b) Exhaust fans shall conform to IS 2312.

c) Selection of exhaust fans can be done on the basis of sweep, air changes in CFM or m^3/min between 6-12 as per the application, service value, m^3/min/W.

There should be arrangement for entry of fresh air so that negative pressure does not develop within the area

Fresh Air inlet for bathroom

9.4 Portable Appliances

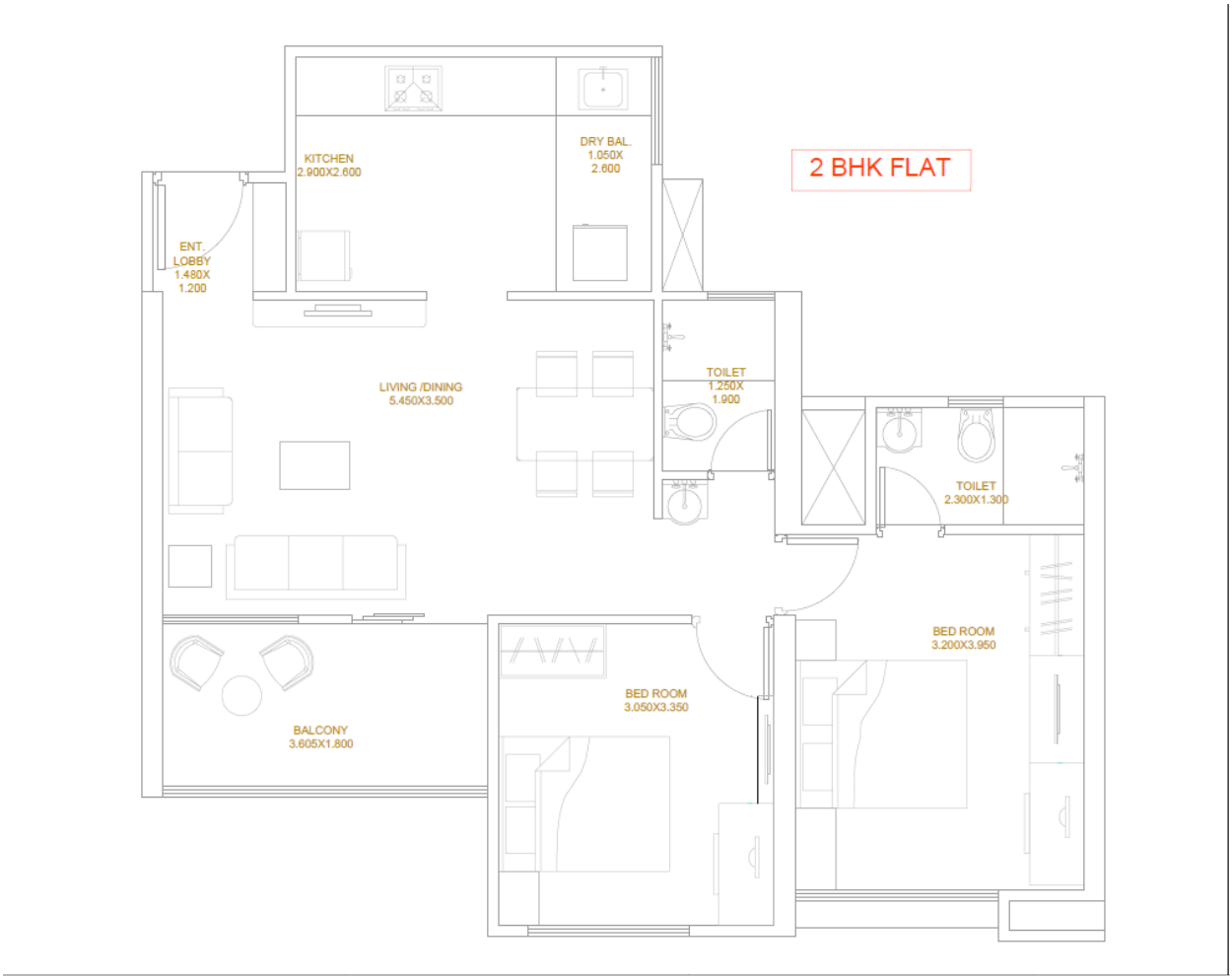
Location of such appliance shall be as near as possible to the power outlet so that the length of cord will not exceed 2m. Such appliance shall pass Portable Appliance Test. For class 1 appliances, proper connectivity to earth shall be checked. Connections shall be through shielded cord only. Heat generating appliances/parts shall be safely located and shall be provided with suitable thermostat.

9.5 Supply leads, cords

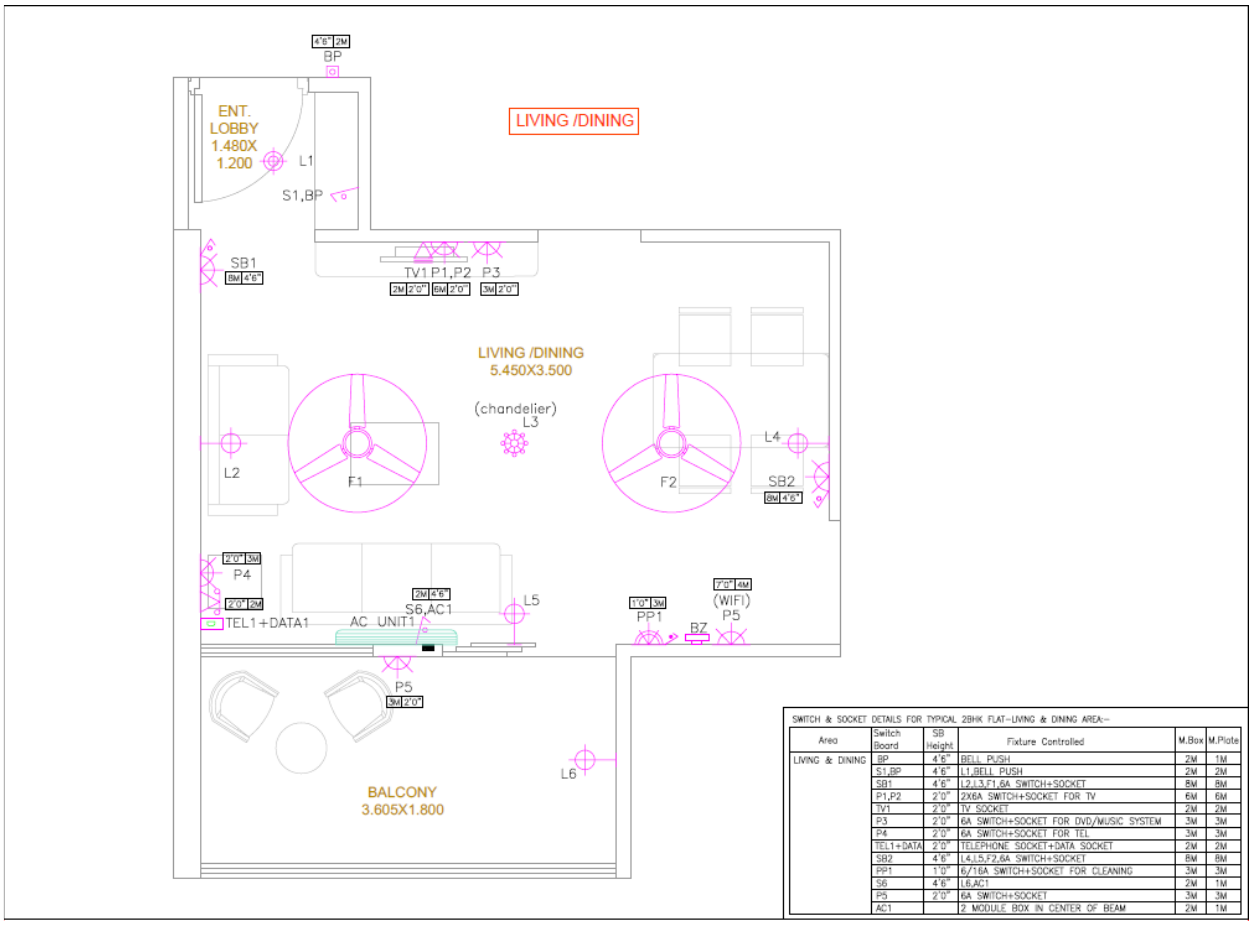
Supply leads and cords forming connectivity between final termination point of fixed wiring and the input terminal of appliance / fixture shall conform IS 302-1 in respect of requirements related to cross-section, insulation, maximum length, pull force and torque.

ANNEX A

[*Clause* **5.5** Layouts for Internal electrical installation within individual dwelling unit(s)]



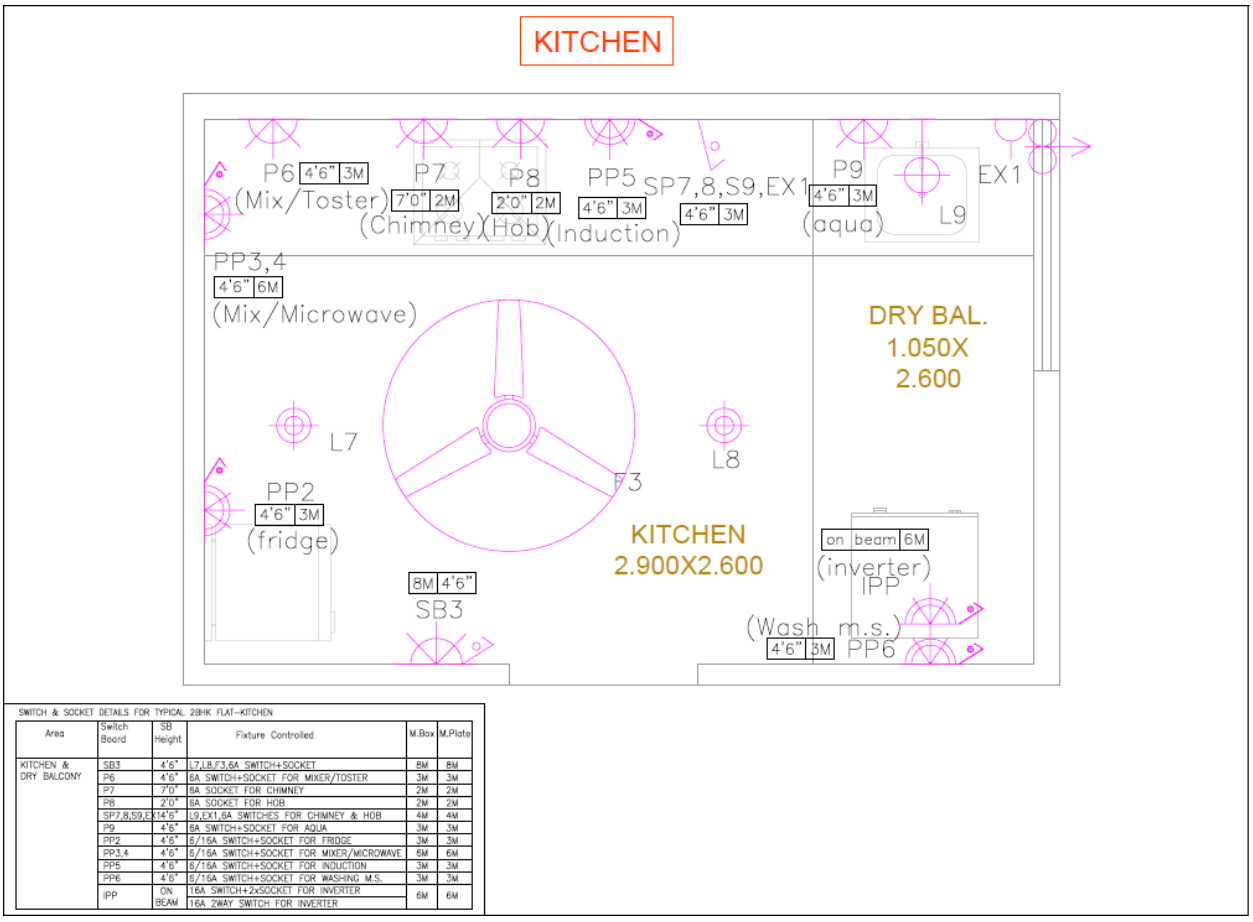
Interior / Furniture Layout



SWITCH & SOCKET DETAILS FOR TYPICAL 2BHK FLAT-LIVING & DINING AREA:-

Area	Switch Board	SB Height	Fixture Controlled	M.Box	M.Plate
LIVING & DINING	BP	4'6"	BELL PUSH	2M	1M
	S1,BP	4'6"	L1,BELL PUSH	2M	2M
	SB1	4'6"	L2,L3,F1,6A SWITCH+SOCKET	8M	8M
	P1,P2	2'0"	2X6A SWITCH+SOCKET FOR TV	6M	6M
	TV1	2'0"	TV SOCKET	2M	2M
	P3	2'0"	6A SWITCH+SOCKET FOR DVD/MUSIC SYSTEM	3M	3M
	P4	2'0"	6A SWITCH+SOCKET FOR TEL	3M	3M
	TEL1+DATA	2'0"	TELEPHONE SOCKET+DATA SOCKET	2M	2M
	SB2	4'6"	L4,L5,F2,6A SWITCH+SOCKET	8M	8M
	PP1	1'0"	6/16A SWITCH+SOCKET FOR CLEANING	3M	3M
	S6	4'6"	L6,AC1	2M	1M
	P5	2'0"	6A SWITCH+SOCKET	3M	3M
	AC1		2 MODULE BOX IN CENTER OF BEAM	2M	1M

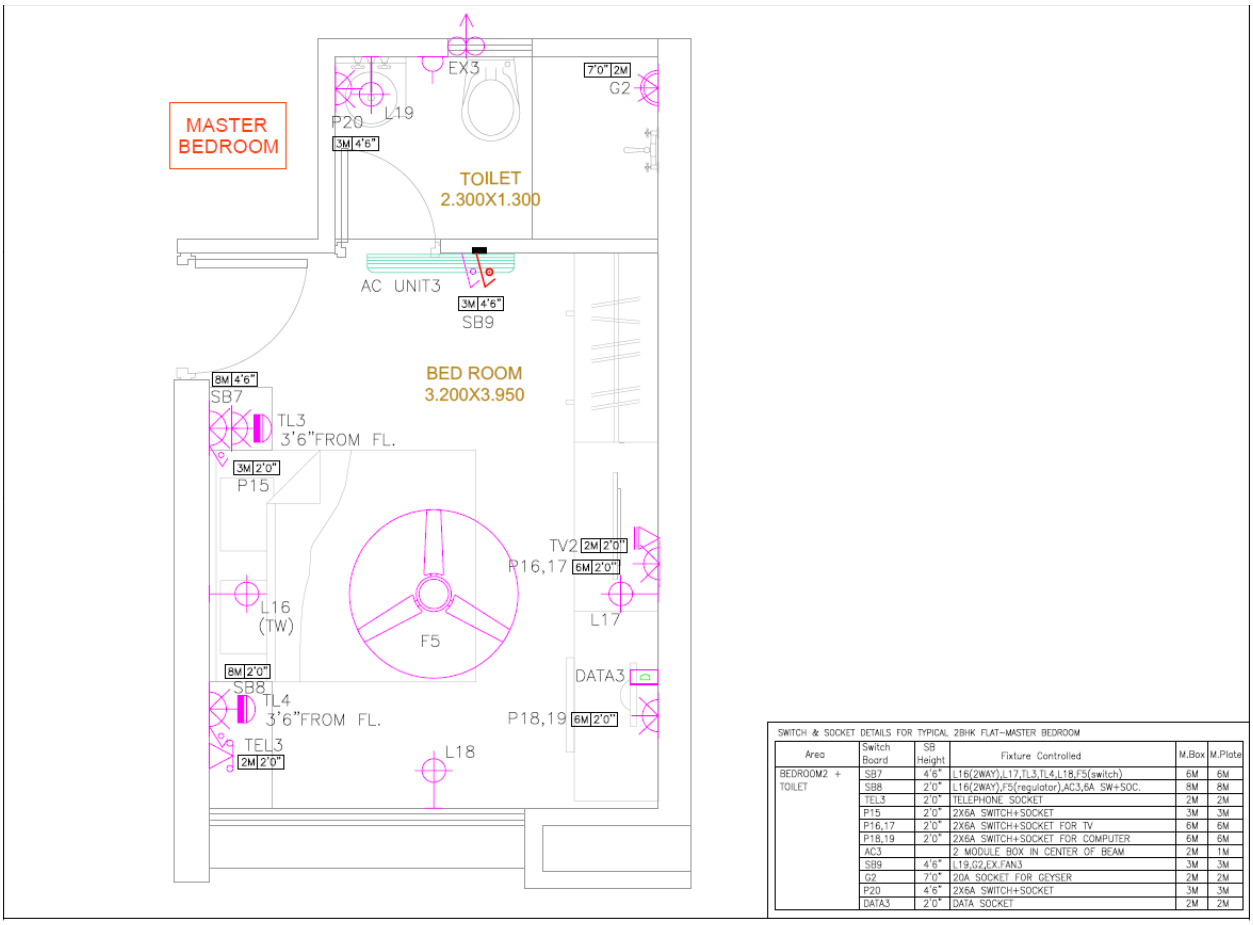
Electrical Layout for Living – Dining



SWITCH & SOCKET DETAILS FOR TYPICAL 2BHK FLAT–KITCHEN

Area	Switch Board	SB Height	Fixture Controlled	M.Box	M.Plate
KITCHEN & DRY BALCONY	SB3	4'6"	L7,L8,F3,6A SWITCH+SOCKET	8M	8M
	P6	4'6"	6A SWITCH+SOCKET FOR MIXER/TOSTER	3M	3M
	P7	7'0"	6A SOCKET FOR CHIMNEY	2M	2M
	P8	2'0"	6A SOCKET FOR HOB	2M	2M
	SP7,8,S9,EX1	4'6"	L9,EX1,6A SWITCHES FOR CHIMNEY & HOB	4M	4M
	P9	4'6"	6A SWITCH+SOCKET FOR AQUA	3M	3M
	PP2	4'6"	6/16A SWITCH+SOCKET FOR FRIDGE	3M	3M
	PP3,4	4'6"	6/16A SWITCH+SOCKET FOR MIXER/MICROWAVE	6M	6M
	PP5	4'6"	6/16A SWITCH+SOCKET FOR INDUCTION	3M	3M
	PP6	4'6"	6/16A SWITCH+SOCKET FOR WASHING M.S.	3M	3M
	IPP	ON BEAM	16A SWITCH+2xSOCKET FOR INVERTER	6M	6M
			16A 2WAY SWITCH FOR INVERTER		

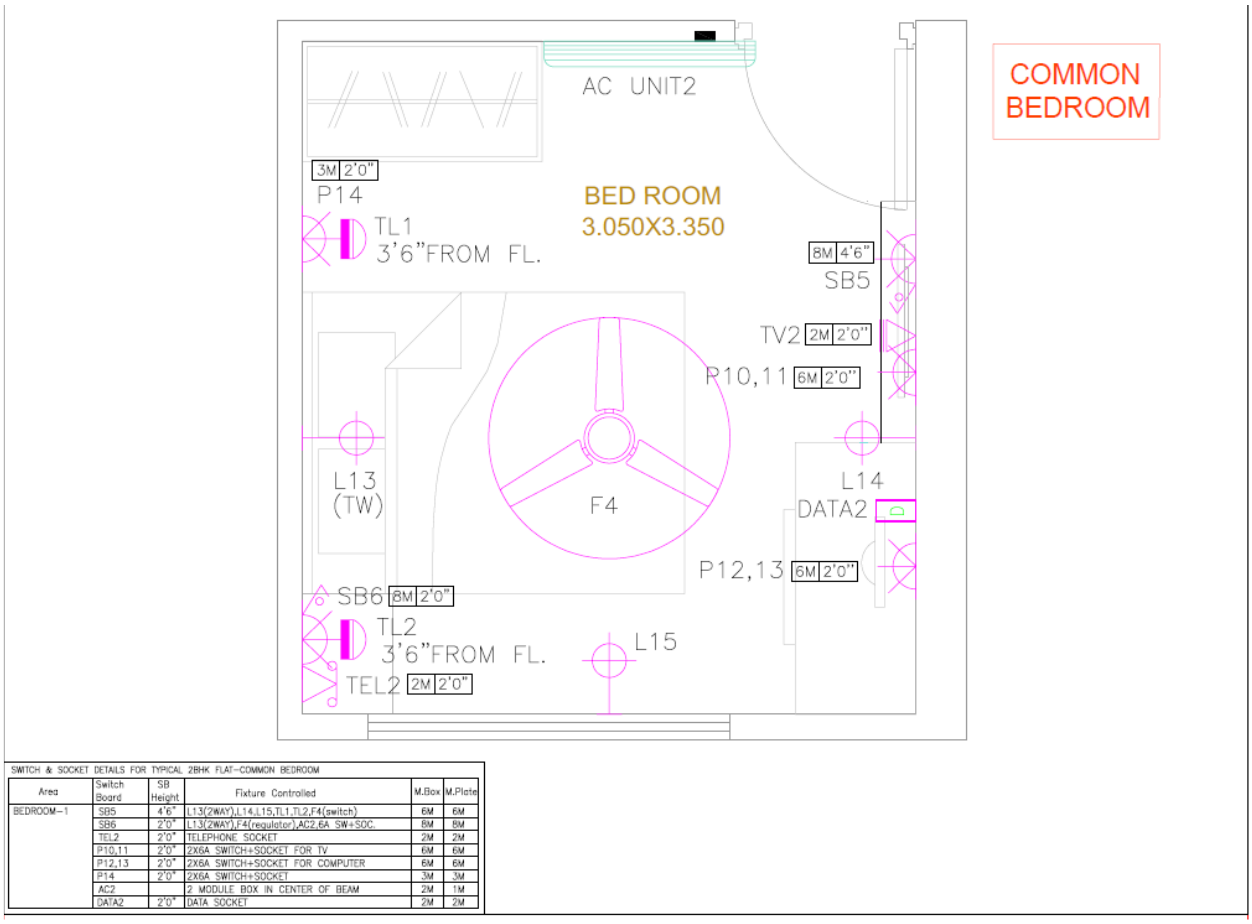
Electrical Layout for Kitchen



SWITCH & SOCKET DETAILS FOR TYPICAL 2BHK FLAT–MASTER BEDROOM

Area	Switch Board	SB Height	Fixture Controlled	M.Box	M.Plate
BEDROOM2 + TOILET	SB7	4'6"	L16(2WAY),L17,TL3,TL4,L18,F5(switch)	6M	6M
	SB8	2'0"	L16(2WAY),F5(regulator),AC3,6A SW+SOC.	8M	8M
	TEL3	2'0"	TELEPHONE SOCKET	2M	2M
	P15	2'0"	2X6A SWITCH+SOCKET	3M	3M
	P16,17	2'0"	2X6A SWITCH+SOCKET FOR TV	6M	6M
	P18,19	2'0"	2X6A SWITCH+SOCKET FOR COMPUTER	6M	6M
	AC3	-	2 MODULE BOX IN CENTER OF BEAM	2M	1M
	SB9	4'6"	L19,G2,EX.FAN3	3M	3M
	G2	7'0"	20A SOCKET FOR GEYSER	2M	2M
	P20	4'6"	2X6A SWITCH+SOCKET	3M	3M
	DATA3	2'0"	DATA SOCKET	2M	2M

Electrical Layout for Master Bedroom



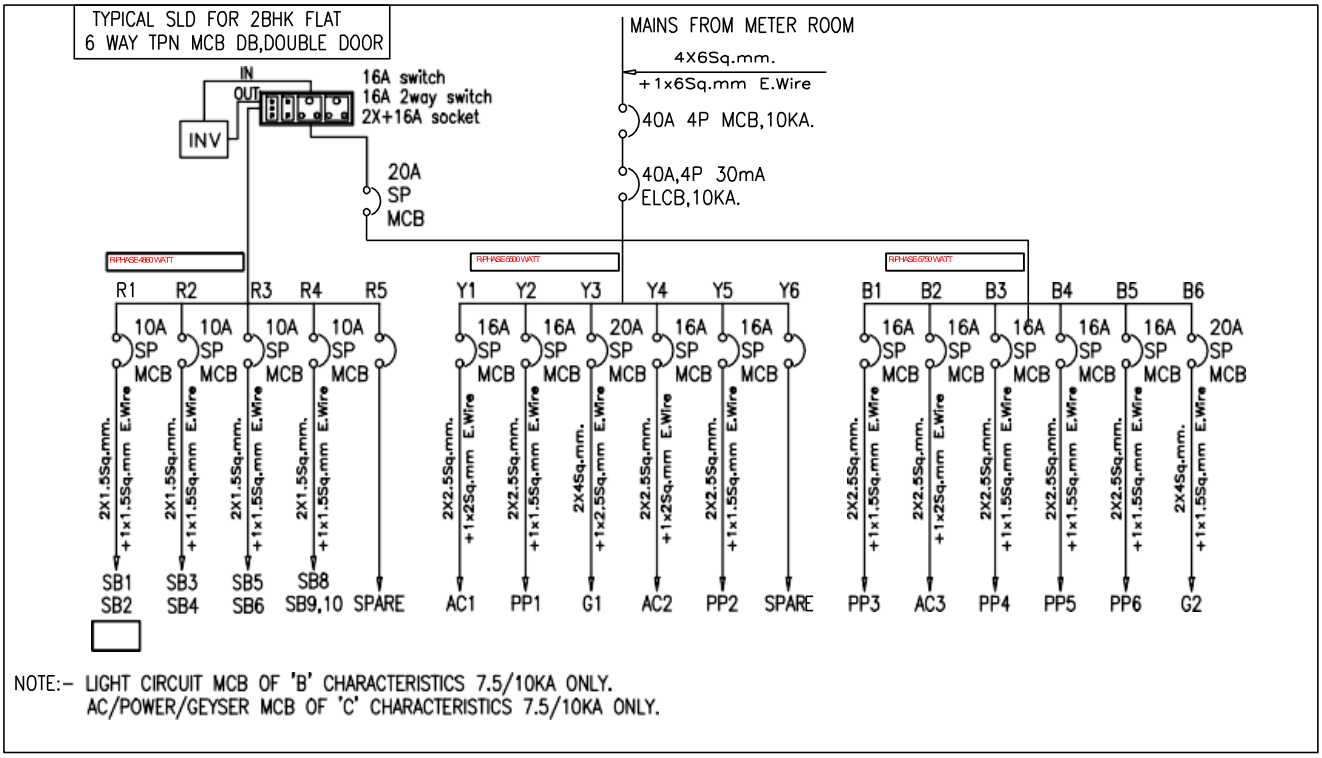
SWITCH & SOCKET DETAILS FOR TYPICAL 2BHK FLAT–COMMON BEDROOM

Area	Switch Board	SB Height	Fixture Controlled	M.Box	M.Plate
BEDROOM–1	SB5	4'6"	L13(2WAY),L14,L15,TL1,TL2,F4(switch)	6M	6M
	SB6	2'0"	L13(2WAY),F4(regulator),AC2,6A SW+SOC.	8M	8M
	TEL2	2'0"	TELEPHONE SOCKET	2M	2M
	P10,11	2'0"	2X6A SWITCH+SOCKET FOR TV	6M	6M
	P12,13	2'0"	2X6A SWITCH+SOCKET FOR COMPUTER	6M	6M
	P14	2'0"	2X6A SWITCH+SOCKET	3M	3M
	AC2		2 MODULE BOX IN CENTER OF BEAM	2M	1M
	DATA2	2'0"	DATA SOCKET	2M	2M

Electrical Layout for Common / Children's Bedroom

ANNEX B

[*Clause* **6.2** Typical Single Line Diagram for 2 BHK apartment]



ANNEX C

(*Clause* 2)

LIST OF INDIAN STANDARDS REQUIRED FOR THIS GUIDE

IS Number	*Title*
IS 302-1:2008	Safety of Household and similar Electrical Appliances — General Requirements
IS 302-2-80	Safety of Household and Similar Electrical Appliances — Particular Requirements – Fans
IS 365:1983	Specification for electric hot plates (*Second Revision*)
IS 366:1991	Electric iron - Specification (*Fourth Revision*)
IS 367:1993	Electric kettles and jugs for household and similar use - Specification (*Fourth Revision*)
IS 368:2014	Electric immersion water heaters - Specification (*Fifth Revision*)
IS 369:2019	Household electric direct - Acting room heaters - Performance requirements (*Fourth Revision*)
IS 371:1999	Ceiling Roses - Specification (*Third Revision*)
IS 374:2019	Electric Ceiling Fans – Specifications
IS 555:1979	Specification for electric table type fans and regulators (*Third Revision*)
IS 732:2019	Code of practice for electrical wiring installations (Fourth Revision)
IS 1169:1967	Specification for electric pedestal type fans and regulators (*First Revision*)
IS 1255:1983	Code of Practice for Installation and Maintenance of Power Cables up to and including 33kV
IS 1287:1993	Electric Toasters - Specification (*Third Revision*)
IS 1293:2019	Plugs and Socket Outlets of rated Voltage up to and including 250 Volts and rated current up to and including 16 amperes - Specification (*Third Revision*)
IS 2082:2018	Stationary storage type electric water heaters - Specification (*Fifth Revision*)
IS 2268:1994	Electrical call bells and buzzers for indoor use - Specification (*Third Revision*)
IS 2312:1967	Specifications for Propeller type ac Ventilating Fans
IS 2412:1975	Specification for link clips for electrical wiring (*First Revision*)
IS 2994:1992	Electric stoves - Specification (*Second Revision*)
IS 3010-1:1965	Specification for appliance - connectors and appliance - Inlets (Non - Reversible Three - Pin Type): Part 1 appliance – Connectors
IS 3043:2018	Code of practice for earthing (*Second Revision*)
IS 3412:1994	Electric water boilers - Specification (*Second Revision*)
IS 3419:1988	Specification for fittings for rigid non - Metallic (*Second Revision*)
IS 3481:1966	Specification for electric portable lamp stands and brackets
IS 3854:1997	Switches for domestic and similar purposes - Specification (*Second Revision*)
IS 4160:2005	Interlocking switch socket outlets - Specification (*First Revision*)

IS 4250:1980	Specification for domestic electric food - Mixers (Liquidizers and Grinders) (*First Revision*)
IS 5613 series	Maintenance and Installation of Over-head power lines
IS 10322 series	Luminaires
IS 12640-1&2:2016	Residual Current Operated Circuit-Breakers without/with Over current Protection for household and similar uses
IS 16997	Requirements for Low-Voltage Special Electrical Installations or Locations Solar Photovoltaic (PV) Power Supply Systems
IS 17017 series	Electric Vehicle Conducive Charging System
IS 17900-1:2022	Lifts for Transport of Persons and Goods – Safety Rules
IS IEC 60898-1:2015	Circuit Breakers for Over-current Protection for household and similar purposes
IS IEC 61936-1:2021	Power installations exceeding 1 kV ac Part 1: Common Rules