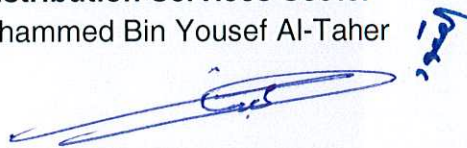# DPS-01

DISTRIBUTION PLANNING STANDARDS

ESTIMATION OF CUSTOMER LOAD GUIDELINE

(CONNECTED LOAD & DEMAND LOAD)

Approved by:

Executive Director
Distribution Services Sector
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DPS-01

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1.0 INTRODUCTION

This document is according to the guidelines of the Electricity & Cogeneration Regulatory Authority "ECRA") to calculate the customers minimum loads based on total covered area of the building. The review of the existing document was initiated in line with the Council of Ministers decree 324 dated 20/9/1431H approving the change of the distribution voltage for all customers to the international low voltage standard 400/230 volts. This document represents the new SEC Distribution Planning Standards (DPS) for Estimation of Customer Load. This guideline should be applied and followed in place of the existing SEC Standard in Arabic named (Customer Load Calculation, Rev.01, Dated: 23/8/1423H)

2.0 SCOPE

This document deals with the estimation of :
- Connected Load
- Demand Load
- Coincident Demand Load

for all categories of customers. It is applicable to all the existing and new customers to be supplied by SEC.

3.0 NEW FEATURES

The Major New Features in this guideline are :

1. New Classification of Customers' Facilities
2. New Tables for Connected Loads Estimation for Normal Residential Dwelling & Normal Commercial Shops due to New Voltage (230/400 V)
3. Connected Loads Estimation for buildings with Central AC
4. New Load Density Factor (VA/m^2) for all categories of customers.
5. New Form for Conventional Declared Load Method
6. Connected Loads Estimation for Areas Development Project
7. Connected Loads Estimation for Facility without AC (District Cooling)
8. Connected Loads Estimation for Facilities in Winter Peak Area
9. Step by Step Procedure for Coincident Demand Load Calculation
10. Special Case : Load Calculation for Hajj Area
11. Special Case : Load Calculation for Random Area
12. Special Case : Load Calculation for Commercial Center

4.0 DEFINITIONS

Customer :
It is any entity that purchases electrical power from a power utility. It is the owner of the building/facility supplied by SEC's power system. It is the owner of the supply request submitted to SEC to get electrical power.

Unit :
It is intended for the building's unit. Each unit should be used by one consumer. Each building can contain a single unit or multiple units. Each unit should be supplied by one KWH Meter according to SEC regulations.

Supply Request :
It is the request applied by the customer to get electric power supply from SEC's power system. It can contain a single building or multiple buildings and subsequently it can contain a single unit or multiple units and subsequently it can contain a single KWH Meter or multiple KWH Meters.

Connected Load (CL) :
It is the sum of all the nameplate ratings of all present and future electrical equipments & installations belongs to the customer's building/facility and could be used by the customer in future. It is to be estimated before applying any demand factor or diversity factor. It is expressed in Volt-Amperes (VA).

Demand Load (DL) :
It is the individual maximum demand load of a customer's building's unit usually occurring during the peak loading period (either estimated or measured). It must be calculated from the connected load of that customer's building's multiply by the approved demand factor of that customer's building's unit. It is expressed in Volt-Amperes (VA).

$$Demand\ Load\ =\ Connected\ Load\ \times\ Demand\ Factor$$

Demand Factor (DF):
It is the ratio of the Demand Load of a customer's building's unit to the Connected Load of that customer's building's unit.

$$Demand\ Factor\ =\ \frac{Demand\ Load}{Connected\ Load}$$

Total Demand Load (TDL):

It is the total (non-coincident) demand load of a customer's building with multiple units. It is the non-coincident summation of all individuals demand loads of all units belongs to that customer's building. It is expressed in Volt-Amperes (VA).

$$Total\ Demand\ Load\ =\ \Sigma\,(all\ individuals\ demand\ loads)$$

Coincident Demand Load (CDL):

It is the maximum (coincident) demand load of a customer's building with multiple units. It must be calculated from the Total Demand Load of that customer's building multiplying by the approved coincidence factor of that customer's building. It is expressed in Volt-Amperes (VA).

$$Coincident\ Demand\ Load\ =\ Total\ Demand\ Load\ \times\ Coincidence\ Factor$$

Coincidence Factor (CF) :

It is the ratio of the Coincident Demand Load of a customer's building with group of units (KWH Meters) to the Total Demand Load of that customer's building both taken at the same point of supply for the same time.

$$Coincidence\ Factor\ =\ \frac{Coincident\ Demand\ Load}{Total\ Demand\ Load}$$

Diversity Factor :

It is the inverse of the Coincidence Factor.

Contracted Load:

It is the capacity of power supply (in Volt-Amperes) equivalent to the circuit breaker rating (in Amperes) provided to the customer's KWH Meter. Supply connection fees and insurance charges are based on contracted load.

Individual Equipment Demand Factor (IEDF)

It is the demand factor used to calculate the demand of a specific piece of equipment. Value of IEDF generally varies between 0.1 and 1.0

5.0 DESCRIPTION OF CUSTOMERS' LOADS

5.1 RESISTIVE LOADS

With a resistive load the voltage and current peaks coincide and are therefore in phase and the power factor is unity.

a) Lighting Loads.
Lighting meant for illumination, bulbs, lamps, tube lights, fluorescent lights, halogen bulbs, spot lights, search lights, fence lights, outdoor lights, emergency lights.

b) Other Loads -Receptacles Loads.
Heating meant for accomplishing housekeeping tasks like water heaters, electric ovens, hot plates, microwaves are major domestic appliance.
TV, CD/DVD players, hi-fi system, video games, PC, LCD, printers, scanners, phones, clocks, routers, chargers and projectors are light electronic goods extensively used by customers.

5.2 INDUCTIVE LOADS

With an inductive load the current waveform is lagging behind the voltage waveform, therefore, the voltage and current peaks are not in phase. The amount of phase delay is given by the cosine of the angle (Cos), between the vectors representing voltage and current, and the power factor is less then unity.

a) Air Conditioner Loads (AC). (Window, Split Or Central Type)
A complete system of heating, ventilation and air conditioning is referred as "HVAC". Its purpose, in a building is to stabilize the air temperature and humidity within an area for comfort.

b) Other Motor Driven Loads
Refrigerators, freezers, dish washers, vacuum cleaners, laundry appliance fan, lifts, escalators, garage doors and water pumps.

6.0 CLASSIFICATION OF CUSTOMERS' FACILITIES

6.1 BASIC CONCEPTS

In this document Customers are classified according to the nature of use of their Facilities in reality and according to their connected and demand load estimation methodology. This shall not cause any conflict to any other customer classification used for financial and tariff purposes.

6.2 HOW TO DETERMINE CUSTOMERS' FACILITIES TYPE

Customers' Facilities type should be determined according to the nature of the use of their Facilities in reality and according to an approved license or official document from the authority related to the nature of their use. In case there is a difference between the reality and the license, Customers' Facilities type should be determined according to the nature of the use of their Facilities in reality.

6.3 TYPES OF CUSTOMERS' FACILITIES

Customers' Facilities are classified into the following Types :

C1 : Normal Residential Dwelling
Description: it is any facility used as Dwelling meant for private use.
Includes: houses, duplexes, apartments, villas, palaces, istrahat, labor housing, etc.

C2 : Normal Commercial Shops
Description: it is any facility designed for use as Commercial Shops.
Includes: Commercial Shops, Commercial Stores, Gold Shops, Pharmacies, Boutiques, etc.

C3 : Furnished Flats
Description: it is any facility designed for use as Furnished Flats.
Includes: Furnished Flats.

C4 : Hotels
Description: it is any facility designed for use as Hotels.
Includes: Hotels, Motels.

C5 : Malls
Description: it is any facility designed for use as Malls or shopping centers.
Includes: shopping centers, Malls, Supermarkets, Hypermarkets.

C6 : Restaurants
Description: it is any facility designed for use as Restaurants.
Includes: Restaurants, Coffee Shops, Cafeteria.

C7 : Offices
Description: it is any facility designed for use as work offices.
Includes: commercial offices, government offices, office complexes, offices, Banks

C8 : Schools
Description: it is any facility designed for use as Schools.
Includes: Schools, Nursery, Private Training Institute

C9 : Mosques
Description: it is any facility designed for use as Mosques.
Includes: Mosques

C10 : Mezzanine in Hotel
Description: it is any facility designed for use as Mezzanine Floor.
Includes: Mezzanine in Hotel

C11 : Common Area/Services in Buildings
Description: it is any facility designed for use as Common Area/Services in Buildings.
Includes: Roof, Corridors, Stairs, piazza

C12 : Public Services Facilities
Description: it is any facility designed for use as Public Services Facilities.
Includes: outdoor bath rooms, washing rooms

C13 : Indoor Parking
Description: it is any facility designed for use as Indoor Parking.
Includes: Indoor Parking

C14 : Outdoor Parking
Description: it is any facility designed for use as Outdoor Parking
Includes: Outdoor Parking

C15 : Streets Lighting
Description: it is any facility designed for use as Streets Lighting.
Includes: Streets Lights, Roads Lights

C16 : Parks & Gardens
Description: it is any facility designed for use as Parks & Gardens.
Includes: Parks & Gardens

C17 : Open Spaces
Description: it is any facility designed for use as Open Spaces.
Includes: Open Spaces

C18 : Hospitals\Medical Facilities
Description: it is any facility designed for use as Hospitals\Medical Facilities.
Includes: Hospitals, Medical Centers

C19 : Medical Clinics
Description: it is any facility designed for use as Medical Clinics.
Includes: Medical Clinics

C20 : Universities\High Educational Facilities
Description: it is any facility designed for use as Universities\High Educational Facilities.
Includes: Universities, Colleges, High Educational Institutes

C21 : Light Industries
Description: This includes all industries with load up to (4 MVA) inside designated Industrial Area or having industrial License.
Includes: Small Factories, Livestock, Poultry, Dairy Farms

C22 : Workshops
Description: it is any facility designed for use as Workshops.
Includes: Workshops

C23 : Cooling Stores
Description: it is any facility designed for use as Cooling Stores.
Includes: Cooling Stores

C24 : Warehouses
Description: it is any facility designed for use as Warehouses.
Includes: Warehouses

C25 : Community Halls
Description: it is any facility designed for use as Community Halls.
Includes: Community Halls, Wedding Party Halls, Auditorium

C26 : Recreational Facilities
Description: it is any facility designed for use as Recreational Facilities.
Includes: Clubs, Theaters, Cinemas, Gymnasium

C27 : Farms\Agricultural Facilities
Description: This includes farms used for producing agricultural products (Big one or small)
Includes: Farms, Green Houses, Production Farms

C28 : Fuel Stations
Description: it is any facility designed for use as Fuel Stations.
Includes: Petrol Pumps, Fuel Stations

C29 : Bulk Factories
Description: This includes all industries with load more than (4 MVA) inside designated Industrial Area or having industrial License.
Includes: Big Factories, manufacturing plants

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7.0 METHODOLOGIES

In order to determine the connected and demand load of a customer the following two methodologies are described in this document for the use of concerned departments of SEC as following :

1. Area Load Density Method
2. Declared Load Method

7.1 AREA LOAD DENSITY METHOD

This method is required to be implemented as per instructions of Ministry of Water and Electricity (formerly Ministry of Industry & Electricity "MI&E"), covered area of the customer premises is used as basic parameter for the assessment of the size of power supply to the customer.
Its application is limited to the Residential/ Commercial customers whose areas are defined the covered area tables. Such customers are normally expected to have uniform behavior in terms of electrical requirements.

7.2 CONVENTIONAL DECLARED LOAD METHOD

This method is used to estimate the load of those customers who have a variety of load requirements. It is essentially based on customer load declaration. Information regarding the ratings of equipments to be installed and their usage is mainly required. Customer shall provide load information/details.

Note:
Large residential/Commercial customers, where the covered area is beyond the limits given in the relevant tables OR all other type of customers who have a variety of load requirement irrespective of Floor Area or Lot Size, the power supply requirement of all such customers shall be estimated by using Declared Load Method.

8.0 CLASSIFICATION OF FACILITIES TYPES DUE TO METHODOLOGIES

According to the Connected Load Estimation Methodologies, the Facilities Types are classified into two groups as following :

1. Area-Based Facility Type
2. Non Area-Based Facility Type

8.1   AREA-BASED FACILITY TYPE

All Facilities Types which their Connected Load can be estimated according to Area Load Density Method. It includes the following Facilities Types as mentioned in Table (1) below :

Table (1)

Type due to Methodology	Code	Customer Category
Area-Based Facility Type **(Area Load Density Method)**	C1	Normal Residential Dwelling, Houses, Duplexes , Apartments , Villas, Palaces , Istrahat , Labor Housing, etc.
	C2	Normal Commercial Shops, Commercial Shops, Commercial Stores, Gold Shops, Pharmacies, Boutiques, etc.
	C3	Furnished Flats
	C4	Hotels, Motels
	C5	Malls, Shopping Centers, Supermarkets, Hypermarkets.
	C6	Restaurants, Coffee Shops, Cafeteria.
	C7	Offices, Commercial Offices, Government Offices, Office Complexes, Banks.
	C8	Schools, Nursery, Private Training Institute.
	C9	Mosques
	C10	Mezzanine in Buildings/ Facilities
	C11	Common Area/Services in Buildings, Roof, Corridors, Stairs, Piazza.
	C12	Public Services Facilities, Outdoor Bathrooms, Washing Rooms.
	C13	Indoor Parking
	C14	Outdoor Parking
	C15	Streets Lighting
	C16	Parks & Garden
	C17	Open Spaces

8.2   NON AREA-BASED FACILITY TYPE

All Facilities Types which their Connected Load cannot be estimated according to Area Load Density Method and should be estimated according to Declared Load Method. It includes the following Facilities Types as mentioned in Table (2) below :

Table (2)

Type due to Methodology	Code	Customer Category
Non Area-Based Facility Type **(Conventional Declared Load Method)**	C18	Hospitals/Medical Facilities
	C19	Medical Clinics
	C20	Universities/High Educational Facilities, Colleges, High Educational Institutes.
	C21	Light Industries, Small Factories, Livestock, Poultry, Dairy Farms.
	C22	Workshops
	C23	Cooling Stores
	C24	Warehouses
	C25	Community Halls, Wedding Party Halls , Auditorium.
	C26	Recreational Facilities, Clubs, Theaters, Cinemas, Gymnasium.
	C27	Farms/Agricultural Facilities, Green Houses, Production Farms
	C28	Fuel Stations, Petrol Pumps.
	C29	Bulk Factories, Big Factories, Manufacturing Plants.

9.0 HOW TO DETERMINE COVERED/BUILT-UP AREA

There are three types of Area used in Area Load Density Method as follows :

9.1 UNIT'S COVERED/BUILT-UP AREA

It is an individual built-up area for a customer's unit. It is calculated based on the drawings provided by the customer of its building or the project with approved municipal documents.

9.2 TOTAL COVERED/BUILT-UP AREA

It is the total built-up area for a plot land. It is the sum of covered or roofed areas excluding services areas which are open. Building's covered area shall be cross checked with approved municipal documents/permits to ascertain its correctness. Covered area is calculated based on the drawings provided by the customer of its building or the project.

Where total covered area is not mentioned in the building permits, it can be calculated by applying allowed percentage of construction of the buildings on the plot land multiplied by the allowed number of floors in the area, by using the following equation :

$$
\begin{aligned}
Total\ Covered\ &(Built-Up)Area \\
&= Plot\ Land\ Area \\
&\times Allowed\ Percentage\ of\ Construction\ on\ Plot\ Land \\
&\times Number\ of\ Floors
\end{aligned}
$$

9.3 PLOT LAND AREA

It is the total area for a land contains covered area's part and open area's part.

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10.0 CONNECTED LOADS ESTIMATION FOR NORMAL RESIDENTIAL DWELLING (Facility Category : C1)

Calculate the total connected load (KVA) according to the Unit covered/built-up area (square meter) from the Electricity & Cogeneration Regulatory Authority "ECRA") guidelines. Use the New Tables : Table (3) & Table (4).

Table (3)

Facility Category (C1) : Loads Of Residential Buildings -220 V Phase To Phase

Constructed Area of Building (m²)	Total Connected Load (KVA)	Circuit Breaker Rating (AMP)	Constructed Area of Building (m²)	Total Connected Load (KVA)	Circuit Breaker Rating (AMP)
25	4	30	801	114	300
50	8	30	825	116	300
75	12	30	850	120	300
76	13	40	875	123	300
100	16	40	900	126	300
110	17	40	925	130	300
111	18	50	950	133	300
125	20	50	975	136	300
150	24	50	976	137	400
151	25	70	1000	140	400
175	28	70	1025	143	400
200	32	70	1050	146	400
225	36	70	1075	150	400
226	37	100	1100	152	400
250	40	100	1125	156	400
275	43	100	1150	160	400
300	46	100	1175	163	400
301	47	125	1200	166	400
325	50	125	1201	167	500
350	53	125	1300	180	500
375	56	125	1400	193	500
376	57	150	1500	206	500
400	60	150	1600	220	500
425	63	150	1601	221	600
450	66	150	1700	233	600
460	68	150	1800	246	600
461	69	200	1900	260	600
475	70	200	2000	273	600
500	73	200	2001	274	800
525	76	200	2100	286	800
550	80	200	2200	300	800
575	83	200	2300	313	800
600	86	200	2400	326	800
625	90	200	2500	340	800
626	91	250	2600	354	800
650	93	250	2700	366	800
675	96	250	2701	367	1000
700	100	250	2800	380	1000
725	103	250	2900	394	1000
750	106	250	3000	406	1000
775	110	250	3200	433	1000
800	113	250	3400	459	1000

Table (4)

Facility Category (C1) : Loads Of Residential Buildings - 230/400 V

Constructed Area of Building (m²)	Total Connected Load (KVA)	Circuit Breaker Rating (AMP)	Constructed Area of Building (m²)	Total Connected Load (KVA)	Circuit Breaker Rating (AMP)
25	4	20	901	127	200
50	8		925	130	
75	12		950	133	
100	16		975	136	
101	17	30	1000	140	
125	20		1025	143	
150	24		1050	146	
151	25	40	1075	150	
175	28		1100	152	
200	32		1125	156	
201	33	50	1150	160	
225	36		1175	163	
250	40		1200	166	
251	41	70	1201	167	250
275	43		1300	180	
300	46		1400	193	
325	50		1500	206	
350	53		1501	207	300
375	56		1600	220	
376	57	100	1700	233	
400	60		1800	246	
425	63		1801	247	400
450	66		1900	260	
475	70		2000	273	
500	73		2100	286	
525	76		2200	300	
550	80		2300	313	
575	83		2400	326	
576	84	125	2401	327	500
600	86		2500	340	
625	90		2600	354	
650	93		2700	366	
675	96		2800	380	
700	100		2900	394	
725	103		3000	406	
726	104	150	3001	407	600
750	106		3200	433	
775	110		3400	459	
800	113		3500	470	
825	116		3600	486	
850	120		3601	487	800
875	123		3800	513	
900	126		4000	540	
			4200	567	
			4400	594	
			4600	621	
			4800	648	

11.0 CONNECTED LOADS ESTIMATION FOR NORMAL COMMERCIAL SHOPS (Facility Category : C2)

Calculate the total connected load (KVA) according to the Unit covered/built-up area (square meter) from Electricity & Cogeneration Regulatory Authority "ECRA") guidelines. Use the New Tables : Table (5) & Table (6).

<u>Table (5)</u>

Facility Category (C2) : Loads Of Commercial Buildings - <u>220 V Phase To Phase</u>

Constructed Area of Building (m²)	Total Connected Load (KVA)	Circuit Breaker Rating (AMP)	Constructed Area of Building (m²)	Total Connected Load (KVA)	Circuit Breaker Rating (AMP)
25	6		601	129	
50	10	30	625	134	
55	12		650	139	
56	13		675	144	400
75	16	50	700	150	
100	22		725	155	
101	23		750	160	
125	27	70	775	166	
150	32		776	167	
151	33		800	171	
175	38	100	850	182	
200	43		900	192	500
201	44		950	203	
225	48		1000	214	
250	54	150	1001	215	
275	59		1050	224	
300	64		1100	235	
301	65		1150	246	600
325	70		1200	256	
350	75	200	1250	267	
375	80		1251	268	
400	86		1300	278	
401	87		1400	299	
425	91		1500	320	800
450	96	250	1600	342	
475	102		1700	363	
500	107		1701	364	
501	108		1800	384	
525	112		2000	427	1000
550	118	300	2100	448	
575	123				
600	128				

Table (6)

Facility Category (C2) : Loads Of Commercial Buildings - 230/400 V

Constructed Area of Building (m²)	Total Connected Load (KVA)	Circuit Breaker Rating (AMP)	Constructed Area of Building (m²)	Total Connected Load (KVA)	Circuit Breaker Rating (AMP)
25	6		776	167	
50	10		800	171	
75	16	30	825	176	
100	22		850	182	250
110	24		875	187	
111	25		900	192	
125	27	50	925	198	
150	32		926	199	
175	38		950	203	
176	39		975	208	
200	43	70	1000	214	300
225	48		1025	219	
250	54		1050	224	
251	55		1075	230	
275	59		1125	240	
300	64	100	1126	241	
325	70		1200	256	
350	75		1300	278	400
375	80		1400	299	
376	81		1500	320	
400	86		1501	321	
425	91		1600	342	
450	96	150	1700	363	500
475	102		1800	384	
500	107		1850	395	
525	112		1851	396	
550	118		2000	427	600
551	119		2100	448	
575	123		2200	469	
600	128		2201	470	
625	134		2300	491	
650	139		2400	512	
675	144	200	2500	533	
700	150		2600	555	800
725	155		2700	576	
750	160		2800	597	
775	166		2900	619	
			3000	640	

12.0 INTERMEDIATE VALUES OF COVERED\BUILT-UP AREA FOR [NORMAL RESIDENTIAL DWELLING TYPE (C1) OR NORMAL COMMERCIAL SHOPS TYPE (C2)]

The values of intermediate areas shall be interpolated to the nearest value. If the exact covered area is found in the table all values pertaining to the customer power supply can be directly read from the table.

In the Tables : Table (3) & Table (4) & Table (5) & Table (6) ; of floor area with slabs providing border line values for each block. Any area in between the slabs shall be assessed in proportion to the nearest slab and the corresponding values determined accordingly.

$$CL = \left[\left(\frac{A - A_1}{A_2 - A_1} \right) \times (CL_2 - CL_1) \right] + CL_1$$

Where:
CL = Customer Connected Load for an intermediate area value
A = Covered area of the customer which is an intermediate value
A_1 = Covered area step in the table immediate lower than area A
A_2 = Covered area step in the table immediate higher than area A
CL_1 = Connected load for area A_1
CL_2 = Connected load for area A_2

The above formula can be used to calculate demand load also by replacing connected load figures with demand load.

Notes :
Adjacent steps from the table shall be taken for calculating intermediate values.

Borderline cases between floor area slabs involving decimals shall be rounded off to nearest integers. Accordingly "0.5 and above" shall be treated as '1' and included in the higher slab and decimal values < 0.5 shall be ignored.

The range of customer sizes in each slab has been given in terms of KVA in the tables.

13.0 CONNECTED LOADS ESTIMATION FOR COMBINED TYPE CUSTOMER [NORMAL RESIDENTIAL DWELLING (C1) & NORMAL COMMERCIAL SHOPS (C2)]

In case the customer building consists of both residential and commercial load e.g. shops on ground floors and residential apartments on above floors the connected load shall be assessed separately corresponding to the areas associated with each using the Tables : Table (3) & Table (4) & Table (5) & Table (6) .

The total connected load shall be the sum total of the two values.

- Determine floor area of the customer buildings separately for each category.
- Read out from the appropriate tables the connected and demand load in each category.
- Determine the total contracted load by simple addition of circuit breakers ratings in each category.
- Determine the total Coincident Demand Load as follows :

  Total Coincident Demand Load =

  = Single Largest Demand + $\dfrac{\text{Sum of Remaining Demands}}{\text{Diversity Factor (of Remaining Demands)}}$

14.0 CONNECTED LOADS ESTIMATION FOR [NORMAL RESIDENTIAL DWELLING (C1) & NORMAL COMMERCIAL SHOPS (C2)] WITH CENTRAL AC

Since AC load is already included in the values provided in the tables as customer minimum load, the same shall be subtracted from the connected load figure before adding central AC load at the following rate:

    Residential Customers = 100   VA/ sq. m
    Commercial Customers = 150   VA/ sq. m

If the customer declared load for central AC happens to be less than the unit AC load as computed above, central AC load shall be ignored.

- Determine covered area of the customer building.

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- Determine the total connected load from the appropriate tables.
- Determine the unit AC connected load as per procedure given above.
- Subtract the estimated unit AC load from the total connected load and add customer declared central AC load to obtain total connected load of the customer provided it is more than the estimated unit AC load, otherwise it shall be ignored.
- Calculate the customer demand load as follows :

    Demand Load = (Non-AC Connected Load **x** DF) + Central AC Load

- Read out all other parameters of power supply from the tables against the computed total connected load, as obtained by above calculations.
- If the demand load of the customer exceeds the circuit breaker rating provided for the slab, select the next higher size breaker which is adequate to provide for the demand load of the customer.

15.0 CONNECTED LOADS ESTIMATION FOR [NORMAL RESIDENTIAL DWELLING (C1) & NORMAL COMMERCIAL SHOPS (C2)] WITH BOTH WINDOW/SPLIT AC AND CENTRAL AC

- Determine the floor area of the customer building in each category.
- Proportionally, determine the connected and the Unit AC load for each category from the total load corresponding to the total area.
- Determine connected and demand load for the portion of the building equipped with central AC .
- Obtain total connected load of the customer as follows :

Total Connected Load = Connected Load for Central AC Area
                    + Connected Load for Unit AC Area

- Obtain total Demand Load of the customer as follows:

Total Demand Load = Demand Load for Central AC Area
                    + [Connected load for Unit AC Area x D.F]

- Read out all other parameters of Power supply from the tables against the computed total Connected load (as obtained by calculations)

- If the Total Demand Load (as calculated above) exceeds the circuit breaker rating provided for the slab, select the next higher size breaker which is adequate to meet the demand load of the customer.

16.0 CONNECTED LOADS ESTIMATION FOR BIG [NORMAL RESIDENTIAL DWELLING (C1) & NORMAL COMMERCIAL SHOPS (C2)] WITH BUILT-UP AREA EXCEEDS TABLES' LIMITS

For such customers (type C1 and type C2) an average load requirement VA/m² is considered as appropriate method for the load calculation as follows :

$$Total\ Connected\ Load\ (KVA)\\ = \frac{Built\ up\ Area\ (m2)\ \times\ Load\ Density\ (VA/m2)}{1000}$$

By using the following load density :

Residential Customers = 145   VA/ sq. m
Commercial Customers = 215   VA/ sq. m

17.0 CONNECTED LOADS ESTIMATION FOR [NORMAL RESIDENTIAL DWELLING (C1) & NORMAL COMMERCIAL SHOPS (C2)] WITH ABNORMAL FLOOR'S HEIGHT (MORE THAN 3.5 M)

Assessment of AC Load for Mezzanine cases or for buildings with ceilings higher than the standard height of **3.5** meters shall be as follows:

Additional volume (m³) = [Total Height (m) - Standard Height (3.5 m) X Covered Area (m^2)

Additional AC Load (VA) =(30 VA/m³) × Additional volume (m^3)

The calculated extra AC load by above formula shall be added as an additional load as follow :
Total Connected Load = Standard Connected Load from tables (3,4,5,6) + Additional AC Load

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18.0 CONNECTED LOADS ESTIMATION FOR AREA-BASED TYPES WITH ADDITIONAL SPECIAL LOADS

Connected loads according to Area Load Density Method are only covering normal loads , any additional loads should be considered & added as additional special loads.

Examples: Swimming pool loads, Additional elevator, Central AC.

19.0 CONNECTED LOADS ESTIMATION FOR THE OTHER REMAINING AREA-BASED CUSTOMERS FACILITIES TYPES (FROM TYPE C3 UP TO TYPE C17)

For all such customers (from type C3 up to type C17) an average load requirement VA/m² is considered as appropriate method for the load calculation. Use Table (7).

$$Total\ Connected\ Load\ (KVA) = \frac{Built\ up\ Area\ (m2)\ \times\ Load\ Density\ (VA/m2)}{1000}$$

Table (7)

Code	Customer Category	Loads included*	VA/m²
C3	Furnished Flats	(Lights + Air Conditioning + Power Sockets)	175
C4	Hotels	(Lights + Air Conditioning + Power Sockets)	240
C5	Malls	(Lights + Air Conditioning + Power Sockets)	255
C6	Restaurants	(Lights + Air Conditioning + Power Sockets)	235
C7	Offices	(Lights + Air Conditioning + Power Sockets)	220
C8	Schools	(Lights + Air Conditioning + Power Sockets)	180
C9	Mosques	(Lights + Air Conditioning + Power Sockets)	185
C10	Mezzanine in Hotel	(Lights + Air Conditioning + Power Sockets)	100
C11	Common Area/Services in Buildings	(Lights + Power Sockets)	60
C12	Public Services Facilities	(Lights + Power Sockets)	50
C13	Indoor Parking	(Lights + Vans + Gates + Safety Systems)	30
C14	Outdoor Parking	(Lights)	5
C15	Streets Lighting	(Lights)	5
C16	Parks & Garden	(Lights + Water Distributor)	4
C17	Open Spaces	(Lights)	3

Note : This is only covering normal loads , any additional loads will be considered & added as special loads.

20.0 (CONVENTIONAL DECLARED LOAD METHOD)
CONNECTED LOADS ESTIMATION FOR NON AREA-BASED CUSTOMERS FACILITY TYPES (FROM TYPE C18 UP TO TYPE C29)

For all such customers (from type C18 UP to type C29) Ask customer for declared list (use Conventional Declared Load method) and use individual equipment demand loads.

SEC – Load Declaration Form (SEC-LD)

Where the covered area is beyond table limits and for all types of customers who have a variety of load requirement irrespective of floor area or plot size cannot be assessed for their power supply requirement by the Table (7).

Use the load declaration form in Appendix (A2) which covers various industrial (motors) equipments, to assess the connected load of industrial, light industries (including hangers and warehouses) and agricultural customers as in the past.

These customers will be requested to fill this form at the time of filing request of supply application. This will be the basic information for the study of power supply requirement of the customer.

Ascertain the customer declared load is not less than the minimum load indicated in Table (8).

Review of the connected load of large customers SEC – Enquiry Form (SEC-EF)

Large customers whose load exceeds the standard level will continue to declare their load on the consolidated SEC Enquiry Form (SEC-EF) as per Appendix (A2). These customers will be requested to fill this form at the time of filing request of supply application. This will be the basic information for the study of power supply requirement of the customer.

21.0 CONNECTED LOADS ESTIMATION FOR AREAS DEVELOPMENT PROJECT OR COMBINED PLOT PLAN

For all such customers, an average load requirement VA/m² is considered as appropriate method for the load calculation. Use Table (8).

Table (8)

Code	Customer Category	Loads included*	VA/m²
C3	Furnished Flats	(Lights + Air Conditioning + Power Sockets)	175
C4	Hotels	(Lights + Air Conditioning + Power Sockets)	240
C5	Malls	(Lights + Air Conditioning + Power Sockets)	255
C6	Restaurants	(Lights + Air Conditioning + Power Sockets)	235
C7	Offices	(Lights + Air Conditioning + Power Sockets)	220
C8	Schools	(Lights + Air Conditioning + Power Sockets)	180
C9	Mosques	(Lights + Air Conditioning + Power Sockets)	185
C10	Mezzanine in Hotel	(Lights + Air Conditioning + Power Sockets)	100
C11	Common Area/Services in Buildings	(Lights + Power Sockets)	60
C12	Public Services Facilities	(Lights + Power Sockets)	50
C13	Indoor Parking	(Lights + Vans + Gates + Safety Systems)	30
C14	Outdoor Parking	(Lights)	5
C15	Streets Lighting	(Lights)	5
C16	Parks & Garden	(Lights + Water Distributor)	4
C17	Open Spaces	(Lights)	3
C18	Hospitals\Medical Facilities	(Lights + Air Conditioning + Power Sockets)	250
C19	Medical Clinics	(Lights + Air Conditioning + Power Sockets)	225
C20	Universities/High Educational Facilities	(Lights + Air Conditioning + Power Sockets)	245
C21	Light Industries	(Lights + Motors + Power Sockets + AC)	280
C22	Workshops	(Lights + Power Sockets)	80
C23	Cooling Stores	(Lights +Chillers + Power Sockets)	260
C24	Warehouses	(Lights + Vans + Power Sockets)	70
C25	Community Halls	(Lights + Air Conditioning + Power Sockets)	230
C26	Recreational Facilities	(Lights + Air Conditioning + Power Sockets)	200
C27	Farms\Agricultural Facilities	(Lights + Power Sockets)	130
C28	Fuel Stations	(Lights + Power Sockets)	90
C29	Bulk Factories	(Lights + Power Sockets)	295

Note : This is only covering normal loads , any additional loads will be considered & added as special loads.

22.0 CONNECTED LOADS ESTIMATION FOR FACILITY WITHOUT AC (DISTRICT COOLING)

For all such customers, an average load requirement VA/m² is considered as appropriate method for the load calculation. Use Table (9).

Table (9)

Code	Customer Category	Loads included*	VA/m²
C3	Furnished Flats	(Lights + Power Sockets)	80
C4	Hotels	(Lights + Power Sockets)	95
C5	Malls	(Lights + Power Sockets)	75
C6	Restaurants	(Lights + Power Sockets)	95
C7	Offices	(Lights + Power Sockets)	90
C8	Schools	(Lights + Power Sockets)	80
C9	Mosques	(Lights + Power Sockets)	65
C10	Mezzanine in Hotel	(Lights + Power Sockets)	40
C11	Common Area/Services in Buildings	(Lights + Power Sockets)	60
C12	Public Services Facilities	(Lights + Power Sockets)	50
C13	Indoor Parking	(Lights + Vans + Gates + Safety Systems)	30
C14	Outdoor Parking	(Lights)	5
C15	Streets Lighting	(Lights)	5
C16	Parks & Garden	(Lights + Water Distributor)	4
C17	Open Spaces	(Lights)	3
C18	Hospitals\Medical Facilities	(Lights + Power Sockets)	115
C19	Medical Clinics	(Lights + Power Sockets)	100
C20	Universities/High Educational Facilities	(Lights + Power Sockets)	125
C21	Light Industries	(Lights + Motors + Power Sockets)	240
C22	Workshops	(Lights + Power Sockets)	80
C23	Cooling Stores	(Lights + Power Sockets)	25
C24	Warehouses	(Lights + Vans + Power Sockets)	70
C25	Community Halls	(Lights + Power Sockets)	115
C26	Recreational Facilities	(Lights + Power Sockets)	90
C27	Farms\Agricultural Facilities	(Lights + Power Sockets)	115
C28	Fuel Stations	(Lights + Power Sockets)	70
C29	Bulk Factories	(Lights + Motors + Power Sockets)	250

Note : This is only covering normal loads , any additional loads will be considered & added as special loads.

23.0 CONNECTED LOADS ESTIMATION FOR FACILITIES IN WINTER PEAK AREA (WITHOUT AC & WITH HEATING)

For all customers, belonging to areas where Air Conditioners are not used and instead heating appliances are used due to specific climatic conditions. Specifically for these customers an average load requirement VA/m² is considered the appropriate method for the load calculation as given in Table (10).

Table (10)

Code	Customer Category	Loads included*	VA/m²
C3	Furnished Flats	(Lights + Air Heating + Power Sockets)	145
C4	Hotels	(Lights + Air Heating + Power Sockets)	195
C5	Malls	(Lights + Air Heating + Power Sockets)	200
C6	Restaurants	(Lights + Air Heating + Power Sockets)	195
C7	Offices	(Lights + Air Heating + Power Sockets)	180
C8	Schools	(Lights + Air Heating + Power Sockets)	150
C9	Mosques	(Lights + Air Heating + Power Sockets)	150
C10	Mezzanine in Hotel	(Lights + Air Heating + Power Sockets)	80
C11	Common Area/Services in Buildings	(Lights + Power Sockets)	60
C12	Public Services Facilities	(Lights + Power Sockets)	50
C13	Indoor Parking	(Lights + Vans + Gates + Safety Systems)	30
C14	Outdoor Parking	(Lights)	5
C15	Streets Lighting	(Lights)	5
C16	Parks & Garden	(Lights + Water Distributor)	4
C17	Open Spaces	(Lights)	3
C18	Hospitals\Medical Facilities	(Lights + Air Heating + Power Sockets)	210
C19	Medical Clinics	(Lights + Air Heating + Power Sockets)	190
C20	Universities/High Educational Facilities	(Lights + Air Heating + Power Sockets)	210
C21	Light Industries	(Lights + Motors + Power Sockets + Heating)	265
C22	Workshops	(Lights + Power Sockets)	80
C23	Cooling Stores	(Lights +Chillers + Power Sockets)	260
C24	Warehouses	(Lights + Vans + Power Sockets)	70
C25	Community Halls	(Lights + Air Heating + Power Sockets)	195
C26	Recreational Facilities	(Lights + Air Heating + Power Sockets)	165
C27	Farms\Agricultural Facilities	(Lights + Power Sockets)	125
C28	Fuel Stations	(Lights + Power Sockets)	85
C29	Bulk Factories	(Lights + Motors + Power Sockets + Heating)	280

Note : This is only covering normal loads , any additional loads will be considered & added as special loads.

24.0 SPECIALS PROCEDURES FOR FACILITY WITHOUT AC (DISTRICT COOLING)

a) When a customer facility with a District Cooling system (Load without AC) apply to get power from SEC network , SEC should ask this customer to make an agreement with Cooling System Provider.

b) The customer should submit a copy from the signed agreement between customer and Cooling System Provider to SEC.

c) The customer should make the Cooling System Provider to coordinate with SEC to study the demand required for the Cooling System Provider.

d) After finalizing the study regards supplying of the Cooling System Provider , the SEC can accept to study the load of the customer without AC by using Table (9).

25.0 CIRCUIT BREAKER AND METER SIZES

Circuit breaker and meter sizes are standardized by SEC. The customers are charged based on circuit breaker size in KVA instead of the declared/minimum connected load.

26.0 SERVICE METER FOR NORMAL RESIDENTIAL DWELLING & NORMAL COMMERCIAL SHOPS TYPES

A 30 Amps circuit breaker is normally considered to be adequate for general services. If it does not meet customer requirement due to big associated facilities/equipments Declared Load method shall be used to assess the connected and demand load for service meter.

27.0 DEMAND FACTORS FOR ALL FACILITIES TYPES

Table (11)

Code	Customer Category	DF
C1	Normal Residential Dwelling	0.60
C2	Normal Commercial Shops	0.70
C3	Furnished Flats	0.70
C4	Hotels	0.75
C5	Malls	0.70
C6	Restaurants	0.70
C7	Offices	0.70
C8	Schools	0.80
C9	Mosques	0.90
C10	Mezzanine in Hotel	0.75
C11	Common Area/Services in Buildings	0.80
C12	Public Services Facilities	0.75
C13	Indoor Parking	0.80
C14	Outdoor Parking	0.90
C15	Streets Lighting	0.90
C16	Parks & Garden	0.80
C17	Open Spaces	0.90
C18	Hospitals\Medical Facilities	0.80
C19	Medical Clinics	0.70
C20	Universities/High Educational Facilities	0.80
C21	Light Industries	0.90
C22	Workshops	0.90
C23	Cooling Stores	0.90
C24	Warehouses	0.70
C25	Community Halls	0.80
C26	Recreational Facilities	0.80
C27	Farms/ Agricultural Facilities	0.90
C28	Fuel Stations	0.70
C29	Bulk Factories	0.90

28.0   COINCIDENT FACTORS

Table (12)

Number of Meters N	Coincident Factor CF(N)	Number of Meters N	Coincident Factor CF(N)	Number of Meters N	Coincident Factor CF(N)
1	1.000	34	0.581	67	0.568
2	0.723	35	0.581	68	0.568
3	0.688	36	0.580	69	0.568
4	0.668	37	0.579	70	0.568
5	0.654	38	0.579	71	0.567
6	0.644	39	0.578	72	0.567
7	0.636	40	0.578	73	0.567
8	0.629	41	0.577	74	0.567
9	0.624	42	0.577	75	0.566
10	0.619	43	0.576	76	0.566
11	0.616	44	0.576	77	0.566
12	0.612	45	0.575	78	0.566
13	0.609	46	0.575	79	0.566
14	0.607	47	0.575	80	0.566
15	0.604	48	0.574	81	0.565
16	0.602	49	0.574	82	0.565
17	0.600	50	0.573	83	0.565
18	0.598	51	0.573	84	0.565
19	0.597	52	0.573	85	0.565
20	0.595	53	0.572	86	0.564
21	0.594	54	0.572	87	0.564
22	0.592	55	0.572	88	0.564
23	0.591	56	0.571	89	0.564
24	0.590	57	0.571	90	0.564
25	0.589	58	0.571	91	0.564
26	0.588	59	0.570	92	0.564
27	0.587	60	0.570	93	0.563
28	0.586	61	0.570	94	0.563
29	0.585	62	0.570	95	0.563
30	0.584	63	0.569	96	0.563
31	0.583	64	0.569	97	0.563
32	0.583	65	0.569	98	0.563
33	0.582	66	0.568	99	0.563

29.0   STEP BY STEP PROCEDURE FOR COINCIDENT DEMAND LOAD CALCULATION

29.1   For Customers' Buildings with LV Meters (from 20 A up to 800 A).

1. Number of Individual units in customer's building should be determined according to SEC Customer Services Manual with its latest up. If Number of Individual units is not available from municipality , Minimum possible number of Individual units per floor should be used.
2. Connected Load (CL) in (KVA) for each Individual unit in customer's building should be estimated, unit by unit, referring to this Guideline. Load Estimation should be according to unit wise (for each unit individually unit by unit).
3. For C1 and C2 Customer Type, Individual Circuit Breaker Rating (CBR) in (Amp) for the Individual KWH Meter for each Individual unit in customer's building should be determined according to the estimated connected load (CL) of that Individual unit and referring to Tables (3, 4, 5, 6).
4. For Customer Types (from C3 up to C29), Individual Circuit Breaker Rating (CBR) in (Amp) for the Individual KWH Meter for each Individual unit should be determined to be the nearest up SEC standard Circuit Breaker Rating according to estimated connected load (CL) of that Individual unit.
5. Number of Individual KWH Meters (N) required for the customer's building should be determined according to number of Individual units in customer's building and referring to SEC Customer Services Manual with its latest updates.
6. Calculate the Coincident Demand Load (CDL) in (Amp) for the group of all KWH Meters of the customer's building as follows :

$$CDL = \left(\sum_{i=1}^{N} CBR_i \times DF_i \right) \times CF(N)$$

Where :

N = Number of Individual KWH Meters required for the customer's building.

CBR_i = Circuit Breaker Rating in (Amp) for the Individual KWH Meter no. (i).

DF_i = Demand Factor for the Individual KWH Meter no. (i) which should be determined according to the utilization nature of the concerned Individual unit no. (i) in customer's building and referring to this Guideline.

$CF(N)$ = Coincident Factor for the group of all KWH Meters of the customer's building which should be determined according to Number of these

KWH Meters (N) and referring to this Guideline. Use the following equation to calculate the Coincident Factor $F(N)$:

$$CF(N) \ = \ \frac{\left(0.67 + \dfrac{0.33}{\sqrt{N}}\right)}{1.25}$$

$$For \ N = 1 \ \Rightarrow \ CF(N) = 1$$

$$Diversity \ Factor \ (N) = \frac{1}{CF(N)}$$

Note :

For a group of (N) KWH Meters in the customer's building where all of them have same Circuit Breaker Rating (CBR) in (Amp) and same Demand Factor (DF), the equation to calculate the Coincident Demand Load (CDL) in (Amp) for this group of KWH Meters could be simplified as follows :

$$CDL \ = N \times CBR \times DF \times CF(N)$$

Note :

For a group of (N) KWH Meters in the customer's building where any one of them has different Circuit Breaker Rating (CBR) in (Amp), the equation to calculate the Coincident Demand Load (CDL) in (Amp) for this group of KWH Meters will be as follows :

$$CDL = \left[CBR_{\substack{Largest \\ Meter}} \times DF_{\substack{Largest \\ Meter}} \right] + \left[\left(\sum_{i=1}^{N-1} CBR_i \times DF_i \right) \times CF(N-1) \right]$$

29.2 For Customers' Buildings designed to be supplied by Private Substation or by MV RMU

1. Connected Load (CL) in (KVA) for each Individual unit in customer's building should be estimated, unit by unit, referring to this Guideline. Load Estimation should be according to unit wise (for each unit individually unit by unit).
2. Calculate the Coincident Demand Load (CDL) in (KVA) for the group of all Units of the customer's building as follows :

$$CDL = \left(\sum_{i=1}^{N} CL_i \times DF_i \right) \times CF(N)$$

Where :

N = Number of Individual Units required for the customer's building.

CL_i = Connected Load in (KVA) for the Individual Unit no. (i).

DF_i = Demand Factor for the Individual Unit no. (i) which should be determined according to the utilization nature of the concerned Individual unit no. (i) in customer's building and referring to this Guideline.

$CF(N)$ = Coincident Factor for the group of all Units of the customer's building which should be determined according to Number of these Units (N) and referring to this Guideline. Use the following equation to calculate the Coincident Factor $F(N)$:

$$CF(N) \ = \ \frac{\left(0.67 + \dfrac{0.33}{\sqrt{N}} \right)}{1.25}$$

$$For \ N = 1 \ \Rightarrow \ CF(N) = 1$$

$$Diversity \ Factor \ (N) = \frac{1}{CF(N)}$$

Note :

For a group of (N) KWH Meters in the customer's building where all of them have same Circuit Breaker Rating (CBR) in (Amp) and same Demand Factor (DF), the equation to calculate the Coincident Demand Load (CDL) in (Amp) for this group of KWH Meters could be simplified as follows :

$$CDL \ = N \times CL \times DF \times CF(N)$$

Note :

For a group of (N) KWH Meters in the customer's building where any one of them has different Circuit Breaker Rating (CBR) in (Amp), the equation to calculate the Coincident Demand Load (CDL) in (Amp) for this group of KWH Meters will be as follows :

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$$CDL = \left[CL_{\substack{Largest \\ Unit}} \times DF_{\substack{Largest \\ Unit}} \right] + \left[\left(\sum_{i=1}^{N-1} CL_i \times DF_i \right) \times CF(N-1) \right]$$

3. According to the calculated Coincident Demand Load (CDL) of the unit, the Circuit Breaker Rating (CBR) in (Amp) for the KWH Meter for the unit should be determined to be the nearest up SEC standard Circuit Breaker Rating (Private Substation's Circuit Breaker or MV RMU's Circuit Breaker) to that (CDL).

29.3 For Development Project Or Plot Plan

1. For Customers' Buildings with LV Meters (from 20 A up to 800 A), calculate their Coincident Demand Load (CDL) on their Public Substation as follows :

$$CDL_{on\,Substation} = \left(\sum_{i=1}^{N} CBR_i \times DF_i \right) \times CF(N)$$

Where :
N = Number of all KWH Meters supplied by that Substation.

2. For Customers' Buildings designed to be supplied by Private Substation or by MV RMU, calculate their (CDL) according to steps described in (clause 29.2).

3. Calculate the Total Coincident Demand Load (CDL) for the (Development Project / Plot Plan) as follows :

$$CDL_{Total} = \left(\sum_{i=1}^{N} CDL_i \right) \times CF_{For\,Substations} \times CF_{For\,MV\,Feeders}$$

Where :
N = Number of all (Public Substations + Private Substations + MV RMUs) which designed to supply all Lots/Buildings within the (Development Project / Plot Plan).
CDL_i = Coincident Demand Load in (KVA) for the Individual element (Public Substations + Private Substations + MV RMUs) no. (i).
$CF_{For\,Substations}$ = Coincident Factor between (Public Substations + Private Substations + MV RMUs) = 0.9
$CF_{For\,MV\,Feeders}$ = Coincident Factor between (MV Feeders) = 0.9

Or **(Only in case of Master Plan Stage without detailed Networks design)** :

N = Number of all Lots/Buildings within the (Development Project / Plot Plan).

CDL_i = Coincident Demand Load in (KVA) for the Individual Lot/Building no. (i).

Note :

Calculate the Coincident Demand Load (CDL) in (KVA) of the customer's building from the calculated Coincident Demand Load (CDL) in (Amp) as follows :

$$CDL_{in\ KVA} = \frac{CDL_{in\ AMP} \times V_{LL} \times \sqrt{3}}{1000}$$

Where :

V_{LL} = Nominal Voltage (line to line) of the LV Network (in volts).

This equation can be simplified as follows :

$$CDL_{in\ KVA} = \frac{CDL_{in\ AMP}}{F_{Conversion}}$$

Where :

$F_{Conversion}$ = Conversion Factor to convert (CDL) from (Amp) to (KVA). Its values for different nominal voltages are shown in the following Table (13) below.

Table (13)

Conversion Factor $F_{Conversion}$	Standard Nominal Voltages (V)		
	400	**380**	**220**
	1.443	1.519	2.624

30.0 SPECIAL CASE : COINCIDENT DEMAND LOAD CALCULATION FOR HAJJ AREA

Hajj Load is intended any building used for pilgrims lodging. The Hajj Area is the area which has permits from municipality to build buildings using for pilgrims lodging. For these areas with this type, the Calculation of Coincident Demand Load should be based on the following special considerations :
1. The Demand Factor (DF) is 0.9.
2. The Coincident Factor (CF) is 1.0.

31.0 SPECIAL CASE : COINCIDENT DEMAND LOAD CALCULATION FOR RANDOM AREA

The Random Area is the area which is considered as un-planned area according to the municipality and which has many buildings without construction permits from the municipality. Usually in this area type, the un-permitted buildings get the supply illegally from the permitted buildings. For these areas with this type, the Calculation of Coincident Demand Load should be based on the following special considerations :
1. The Demand Factor (DF) is 1.0.
2. The Coincident Factor (CF) is 0.8.

32.0 SPECIAL CASE : COINCIDENT DEMAND LOAD CALCULATION FOR COMMERCIAL CENTER

The Commercial Center or any group of commercial shops which apply common working time so that all its shops are to be opened and closed at the same time , for this type of commercial shops , the Calculation of Coincident Demand Load should be based on the following special considerations :
1. The Demand Factor (DF) is 0.7.
2. The Coincident Factor (CF) is 1.0.

33.0 SPECIAL CASE : COINCIDENT DEMAND LOAD CALCULATION FOR COMMERCIAL OFFICES BUILDINGS

The Commercial Offices Building which apply common working time so that all its Offices are to be opened and closed at the same time , for this type of commercial Offices, the Calculation of Coincident Demand Load should be based on the following special considerations :

1. The Coincident Factor (CF) is 1.0.
2. The Demand Factor (DF) is 0.7

34.0 SPECIAL CASE : COINCIDENT DEMAND LOAD CALCULATION FOR COMPLEX OF WORKSHOPS

The Complex Of Workshops which apply common working time so that all its Workshops are to be opened and closed at the same time , for this type of Workshops, the Calculation of Coincident Demand Load should be based on the following special considerations :

1. The Coincident Factor (CF) is 1.0.
2. The Demand Factor (DF) is 0.9.

35.0 GENERAL PRINCIPLES

- If any type of customer provide his study in Area-based method. Review it by using (VA/m2 All Categories Min. Loads : Area-based types & Non Area-based type - one value) and should be not less than it

- If any type of customer provide his study in declared List (conventional method). Review it by using (declared list form) and should be not less than the estimation using (VA/m2 All Categories Min. Loads : Area-based types & Non Area-based type - one value).

- In all Cases when the loads estimation done by company Customer shall confirm that satisfy his requirements and no more loads required (should be documented).

- In all Cases loads estimation provided by customer can be more than loads estimation using (VA/m2 All Categories Min. Loads : Area-based types & Non Area-based type - one value) and in this case customer should provide technical justifications for that.

- In all Cases loads estimation provided by customer is not accepted to be less than loads estimation using (VA/m2 All Categories Min. Loads : Area-based types & Non Area-based type - one value).

APPENDIXES

A1.   INDIVIDUAL EQUIPMENT DEMAND FACTORS (IEDF)

A2.   LOAD DECLARATION BY CUSTOMERS , SEC- ENQUIRY FORM (SEC-EF)

APPENDIX (A1)
INDIVIDUAL EQUIPMENT DEMAND FACTORS (IEDF)

S/N	Type of Load	Demand Factors Used by SEC			
		Residential	**Commercial**	**Industrial**	**Agr. Farms**
1	Central A/Cs	0.9	0.9	0.9	0.9
2	Window Type A/Cs	0.6	0.6	0.7	0.7
3	Lighting (Interior / Exterior)	1.0	1.0	1.0	1.0
4	Refrigeration / Cooling	0.6	0.6	0.6	0.6
5	Fans / Blowers	0.2	0.2	0.2	0.2
6	Equipment Used in Kitchens	0.2	0.2	0.2	-
7	Water Heaters	0.2	0.2	0.2	-
8	Laundry Equipment	0.2	0.2	0.2	-
9	Appliances Used for Recreation	0.2	0.2	-	-
10	Appliances Used for Services	0.2	0.2	0.2	-
11	Equipment Used in Office / Labs	-	0.2	0.2	-
12	Welding Equipment	-	0.15	0.20	-
13	Electric Motors Used for Crafts, Workshops & Service Centers	-	0.25	0.25	-
14	Electric Motors Used for Batch Work, Fluctuating of Multiple Production	-	-	0.4	0.4
15	Electric Motors Used for Continuous Process and Mass Production	-	-	0.6	-
16	Process Heating Using Ovens	-	-	0.35	-
17	Process Heating Using Furances	-	-	0.7	-
18	Miscellaneous (not covered above)	0.1	0.1	0.1	0.1

NOTE: Demand factors are based on the following:
- IEEE STD 241-1974
- Electric Utility Engineering Reference Book by Westinghouse.

APPENDIX (A2)

<u>LOAD DECLARATION BY CUSTOMERS</u>

SEC- Enquiry Form [SEC-EF]

	CUSTOMER'S NAME			
	CUSTOMER'S ADDRESS			
	CUSTOMER CLASS	Residential [ ]	Commercial [ ]	Industrial [ ]
	SUPPLY VOLTAGE	127/220 V [ ]	220/380 V [ ]	277/480 V [ ]
	TYPE OF A/Cs USED	Central [ ]	Window/Split [ ]	Mixed [ ]
ITEM #	**TYPE OF LOAD**	**TOTAL UNITS (No.)**	**RATING PER UNIT (WATTS)**	**REMARKS**
1	**CENTRAL A/Cs**			
	- Unit # 1 (specify) ………..			
	- Unit # 2 (specify) ………..			
	- Unit # 3 (specify) ………..			
	- Unit # 4 (specify) ………..			
	- Unit # 5 (specify) ………..			
2	**WINDOW/SPLIT A/Cs**			
	- 1.0 Ton			
	- 1.25 Ton			
	- 1.5 Ton			
	- 2.0 Ton			
	- 3.0 Ton			
	- 4.0 Ton			
	- Others (specify)			
3	**LIGHTING LOADS**			
	- Ordinary Lamps			
	- Flourescent Lamps			
	- Spot Lights (Halogen)			
	- Chandeliers (specify)			
	- Security Lights (specify)			
	- Others (specify)			
4	**FAN LOADS**			
	- Fan (Ceiling/Floor)			
	- Exhaust Fans			
	- Blower Fans			
	- Others (specify)			
5	**REFRIGRATION LOADS**			
	- Refrigerators			
	- Deep Freezers			
	- Ice Making Machine			
	- Water Coolers			
	- Others (specify)			
	- Others (specify)			

ITEM #	TYPE OF LOAD	TOTAL UNITS (No.)	RATING PER UNIT (WATTS)	REMARKS
6	**KITCHEN LOADS**			
	- Electric Range			
	- Electric Ovens			
	- Dish Washers			
	- Toasters			
	- Mixers			
	- Water Heaters			
	- Others (specify)			
7	**BATHROOM LOADS**			
	- Water Heaters			
	- Others (specify)			
8	**LAUNDRY LOADS**			
	- Washing Machines			
	- Dryers for Clothes			
	- Others (specify)			
9	**RECREATIONAL LOADS**			
	- Televisions			
	- Audio/Vidio Systems			
	- Film Projectors			
	- Public Address System			
	- Exercise Equipment			
	- Others (specify)			
10	**SERVICES LOADS**			
	- Electric Irons			
	- Vacuum Cleaners			
	- Intercom Systems			
	- Water Pumps			
	- Lift/Elevators			
	- Others (specify)			
11	**SECURITY LOADS**			
	- Fire Alarm Systems			
	- Burgler Alarm Systems			
	- Emergency Fire Pumps			
	- Others (specify)			
12	**OFFICE EQUIPMENT**			
	- ElectricTypewriters			
	- Photocopying Machines			
	- Data Processing Equipment			
	- Others (specify)			
	- Others (specify)			

ITEM #	TYPE OF LOAD	TOTAL UNITS (No.)	RATING PER UNIT (WATTS)	REMARK
13	**LAB EQUIPMENT**			
	- Air Compressors			
	- Vacuum Pumps			
	- Centrifuge Pumps			
	- Hot Plates			
	- Sterilizers			
	- X-Ray Machines			
	- Sonographic Machines			
	- Others (specify)			
14	**WELDING EQUIPMENT**			
	- Butt Welding Equipment			
	- Arc Welding Equipment			
	- High Frequency Welding			
	- Others (specify)			
15	**ELECTRIC MOTORS (*) USED FOR CRAFTS WORK SHOPS & SERVICE CENTERS**			
	- Lathe Machines			
	- Drilling Machines			
	- Presses			
	- Saw Mashines			
	- Millers			
	- Shapers			
	- Others (specify)			
16	**ELECTRIC MOTORS (*) USED FOR BATCH WORK EDUCDATING, OR MULTIPLE PRODUCTION**			
	- Specify……………………..			
	- Specify……………………..			
17	**ELECTRIC MOTORS (*) USED FOR CONTINEOUS PROCESS & MASS PRODUCTION**			
	- Specify……………………..			
	- Specify……………………..			
18	**PROCESS HEATING USING ELECTRIC OVENS**			
	- Specify……………………..			
	- Specify……………………..			
19	**PROCESS HEATING USING ELECTRIC FURNACES**			
	- Specify……………………..			
	- Specify……………………..			
20	**MISCL. LOADS (Not covered in Items # 1-19 above)**			
	- Specify……………………..			
	- Specify……………………..			