ELECTRICAL NETWORK DESIGN- RESIDENTIAL DEVELOPMENTS

1. Objective

The following policy is formulated to provide a guide line for the following:

1.1 Design of Electrical infrastructure in Residential apartment considering Maximum demand as per development viz. Casa, Aspirational, and High End/Luxury.

1.2 Design of Electrical Infrastructure for Residential tower considering Overall diversified Maximum Demand.

1.3 Common area (internal & external) load diversity.

1.4 Point Load/Power/Light/T.V/Data/Telephone/Intercom/VDP/Bell/Motion Sensor allocation apartment type wise.

1.5 Do's & Don'ts for Electrical Network Design

2. Development Classification

a. Residential developments are classified as follows:

i. Luxury
ii. High End
iii. Aspirational
iv. Casa

b. Commercial Developments are classified as follows;

i. Supremus
ii. I-Think
iii. Excelus
iv. Malls

3. Load Calculation and Equipment Sizing

Listed below are diversity factor to be considered for Maximum Demand (@each apartment) and Overall Maximum Demand (for each Tower Load)

- Connected Load of Unit/Common Area = Sum of all electrical loads in the unit / common area which are served of a single DB
- DB load = Connected Load of Unit x Unit Diversity (/ Connected Load of Common Area x Common Area Diversity)
- Cable Load = DB Load (note: assumed that one cable is connected to one DB)

- Bus Bar Load = Sum of all DB or Cable Loads connected to the bus bar x Bus Bar Diversity
- Panel Load = Sum of all Bus Bar Loads connected to the Panel x Panel Diversity + Sum of all Cable Loads connected to the Panel
- Transformer Load = Panel Load

To calculate connected load see Annexure A.

Diversity Factors to be used:

	Residential	**Office**	**Retail**
Unit Diversity	0.8	Unit HVAC – 1, Lighting – 0.8, All other loads – 0.88	
Common Area Diversity	Life safety loads - 1, Elevator/escalator and common HVAC – 0.8, All other connected loads – 0.6		
Bus Bar / Bus Riser Diversity	0.4 (0.25 for Casa)	0.8	0.8
Panel Diversity	1 if there is one bus bar / bus riser connected, 0.9 if there are two bus bars / bus risers connected, 0.8 if there are > two bus bars / bus risers connected.		

4. Do's for Residential Electrical Network Design

4.1 For Level of Electrical Switches and Sockets for Residential Apartments refer to the latest Architectural Policy No 67.

4.2 16A sockets(for 2000W Geyser)/20A Sockets(for 3000W Geyser) to be provided adjacent to the Geyser location as power outlet, Geyser switch of similar rating shall be installed together with toilet lights switches.

4.3 In CASA, AC switch/socket (16A for 1Ton M/C & 20A for 1.5Ton M/C) to be provided @ the indoor unit, switch to be installed @ the nearest Switch board in the room. Embedded PVC conduiting to be done from indoor to outdoor unit for power supply.

4.4 Other than CASA, inside the flats, the Air-conditioning units shall be controlled by a DP switch. A/C units in the flats shall be directly wired without any socket. The wires from the switch shall be directly terminated to the IDU. All further wiring i.e interconnection between IDU and ODU will be in the vendor's scope. Only back-box to be provided behind the IDU. Care to be taken to position the back-box such that it is directly behind the IDU and will not be visible after fixing the IDU.

4.5 Apartment DB's should be preferably located at a centralized location which doesn't have aesthetic impact and is easily accessible as well as decently ventilated viz. store room, servant's room, behind main door, passage wall to kitchen. Location should also be chosen taking into consideration optimization of radial wiring length. Top of the Distribution boards should be +1900mm above finished floor level, to avoid access to children below 12 years. Distribution system inside apartment to be protected by 30mA rating ELCB/RCBO. All lighting circuit to be protected by 6/10A Type C outgoing MCB as per circuit load and power circuit be protected by 16/20/25A Type C outgoing MCB as per circuit load. The RCD/RCBO for the apartment Jacuzzi/pool shall be rated as 10 mA.

Comment [SB1]: R9

4.6 Casa Development DB to have Single Door and all other Development DB to be Double Door.

4.7 All of the aforesaid calculations shall be multiplied by 1.1 (1.15 for Luxury and Hi-end residential) to take into account use of higher consuming devices in the future.

4.8 The voltage drop calculation & temperature correction factor (de-rating factor) shall be done before finalizing the amperage rating of the Bus Bar. The bus bar shall be considered as being de-rated for a 40° C operating temperature (which is a rise of 20° from general design ambient temperature of 20° C).

4.9 Power outlet for all exhaust fans (in Toilets & Kitchen) shall be concealed within the the exhaust fan cut-out so that post installation, no wires are visible internally or externally and to be a controlled by switch combined together with lighting switch board in respective area. A sample of an aesthetically more pleasing version of the the exhaust fan (max. CFM 100 As per Policy MEP-04_Unit HVAC Guidelines for Residential Project) is provided below and should be considered for use in bathrooms due to its aesthetic superiority (not applicable for Kitchens since exhaust capacity (as in June 2015) is not sufficient).

Comment [SB2]: R9



4.10 2nos 2.5sqmm+1nos 1.5sqmm FR wires to be used till the switch boards for circuit feeding combined load of lighting and general purpose/small power . Loading of 2.5sqmm radial circuit with multiple equipments/light should be in the range of 800 to 1000W. Load above 1500W to 2000W should not be shared with other equipments/lighting/small power and shall be fed from individual circuit of 2nos 2.5 + 1nos 1.5sqmm FR sqmm wire rating.

4.11 Load .2000W shall be fed from individual circuit of 2nos 4sqmm + 1nos 2.5sqmm wire which shall be verified for voltage drop calculations.

4.12 All the floor lamps shall be IP 67 Rated. All external up-lighters shall be IP68.

4.13 For all projects except Casa, Sockets should be provided with 'universal shutter' and no switches to be provided for on/off of sockets. Switches should be provided with sockets only in case of Microwave, Oven, Refrigerator and Washing machine points. In case of Casa projects, regular switch should be provided with all sockets.

4.14 In case FTH is planned for a project two data points should be provided, one each in Living room and MBR. Cat 6/equivalent cable from the LVDB to the data points should be provided. Wi-fi in individual residences will be done by 3rd party broadband provider and resident will enter into their own arrangement with them. If the ONT is not centrally located in the apartment, one data point shall be provided such that adequate Wi-fi coverage can be achieved. Power outlet should be provided for the additional Wi-fi unit. Location of Power outlet and WiFi unit to be co-ordinate with architect for aesthetics.

4.15 Need for Multi-room connections, HDR connections and future changes in signal polarities planned by Satellite TV operators will likely increase the number of RG-6 (co-axial) cables that will need to go into a flat from the shaft and distributed to the end points. Therefore, size of LV conduits should be designed to handle three RG-6 cables at a time so that if required the customer can pull the required number of cables.

4.16 Two light point to be provided in bathrooms inside unit for residential projects (One ambient and other for vanity mirror on either ceiling or wall as per design). Wherever light control in the toilets is connected through motion sensors, the ceiling lights and exhaust fans shall be connected through the motion sensor. The architects/owners shall select mirror lights such that it has a local inbuilt switch/control.

No switches/sockets should be next to the shower/wet areas.

4.17 Use standardized low cost electrical fixtures & fittings (switches, etc.) in all non-habitable areas like service floors, service lobbies, and other areas like servant rooms, servant toilets, etc. Switches used in habitable areas of Aspi, Hi-End or Luxury units shall not be specified for such areas unless cost difference is <10%.

4.18 Suitable size 4 core Aluminium FR cables shall be used for connection between meter to apartment DB. For buildings without false ceiling in the corridor/apartment up to BD, bulkhead to be provided to accommodate cable (clamped to soffit, this can also be used for sprinkler pipes, if applicable).

Comment [SB3]: R9

4.19 GI earthing wires/strips to be used and copper earthing wires/strips to be avoided. Copper earthing wires/strips shall be used for neutral earthing of sub-stations.

Comment [SB4]: R9

4.20 Bus duct for electrical distribution should be used for building having height > 125 mtrs for residential building/ 100 mtrs for commercial buildings (distance between transformer and last floor):

a. Bus ducts should be designed in such a way that the ones with high/highest amperage have the lowest length and vice-versa. The approx. cost is Rs. 10 per ampere meter (2012 costs) for aluminium bus bar and the goal should be to reduce this cost by using medium capacity busbars with higher nos. (Max. Of 2500A/3200 A for a transformer capacity of 1600/2500 KVA respectively). (There are following disadvantages in considering very high rated transformers, bus-bars:
   - Associated high kA of the LT system which inturn increase the cost
   - Ratings higher than noted above are more than the standard utility approved ratings therefore should only be considered with prior utility/liaison approval.)

b. Within a given bus duct, use of reducers should also be considered at the upper levels to reduce the current and consequently cost.

c. In buildings which have transformers placed on upper floors, the electrical distribution maybe planned in both directions - up and down – from the transformer so that the bus duct lengths are moderated. In case of “down” bus ducts, special care should be taken about the bus duct connections which may be affected by gravitational pull.

d. The maximum length of the bus duct shall be limited by the maximum voltage drop (max. 5%) between transformer and the last distribution board (this is to achieve overall max voltage drop of 8% in entire network from HT tapping

onwards). The no. of floors served should NOT be a limit to the bus duct length.

e. The top 5-7 floors can be serviced by cable, instead of bus duct to further reduce costs. In such case, the tapping shall be done from the bus duct at 5-7 levels below the top floors and then individual cables shall be used to supply the units above. For the SMDB supplying to the 5-7 floors diversity at the busbar tap off to be considered as 80% (since the quantum of load is more), however diversity on the busbar remains as per item 3.1

f. In commercial towers, redundancy has to be built in the busrisers as the tenants in all prestigious commercial tower will request for it, so: either n+1 redundancy shall be adopted in the busrisers or all the busbars should be upsized to accommodate the load of any failed busbar in the group, depending upon cost comparison between two options.

g. For each project (multiple buildings) using bus ducts, following spares are required to be handed over to HFM and should be appropriately included in the scope of the electrical contractor:

i. Two Bus Lengths of same size or amperage capacity of a model/make
ii. Two numbers of the Bus couplers
iii. One number Tap off units
iv. Torque Wrench

4.21 Use of Power Factor Correction equipment (APFC):

v. Residential connections (except for Clubhouse and PPL) – No
vi. Clubhouse connection – Yes
vii. PPL connection – Yes
viii. Commercial / IT / Retail connections – Yes

4.22 Usage norms for Fire Survival (FS) Cables:

FS Cables usage is to be limited to the below Life Safety Equipment only (i.e equipment expected to run in case of Fire Emergency).

ix. Fire Fighting Pumps & Vertical Transfer pumps(supplying to the fire water tanks)
x. Fire lifts
xi. Staircase /lift well / Lobby pressurization fans
xii. Basement Car Park ventilation Fans (Jet and Centrifugal fans)**
xiii. Basement Supply and Exhaust Fans
xiv. Fire Alarm/Voice evacuation exposed wiring**

xv. Emergency Lighting Distribution Boards (outgoing circuit wiring shall be FR in conduit embedded in slab or in GI conduit)**

xvi. Aviation Lighting Control

Note: ** should be avoided for full length of the cabling by – installing the 3/6runs of FR wires in embedded conduits from jet fan panels/FA panels to individual jet fan junction box/fire alarm system devices – from where onwards FS PH120 cables to be used for exposed cabling as per standard details in Fire alarm/electrical drawings. At the panel end termination from embedded conduits to panel should be done in GI trunking (2mm thick) with all openings fire stopped with sealant.

In addition to the above, table below clarifies the usage of FS/FRLS on the high side.

From	**To**	**Cable Type to be Used**
DG Set	DG Synchronisation Panel	FS only if cable laid above ground. Else FR to be laid in separate containment- viz hume
DG Synchronisation Panel	Change Over Panel	FS only if cable laid above ground. Else FR to be laid in separate containment- viz hume
LT Meter Panel	Change Over Panel	FR
Change Over Panel	Life Safety Panels	FS
Life Safety Panel	Fire Pumps	FS
Life Safety Panel	Fire Lifts	FS
Life Safety Panel	Staircase Pressurisation	FS
Life Safety Panel	Lift Well Pressurisation	FS
Life Safety panel	Lift Lobby Pressurisation	FS
Life Safety Panel	Car Park Ventilation Fans	FS
Life Safety Panel	Basement Exhaust Fans	FS
DB	Emergency Lights	FS
Life Safety Panel	Aviation Lights	FS
Panel	All other Points	FR
Fire alarm/Voice evacuation panels	Devices/panels exposed part	FS

4.23 Conduiting:

a. The conduits shall be embedded in slab as much as possible.
b. Type of conduits:
    i. PVC – HMS
        1. Embedded in slab or wall
        2. On surface, inside the false ceiling void
    ii. GI
        1. Exposed, in plantrooms (where embedded PVC conduiting is not done)
        2. Exposed, in basements, parkings (where embedded PVC conduiting is not done)
        3. Exposed in Risers, Shafts
c. Size of conduits shall be as per requirement and relevant codes with the minimum conduit size being 20mm in dia.
d. Pre-approval to be taken from HOC to allow the slab casting without embedded conduits.

5. Don'ts for Residential Electrical Network Design

5.1 No Electrical switch or socket shall be installed under the taps and horizontally a minimum distance of 1.5 meter shall be maintained.

5.2 If possible we should avoid the floor boxes.

5.3 Normal lights shall not be installed in the external areas. These lights shall be minimum IP65 Rated.

5.4 Normal Sockets shall not be installed in the external areas. These shall be minimum IP66 rated.

5.5 Normal wires shall not be used for the landscape lighting and wiring joining using tapes shall be avoided. We should use flexible (non armoured) cables for the distribution and all the joints shall be done inside water proof junction boxes. The cables shall be fixed with the PVC glands to these boxes.

5.6 1 Data point is to be provided inside each residential unit in Casa and aspirational segment. In hi-end and luxury residential, wi-fi will be done by purchasers themselves and no data point is to be provided by Lodha.In case of hi-end/luxury projects, once Fibre to Home (FTH) partner is selected, consultation should be done as to how IPTV will be enabled in the house and if that require data points, then data points should be provided (though cost should be borne by the FTH partner).

5.7 No exposed wires shall be made visible, to connect Ex. Fans / Water coolers etc and same to be done with flexible cables, which will be supplied by respective vendors.

5.8 Power for VDP units shall be in concealed back box behind the equipments. Provision of direct wire connection to VDP IDU to be facilitated without socket/plug and same should be informed to VDP vendor during bidding. In KCA's, same is also to be done for display units but with socket.

Comment [SB5]: R9

Annexure A

Connected Load Norms

High End/Luxury Development

FACILITY TABLE FOR 2 BHK FLAT (HIGH END + LUXURY BRAND)

S.No.	Name of location	Light Point			Fan Point		6A Power point			16A Power point							AC						
		Light Point	Strip Light	Wall Bracket light	Ceiling	Exhaust	General	Water Purify	Hob	Hood	Dish Washer	Fridge	Geyser*	Oven	MICROWAVE	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	10	60	60	60	200	100	100	500	1500	600	2000	2000	1000	1500	1500	0	0	0	0	0	0
1	Living room/Dinning	4	0	2	3	0	4	0	0	0	0	0	0	0	0	0	2	1	1	0	1	0	0
2	Deck	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Passage	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	Puja	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Kitchen	1	3	0	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0
6	Utility	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7	Store	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Bed Room 1	2	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
9	Common Toilet	1	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
10	Master Bed	3	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
11	Master Toilet	2	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	Total number of fixtures	19	3	8	6	3	17	1	1	1	1	1	3	1	1	1	4	3	3	1	1	1	2
	Connected Load(W)	1140	30	480	360	180	3400	100	100	500	1500	600	6000	2000	1000	1500	6000	0	0	0	0	0	0
	Total Connected Load (Watts)	24890.00																					
	Maximum Demand Load (Watts)	19912.00			(at 0.8 div) (DB level)																		
	Infrastructure Demand Load (Watts)	7964.80			(at 0.4 div)																		

* Geyser not required in kitchen if tapping is available from nearby toilet

FACILITY TABLE FOR 3 BHK FLAT (HIGH END + LUXURY BRAND)

S.No.	Name of location	Light Point			Fan Point		6A PP			16A PP								AC						
		Light Point	Strip Light	Wall Bracket light	Ceiling	Exhaust	General	Water Purify	Hob	Hood	Dish Washer	Fridge	Geyser*	Oven	MICROWAVE	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	10	60	60	60	200	100	100	500	1500	600	2000	2000	1000	1500	1500/t	0	0	0	0	0	0
1	Living room/Dinning	6	0	3	3	0	5	0	0	0	0	0	0	0	0	0	2	1	1	0	1	0	0
2	Deck 1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Deck 2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Passage	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
5	Puja	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Kitchen	2	3	0	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0
7	Utility	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
8	Store	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Bed Room 1	3	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
10	Common Toilet	1	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
11	Bed Room 2	2	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
12	Bed Room 2 Toilet	1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
13	Master Bed	3	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
14	Master Toilet	2	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
15	Walkin Wardrobe	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Powder Toilet	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
17	Servant Room	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Servant Toilet	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total number of fixtures	33	3	13	8	5	25	1	1	1	1	1	4	1	1	1	5	4	4	1	1	1	4
	Connected Load(W)	1980	30	780	480	300	5000	100	100	500	1500	600	8000	2000	1000	1500	7500	0	0	0	0	0	0
	Total Connected Load (Watts)	31370.00																					
	Maximum Demand Load (Watts)	25096.00			(at 0.8 div) (DB level)																		
	Infrastructure Demand Load (Watts)	10038.40			(at 0.4 div)																		

* Geyser not required in kitchen if tapping is available from nearby toilet

FACILITY TABLE FOR 4 BHK FLAT (HIGH END + LUXURY BRAND)

S.No.	Name of location	Light Point			Fan Point		6A PP			16A PP								AC						
		Light Point	Strip Light	Wall Bracket light	Ceiling	Exhaust	General	Water Purify	Hob	Hood	Dish Washer	Fridge	Geyser*	OVEN	MICROWAVE	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	20	60	60	60	200	100	100	500	1500	600	2000	2000	1000	1500	1500	0	0	0	0	0	0
1	Living room/Dinning	7	0	3	3	0	5	0	0	0	0	0	0	0	0	0	2	1	1	0	1	0	0
2	Deck 1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Deck 2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Deck 3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Passage	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6	Puja	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Kitchen	2	3	0	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0
8	Utility	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
9	Store	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Bed Room 1	4	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
11	Common Toilet	1	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
12	Bed Room 2	3	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
13	Bed Room 2 Toilet	1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
14	Bed Room 3	3	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
15	Bed Room 3 Toilet	1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
16	Master Bed	4	0	2	1	0	4	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
17	Master Toilet	2	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
18	Walkin Wardrobe	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Powder Toilet	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
20	Servant Room	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Servant Toilet	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total number of fixtures	42	3	16	9	6	30	1	1	1	1	1	5	1	1	1	6	5	5	1	1	1	5
	Connected Load(W)	2520	60	960	540	360	6000	100	100	500	1500	600	10000	2000	1000	1500	9000	0	0	0	0	0	0
	Total Connected Load (Watts)	36740.00																					
	Maximum Demand Load (Watts)	29392.00			(at 0.8 div) (DB level)																		
	Infrastructure Demand Load (Watts)	11756.80			(at 0.4 div)																		

* Geyser not required in kitchen if tapping is available from nearby toilet

Aspirational Development

FACILITY TABLE FOR 1.5BHK FLAT (ASPIRATIONAL)

S.No.	Name of location	Light Point	Light Point	Light Point	Light Point	6A Power	6A Power	6A Power	16A Power	16A Power	16A Power	16A Power	16A Power	AC						
		Light Point	Wall Bracket light	Ceiling	Exhaust	General	Hob	Water Purify	General	Fridge	Geyser	MICROWAVE/OVEN	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	60	60	60	100	100	100	500	600	2000	2000	1000	1500	0	0	0	0	0	0
1	Living room/Dinning	3	2	2	0	3	0	0	0	0	0	0	0	1	1	1	0	1	0	0
2	Passage	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3	Puja	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Study	1	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Kitchen	2	0	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0
6	Utility	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7	Common Toilet	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
8	Master Bed	2	2	1	0	4	0	0	0	0	0	0	0	1	1	1	0	0	0	0
9	Master Toilet	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total number of fixtures	14	7	5	3	12	1	1	0	1	2	1	1	2	2	2	0	1	1	2
	Connected Load(W)	840	420	300	180	1200	100	100	0	600	4000	2000	1000	3000	0	0	0	0	0	0
	Total Connected Load (Watts)	13740.00																		
	Maximum Demand Load (Watts)	10992.00	(at 0.8 div) (DB level)																	
	Infrastructure Demand Load (Watts)	4396.80	(at 0.4 div)																	

FACILITY TABLE FOR 2BHK FLAT (ASPIRATIONAL)

S.No	Name of location	Light Point	Light Point	Light Point	Light Point	6A Power	6A Power	6A Power	16A Power	16A Power	16A Power	16A Power	16A Power	AC						
		Light Point	Wall Bracket light	Ceiling	Exhaust	General	Hob	Water Purify	General	Fridge	Geyser	MICROWAVE/ OVEN	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	60	60	60	100	100	100	500	600	2000	2000	1000	1500	0	0	0	0	0	0
1	Living room/Dinning	3	2	2	0	3	0	0	0	0	0	0	0	1	1	1	0	1	0	0
2	Desk	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
3	Passage	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	Puja	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Bed room-1	2	1	1	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0
6	Kitchen	2	0	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0
7	Utility	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
8	Common Toilet	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
9	Master Bed	2	2	1	0	4	0	0	0	0	0	0	0	1	1	1	0	0	0	0
10	Master Toilet	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total number of fixtures	16	7	5	3	13	1	1	0	1	2	1	1	3	2	3	0	1	1	2
	Connected Load(W)	960	420	300	180	1300	100	100	0	600	4000	2000	1000	4500	0	0	0	0	0	0
	Total Connected Load (Watts)	15460.00																		
	Maximum Demand Load (Watts)	12368.00	(at 0.8 div) (DB level)																	
	Infrastructure Demand Load (Watts)	4947.20	(at 0.4 div)																	

FACILITY TABLE FOR 2.5BHK FLAT (ASPIRATIONAL)

S.No.	Name of location	Light Point	Light Point	Light Point	Light Point	6A Power	6A Power	6A Power	16A Power	16A Power	16A Power	16A Power	16A Power	AC						
		Light Point	Wall Bracket light	Ceiling	Exhaust	General	Hob	Water Purify	General	Fridge	Geyser	MICROWAVE/ OVEN	WASHING MACHINE	20A point A.C (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	60	60	60	100	100	100	500	600	2000	2000	1000	1500	0	0	0	0	0	0
1	Living room/Dinning	3	2	2	0	3	0	0	0	0	0	0	0	1	1	1	0	1	0	0
2	Desk	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Passage	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	Puja	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Study	1	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Bed room-1	2	1	1	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0
7	Bed room-1 Toilet	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
8	Kitchen	2	0	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0
9	Utility	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
10	Common Toilet	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
11	Master Bed	2	2	1	0	4	0	0	0	0	0	0	0	1	1	1	0	0	0	0
12	Master Toilet	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total number of fixtures	18	9	6	4	15	1	1	0	1	3	1	1	3	2	3	0	1	1	3
	Connected Load(W)	1080	540	360	240	1500	100	100	0	600	6000	2000	1000	4500	0	0	0	0	0	0
	Total Connected Load (Watts)	18020.00																		
	Maximum Demand Load (Watts)	14416.00	(at 0.8 div) (DB level)																	
	Infrastructure Demand Load (Watts)	5766.40	(at 0.4 div)																	

FACILITY TABLE FOR 3BHK FLAT (ASPIRATIONAL)

S.No.	Name of location	Light Point	Light Point	Light Point	Light Point	6A Power	6A Power	6A Power	16A Power	16A Power	16A Power	16A Power	16A Power	AC						
		Light Point	Wall Bracket light	Ceiling	Exhaust	General	Hob	Water Purify	General	Fridge	Geyser	MICROWAVE/ OVEN	WASHING MACHINE	20A point A.C (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	60	60	60	100	100	100	500	600	2000	2000	1000	1500	0	0	0	0	0	0
1	Living room/Dinning	3	2	2	0	4	0	0	0	0	0	0	0	1	1	1	0	1	0	0
2	Desk	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Passage	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	Puja	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Bed room-1	2	1	1	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0
6	Kitchen	2	0	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0
7	Utility	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
8	Common Toilet	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
9	Bed room-2	2	1	1	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0
10	Bed room-2 Toilet	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
11	Master Bed	2	2	1	0	4	0	0	0	0	0	0	0	1	1	1	0	0	0	0
12	Master Toilet	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total number of fixtures	19	9	6	4	17	1	1	0	1	3	1	1	4	2	4	0	1	1	3
	Connected Load(W)	1140	540	360	240	1700	100	100	0	600	6000	2000	1000	6000	0	0	0	0	0	0
	Total Connected Load (Watts)	19780.00																		
	Maximum Demand Load (Watts)	15824.00	(at 0.8 div) (DB level)																	
	Infrastructure Demand Load (Watts)	6329.60	(at 0.4 div)																	

Casa Development

FACILITY TABLE FOR 1BHK FLAT (CASA)

S.No	Name of location	Light Point		Fan Point		6A PP		16A PP										
		Light Point	Wall Bracket light	Ceiling	Exhaust	General	Water Purify	Fridge	Geyser	MICROWAVE/ OVEN	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	60	60	60	100	100	400	3000	2000	600	1500	0	0	0	0	0	0
1	Living room/Dinning	3	1	2	0	3	0	0	0	0	0	1	1	1	0	0	0	0
2	Passage	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3	Puja	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	Kitchen	1	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
5	Utility	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6	Common Toilet	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7	Master Bed	1	1	1	0	3	0	0	0	0	0	1	1	1	0	0	0	0
	Total number of fixtures	9	3	4	2	8	1	1	1	1	1	2	2	2	0	0	1	0
	Connected Load(W)	540	180	240	120	800	100	400	3000	2000	600	3000	0	0	0	0	0	0
	Total Connected Load (Watt)	10980																
	Maximum Demand Load (Watt)	8784 (at 0.8 div) (DB level)																
	Infrastructure Demand Load (Watt)	2196 (at 0.25 div)																

FACILITY TABLE FOR 1.5BHK FLAT (CASA)

S.No	Name of location	Light Point		Fan Point		6A PP		16A PP										
		Light Point	Wall Bracket light	Ceiling	Exhaust	General	Water Purify	Fridge	Geyser	MICROWAVE/ OVEN	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	60	60	60	100	100	400	3000	2000	600	1500	0	0	0	0	0	0
1	Living room/Dinning	3	1	2	0	3	0	0	0	0	0	1	1	1	0	0	0	0
2	Passage	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3	Puja	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	Study	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
5	Kitchen	1	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
6	Utility	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7	Common Toilet	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8	Master Bed	1	1	1	0	3	0	0	0	0	0	1	1	1	0	0	0	0
9	Master Toilet	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
10	Deck	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total number of fixtures	12	4	5	3	10	1	1	2	1	1	2	2	2	0	0	1	0
	Connected Load(W)	720	240	300	180	1000	100	400	6000	2000	600	3000	0	0	0	0	0	0
	Total Connected Load (Watt)	14540																
	Maximum Demand Load (Watt)	11632 (at 0.8 div) (DB level)																
	Infrastructure Demand Load (Watt)	2908 (at 0.25 div)																

FACILITY TABLE FOR 2BHK FLAT (CASA)

S.No	Name of location	Light Point		Fan Point		6A PP		16A PP										
		Light Point	Wall Bracket light	Ceiling	Exhaust	General	Water Purify	Fridge	Geyser	MICROWAVE/ OVEN	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	60	60	60	100	100	400	3000	2000	600	1500	0	0	0	0	0	0
1	Living room/Dinning	2	2	2	0	3	0	0	0	0	0	1	1	1	0	1	0	0
2	Deck	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Passage	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	Puja	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
5	Bed Room 1	1	1	1	0	2	0	0	0	0	0	1	0	0	0	0	0	0
6	Kitchen	2	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
7	Utility	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
8	Common Toilet	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
9	Master Bed	2	1	1	0	3	0	0	0	0	0	1	1	1	0	0	0	0
10	Master Toilet	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total number of fixtures	14	5	5	3	10	1	1	2	1	1	3	2	2	0	1	1	2
	Connected Load(W)	840	300	300	180	1000	100	400	6000	2000	600	4500	0	0	0	0	0	0
	Total Connected Load (Watt)	16220																
	Maximum Demand Load (Watt)	12976	(at 0.8 div) (DB level)															
	Infrastructure Demand Load (Watt)	3244	(at 0.25 div)															

Note: Motion Sensor point at Master Toilet is not required unless mentioned in the sales brochure.

Comment [SB6]: R9

FACILITY TABLE FOR 2.5BHK FLAT (CASA)

S.No	Name of location	Light Point		Fan Point		6A PP		16A PP										
		Light Point	Wall Bracket light	Ceiling	Exhaust	General	Water Purify	Fridge	Geyser	MICROWAVE/ OVEN	WASHING MACHINE	20A point A.C. (1500W/TR)	Tel	TV	Intercom	VDP	Bell	Motion Sensor
	Typical Wattage	60	60	60	60	100	100	400	3000	2000	600	1500	0	0	0	0	0	0
1	Living room/Dinning	2	2	2	0	3	0	0	0	0	0	1	1	1	0	1	0	0
2	Deck	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Passage	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	Puja	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
5	Study	1	0	1	0	2	0	0	0	0	0	0	1	1	0	0	0	0
6	Bed Room 1	2	1	1	0	3	0	0	0	0	0	1	0	0	0	0	0	0
7	Kitchen	2	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
8	Utility	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
9	Common Toilet	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
10	Master Bed	2	1	1	0	3	0	0	0	0	0	1	1	1	0	0	0	0
11	Master Toilet	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total number of fixtures	16	6	6	3	13	1	1	2	1	1	3	3	3	0	1	1	2
	Connected Load(W)	960	360	360	180	1300	100	400	6000	2000	600	4500	0	0	0	0	0	0
	Total Connected Load (Watt)	16760																
	Maximum Demand Load (Watt)	13408	(at 0.8 div) (DB level)															
	Infrastructure Demand Load (Watt)	3352	(at 0.25 div)															

Note: Motion Sensor point at Master Toilet is not required unless mentioned in the sales brochure.

Comment [SB7]: R9

Office & Retail:

Connected load can be calculated as follows:

Typology	Lighting Load (watts /sft of relevant BUA)	Raw power (Watts/sft of relevant BUA)	AC (Watts/sft of relevant BUA)	Connected Load (watts/sft of relevant BUA)
Offices				
Excelus	1	3.6	2.3*	6.9
iThink Offices	1	3.2	2.3*	6.5
Supremus Offices	1	3.2	9	13.2
Retails				
Shop Areas	6	2	2.3 *	10.3
Non-Shop Areas	4	1	2.3 *	7.3
Shop Areas with individual a/c units	6	2	9	17
Kitchen/ Restaurant:				
Restaurants (Food Court)	1.5	1.9	2.5*	5.9
Associated Kitchen(Food Court for kitchen area only)	1.0	28	3.0*	32
Commercial Kitchen	1.0	50.0	3.0*	54
Multiplex :				
Multiplex Office	1.0	1.0	2.3*	4.3
Multiplex area	1.5	6.0	3.0*	10.5
Common areas:				
Common Areas – Basement	0.2	0.5	1.5***	2.2
Common Areas – Entrance Lobby & Typ. corridor	1	1	2.3*	4.3

Centralized HVAC Load for building (for buildings with central HVAC) including common area**	NA	NA	5.3*	5.3
Centralized AC load for Restaurants and multiplex	Na	Na	10*	10

In addition to this, load of common areas is to be calculated separately (e.g. lifts, water pump, fire fighting equipment etc.).

Note :

*In HVAC, it is assumed that 30% of the load is towards low side and balance towards High Side. Low side load is assumed to be part of unit load, whereas high side load is assumed to be part of common area load.

*** Ventilation load

- The Office loads are calculated on the basis of occupancy of one person per 80 sq. ft. of unit BUA and in case, occupancy is higher/lower (see Occupancy Factor Norms), the Raw Power and HVAC loads need to be proportionately adjusted. It can be assumed that unit BUA = unit carpet x 1.15.
- For purposes of connected load calculation (residential, office and retail), all of the aforesaid calculations should be multiplied by 1.1 (1.15 for Luxury and Hi-end residential) to take into account use of higher consuming devices in the future.