Specifying and Designing the Power System

Load list/schedule

The fundamental document used as input to power system design is the load list or load schedule.

ELECTRICAL LOAD SCHEDULE

(Typical example for additional living quarters)

Description	Operating Voltage	Load rating	Absorbed load	Full Load Current	Cable Size	Load factor	Power factor at L.F.	Consumer load type							
								Continuous		Intermittent		Stand-by		Future	
	(V)	[kW]	[kW]	[A]	[mm2]	[%]		[kW]	[kVAr]	[kW]	[kVAr]	[kW]	[kVAr]	[kW]	[kVAr]
6.6kV/460V ALQ Switchboard Transformer	0	0.00	0.00	0.00	3c x 95	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RO Potable Water Maker	440	20.00	20.00	30.87	3c x 6	100%	0.85	20.00	12.39	0.00	0.00	0.00	0.00	0.00	0.00
Calorifier	440	130.00	130.00	170.00	3c x 95	100%	1.00	130.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UV Sterlizier	440	6.00	6.00	9.26	4c x 6	100%	0.85	6.00	3.72	0.00	0.00	0.00	0.00	0.00	0.00
440V ALQ Lighting & Small Power Distribution Board	440	35.42	35.42	46.53	4c x 25	100%	1.00	35.42	1.70	0.00	0.00	0.00	0.00	0.00	0.00
400V ALQ Lighting & Small Power Distribution Board	440	15.74	15.74	24.29	4c x 25	100%	0.85	15.74	9.75	0.00	0.00	0.00	0.00	0.00	0.00
Spare	254			0.00		0%		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AHU Electrical Heater (Via Thyristor Control Panel)	440	60.00	60.00	78.73	3c x 35	100%	1.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AHU Humidifier	440	60.00	60.00	87.00	4c x 35	100%	0.85	60.00	37.18	0.00	0.00	0.00	0.00	0.00	0.00
AHU Supply Fan A Motor	440	11.00	11.00	19.30	3c x 6	100%	0.82	12.09	8.44	0.00	0.00	0.00	0.00	0.00	0.00
AHU Supply Fan B Motor	440	11.00	11.00	19.30	3c x 6	100%	0.82	0.00	0.00	0.00	0.00	12.09	8.44	0.00	0.00
Main Extract Fan A Motor	440	3.00	3.00	5.50	3c x 6	100%	0.81	3.42	2.48	0.00	0.00	0.00	0.00	0.00	0.00
Main Extract Fan B Motor	440	3.00	3.00	5.50	3c x 6	100%	0.81	0.00	0.00	0.00	0.00	3.41	2.47	0.00	0.00
AHU Axial Fan A Motor	440	1.10	1.10	2.10	3c x 6	100%	0.79	1.29	1.00	0.00	0.00	0.00	0.00	0.00	0.00
AHU Axial Fan B Motor	440	1.10	1.10	2.10	3c x 6	100%	0.79	0.00	0.00	0.00	0.00	1.29	1.00	0.00	0.00
AHU Compressor A	440	5.16	5.16	11.60	3c x 6	100%	0.85	5.16	3.20	0.00	0.00	0.00	0.00	0.00	0.00
AHU Compressor B	440	5.16	5.16	11.60	3c x 6	100%	0.85	0.00	0.00	0.00	0.00	5.16	3.20	0.00	0.00
			Assumed Maximum Demand				totals:	349.1	79.9	0.0	0.0	22.0	15.1	0.0	0.0
Peak of normal running plant load =			384.03		kW		kVA	358.1		0.0		26.6		0.00	
X1*Cont. load + Y1*Interm. Load			87.85		kVAr		cos phi	0.97		0.00		0.82		0.00	
X1 = 100% Y1 = 50%			393.95		kVA										
Assumed Maximum Demand =			cos phi		0.97										
110% of Peak normal load			34.46 (FLC)		A										

Figure 24.3 Example load list.

The load list identifies all the electrical power loads on the facility and sub-divides them in to the following types:

- Normal: Required for normal running of the production facility.
- Critical: Failure of these supplies will cause temporary or permanent production stoppage.
- Essential: Essential to allow evacuation of the facility.

Note: the exact definition of the terms may vary in specifics by jurisdiction, but all will be similar in meaning.

Load types

Electrical loads are defined as follows:

- Continuous: Demand at all times.
- Intermittent: Typically required 30 to 60% of the time.
- Standby: Typically required 0 to 20% of the time.

The electrical system will must be designed for both the normal consumed load and the peak load.

Power system study

Once the load list has been determined, a power system study can be carried out, consisting of a complex analysis and often carried out by an external specialist.

As offshore facilities generate at both high voltages (typically 13.8 kV) and high power (typically 100 MW) for the biggest installations, an incorrectly designed power system can cause imbalances and power surges that might damage equipment.

These studies model the entire system and will look at the various configurations and switching scenarios to remove the risk of potentially damaging surge and overload or imbalance situations.