



POWER SUPPLY GUIDELINES FOR MAJOR PROJECTS

**Power & Water Planning Division
Power Transmission Planning Department**

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Contents

1.	Introduction	1
2.	Requirements	
2.1	Technical Requirement	2
2.1.1	Location and layout of the project.....	2
2.1.2	Nature of the project	2
2.1.3	TCL of the project	2
2.1.4	Power Factor	3
2.1.5	Load Characteristics	3
2.1.6	Supply Voltage	3
2.1.7	Substation plot sizes	4
2.1.8	Location of substation plot	4
2.1.9	Site plan for 132kV substation	5
2.1.10	Corridors	5
2.1.11	Policy on construction of 400kV and 132kV substations	6
2.1.12	Requirement for 22-11kV Network/Design approval	6
2.2	General Requirements	8
3.	Annexures	
3.1	List of documents to be submitted	10
3.2	Distribution network design requirements and guidelines for 11/0.4kV supply	11
3.3	Main developer's load confirmation format, NOC approval	14



1 Introduction

To ensure the availability of power, it is essential that the load projections, the time of power requirements and other factors from all the potential developers are available with DEWA well in advance.

The purpose of this document is as follows:

- ❖ To provide guidelines to all the major developers and the consultants in regard to the DEWA's power supply requirements.
- ❖ To assist the developers and the consultants in understanding the requirements for submissions of project / development Master Plan documents and to facilitate the project / development power supply on time.



2 Requirements

In order to avail the power supply for any project / development on time, it is necessary to submit and get approved the technical pre-requisites on time as DEWA require lead-time as indicated in Item No. 2.1.11.

2.1 Technical Requirements

The technical requirements that are necessary to be submitted to DEWA for planning any 400/132kV and 132/22-11kV substations, designing the 22-11kV Distribution Network and allocating necessary 22-11kV cables from the 132/22-11kV substations are listed below:

2.1.1 Location and layout of the development project

- Location and project layout shall be shown on Dubai Map.

2.1.2 Nature of the project

- Residential, Industrial, Commercial, etc to be mentioned.

2.1.3 Total Connected Load of the project & Expected Maximum Demand

- Total connected load and expected peak demand.
- Realistic power requirement date / phasing.
- Split up details of the load like, Residential, Commercial, Industrial, Cooling, etc.
- Plot-wise details like type of development, total connected load, maximum demand and phasing for each plot reflecting respective zones of 132/22-11kV substations.



- In case ultimate load details are not available, the load requirement up to next 5 years should be submitted.
- Details of the District Cooling load (size, location and the expected phasing of its commissioning).

2.1.4 Power Factor

- Power Factor is to be maintained at not less than 0.95 and any capacitor bank installation required at customer end shall be by the customer at his own cost.

2.1.5 Load Characteristics (quality of voltage, harmonics, flickering, dents, etc.)

- Load at the consumer end should follow generally the European Standard EN 50160.
- Voltage drop calculation, harmonic study, fault level calculation, etc., to be submitted by the consumer for any dirty load/ private switchgear.
- Installation of special equipment and devices if required to maintain the same as per the standards shall be by the consumer at his own cost.

2.1.6 Supply Voltage

- Dedicated / shared 132/22-11kV substation is required for meeting the power supply requirement of any Major Development. Large loads might require 400/132kV source at a voltage level of 400kV. The project should allocate plots for the required number of substations and associated corridors for necessary overhead lines/cable circuits.



- 11kV shall be the general distribution voltage and additionally 22kV can be considered on selected cases for which prior approval is necessary.

2.1.7 Substation Plot Sizes

- 400/132kV substation - 200 x 200m.
- 132/22-11kV substation - 80 x 60m (single storey), 49 x 54m (double storey).
- 22-11/0.4kV substation - Refer to Distribution Substation Guideline (*Annexure-2*).

2.1.8 Location of Substation Plot

- **400/132kV Substation location**
 - The 400/132kV substation plot should have access to heavy vehicles.
 - Enough space/corridors for taking 400kV overhead lines IN/OUT.
 - Enough space/corridors for taking 132kV cables IN/OUT.
- **132/22-11kV Substation location**
 - The 132/22-11kV substation plot shall have access from two major roads or one major road and Sikka.
 - Enough space/corridors for taking 132kV cables IN/OUT.
 - Enough space/corridor for taking out 60 numbers of 11kV outgoing cables or 30 numbers of 22kV cables with proper duct arrangement with maximum 150mm space between the cables.



- Location of 132/22-11kV substations should be provided at the load centre and close to district cooling plants if available.
- When a project requires more than one 132/22-11kV substation, the feeding zone of each substation shall be specified.

2.1.9 Site Plan for 132/22-11kV Substation

- Approved site plan /affection plan (*in the ownership of DEWA*) of the substation plot is required from the concerned authority. The developer shall confirm, whether the building permit for the substation building will be issued by Dubai Municipality or some other authority.

2.1.10 Corridors

- **400 kV overhead lines**
 - 80m wide corridor (double circuit tower line).
- **132 kV overhead lines**
 - 32m wide corridor (double circuit tower line).
- **132 kV underground cables**
 - 2.5m for each circuit.
- **22-11 kV under ground cable**
 - Exclusive 22-11kV corridor of 2.5m width to be provided on both sides of the road around the 132/11kV substations.
 - Cross-section to be provided for each road section, dedicated 22-11kV corridors should be available on both sides of road.



- Duct arrangement for each road crossing is to be provided.
- In case of 132/11kV substation away from the road Right-of-Way (ROW), the party shall provide sufficient corridor from the substation boundary to the road.

2.1.11 Policy on Construction of 400kV and 132kV substations.

- **400/132kV substation**
 - DEWA requires 48 months lead time to construct a 400/132kV substation.
- **132/22-11kV substation**
 - Any 132/22-11kV substation for development projects shall be constructed by the project developer matching their power requirement phasing of the project, through a DEWA approved consultant and contractor. However, DEWA requires minimum of 24 months lead time for arranging 132kV cables to any new 132kV substations after finalization of load requirements, substation locations, cable corridors and receiving the affection plan of the plot for the substation in the ownership of DEWA.

2.1.12 Requirement for 22-11kV Network/Design Approval

- Latest planning of the development (with both hard & soft copy).
- Approved 22-11kV Substation location (Refer to Annexure-2 : Distribution Substation Guideline for approval of 11kV and 22kV substations).



- Total connected load, maximum demand and capacity for individual 22-11kV substation.
- Realistic power requirement date.
- Zone-wise/phase-wise load details with respective 132/22-11kV substations to be provided if the number of 132/22-11kV substations is two or more.
- In case of number of 132/22-11kV substations are more, project loads should be allocated to respective 132/22-11kV substations for effective network design (Phase wise). Also the 132/22-11kV substations need to be planned for commissioning to match the power requirement date of projects.
- District cooling loads (if any) should be located adjacent to the related 132/22-11kV substation.
- No source metering is allowed (metering equipment to be arranged in the 22-11kV switchgear room).
- 22-11kV corridors details for all the roads within the project boundary.
- No 22-11kV corridors will be accepted under carriageway.
- Approved cross section of all the roads (with 22-11kV corridor indicated) to be submitted at the time of 22-11kV network design request.
- Generally, in case of private switchgear, approval for single line diagram should be obtained prior to purchase.
- All the distribution network requirements and guidelines for 11kV and 22kV supply mentioned in Annexure - 2 shall be strictly followed.



2.2 General Requirements

1. The developers or their consultants shall submit the documents as listed in Annexure – 1 for DEWA review to Power Transmission Planning Department:

Addressed to:

Dr. Awad Ibrahim
Vice President – Power Transmission Planning
Dubai Electricity and Water Authority
P O Box – 564, Dubai
Fax: 04 - 3249206

2. The listed documents shall be submitted in three sets of hard copies and 1 set of soft copy.
3. The details as mentioned above shall be submitted well in advance to DEWA and got approved to avoid any delay in starting the project.
4. Once approved, DEWA expects that the developer will adhere to the plan and any minor changes in the project plan, changes in phasing, etc. shall be informed to DEWA in time and got approved. Changes on works during the execution stage shall not be entertained.
5. Any power supply requirement for the project shall be from the 132/22-11kV substation built for the project. The developer shall phase the developments and accordingly the power requirements matching the commissioning schedule of the 132/22-11kV substation built for the project.
6. During the progress of the Project, bi-annual updated information shall be submitted by the party which shall include:
 - i. Energized load details till date.



- ii. 22-11kV substation approvals under process (not energized).
 - iii. HV Building NOC load applied (not yet submitted for 22-11kV substations approval) less than or more than 5MW.
 - iv. The developer shall issue confirmation on the individual party's loads (who had applied for HV Building NOC) as a part of their Master Plan in terms of magnitude and time. Load under design/approval but not approved for HV building NOC including the load of project shall be as per the agreement already signed between party and developer.
 - v. The update information shall be submitted by the party in area maps indicating plot numbers, power requirement dates and comparison with the original information received as per the approved Master Plan of the project / development.
7. DEWA will not be responsible for any delay in commissioning due to any change/ revision of loads, which might result in re-design of 22-11kV cable circuits.
 8. For processing the HV NOC applications for any plots within major project, the developer shall confirm the load figures indicated in NOC application are same as that in the approved project Master Plan (Refer Annexure-3, for sample format).



3 Annexures

3.1 Annexure – 1

List of documents to be submitted

Sr. No.	Documents	Remarks
1	Key Plan showing the location and layout of the project in Dubai Map	
2	Power requirements in terms of Total connected load and expected Peak Demand.	
3	Phasing	
4	Nature of Load	
5	Details of District Cooling Loads (location / capacity, power requirement date etc)	
6	Plot-wise loads and power requirement date	Excel sheet and marked in drawing
7	Locations of proposed 132/22-11kV substation(s)	
8	Locations of proposed 400/132kV substation(s)	
9	400kV corridors details within the project area	
10	132kV corridors details with detailed road cross-sections	
11	22-11kV corridors details with detailed road cross-sections	
12	22-11kV ducts arrangements	

The above documents shall be submitted in form of 3 sets of Hard Copies + 1 Digital Copy



3.2 Annexure – 2

Distribution Network Design requirements and Guidelines for 11kV and 22kV Supply

In line with the DEWA's power distribution network design, the following guidelines shall be followed strictly:

1. Ring Supply consisting of two feeders (two-feed ring) is mainly granted for power supply as normal feeding arrangement. Three feed ring arrangement may be adopted for cases where all the MV switchgears/RMUs are installed in one location to ensure the specific supply reliability.
2. For reliable power supply, N-1 offline criterion is considered. Hence, in case of power failure in one of the feeders, the other feeder should be capable to meet the whole demand until the repair work is completed (*6 hrs maximum duration*).
3. DEWA standard 11kV cable size is 3/C 300sq.mm copper XLPE, 3/C 240sq.mm copper XLPE, and 3/C 240sq.mm Aluminum XLPE.
4. DEWA standard 22kV cable size is 3/C 300sq.mm Aluminum XLPE.
5. The maximum sustained load of 11kV feeder is 175A/3MW (for 300sq.mm copper XLPE cables – summer rating)
6. The maximum sustained load of 11kV feeder is 160A/2.7MW (for 240sq.mm copper XLPE cables – summer rating)
7. The maximum sustained load of 22kV feeder is 165A/5.6MW (for 300sq.mm Aluminum XLPE cables – summer rating)
8. For bulk loads such as furnace, district cooling or any other load type requiring direct HV supply (private equipment), space for metering units at party's premises/substation to be considered. Necessary documents, drawings, single line diagram shall be submitted for DEWA's comments and approvals at design stage.



9. Single unit load demand shall not exceed the maximum sustained current of DEWA's 22-11kV cable feeder, which is maximum 175A/3MW for 11kV feeder and 165A/5.6MW for 22kV feeder.
10. Parallel operation of DEWA MV feeders is not allowed at any circumstances, and accordingly proper interlocking (Electrical & Mechanical) shall be provided where required.
11. Standby generators are not allowed to operate in parallel with DEWA network. Therefore, proper interlocking shall be provided where required.
12. Voltage drop shall not exceed 5% during normal operation at medium voltage level. For HV motors operating at 3.3 kV, 6.6 kV, 11 kV & 22kV voltage level, voltage dip calculations during the motor starting must be prepared by the consumer along with motor specifications, starting characteristics, number of motor starts per day, drawings, single line diagram etc for DEWA's comments and approval at the design stage.
13. For loads that may inject harmonics to DEWA's network, harmonic study shall be prepared by the party and approved by DEWA at the design stage, whereas, the total Harmonic Distortion (THD) shall be within permissible limits as per IEE-519 standard.

- 5% Total harmonics distortion (THD%), for voltage and individual harmonic distortion to be less than 3%
- For current distortion, refer to table below :

I_{SC}/I_L	Individual Harmonic Order					THD (%)
	<11	11-17	17-23	23-35	>35	
<20	4.0	2.0	1.5	0.6	0.3	5.0
20-50	7.0	3.5	2.5	1.0	0.5	8.0
50-100	10.0	4.5	4.0	1.5	0.7	12.0
100-1000	12.0	5.5	5.0	2.0	1.0	15.0

I_{SC} : Maximum short circuit at point of common coupling.

I_L : Maximum demand load current (fundamental frequency component) at point of common coupling.



14. Real harmonic measurements shall be conducted after commissioning of project and report of measurements shall be submitted to DEWA.
15. Maximum allowable number of cables per trench for 11kV cables are 20 arranged in maximum two layers (2.5 to 3 meter trench width on both sides of the road, close to 132/11kV substations and 2.0/1.5 meters elsewhere depending on load distribution).
16. Maximum allowable number of cables per trench for 22kV cables are 10 arranged in maximum one layer (2.5 to 3 meter trench width on both sides of the road, close to 132/22kV substations and 2.0 meters elsewhere).
17. Minimum clearance of 2 meters shall be maintained between any 22-11kV cable trench and the surrounding heat sources such as 132kV cable trench.
18. Horizontal spacing between 22-11kV cables are 150mm (edge to edge) and vertical spacing between 11kV cables are 100mm (edge to edge).
19. Separate corridor should be allocated for 22-11kV cable laying within party's premises along the road to ensure avoiding crossing between 132kV, 22kV and 11kV cables.
20. Special backfilling to be used for 22kV and 11kV cables with soil resistivity below $1.6 \text{ }^{\circ}\text{C}\cdot\text{m}/\text{W}$.
21. Single Line Diagram illustrating the protection schemes along with relay setting calculation shall be submitted for DEWA's comments and approval at the design stage.



Power Supply Load Confirmation Form

Date		HV NOC Ref:	
Major Project Name			
Master Developer			
Contact Person		Telephone	
Plot Details			
Plot No		Old Plot No. (if any)	
Plot Developer		Plot Consultant	
Type of development :	<input type="checkbox"/> Industrial <input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/>		
Details of Development :			
Total Connected Load Requested	MW	Power Requirement date	

To be filled by Main Project Developer :

We hereby confirm that the above requested _____ MW for the Plot no. _____ by (power requirement date) _____ is complying with the data mentioned in the Latest Project Master Plan of _____ Project.

Notes :

Confirmed by (sign & stamp) :

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Signed by		Signed by	
Designation		Designation	
Company Name		Company Name	