



PROJECT INFORMATION

1.0	Owner	:	Karnataka Power Corporation Ltd Shakthi Bhavan No.82, Race Course Road Bangalore-560 001 Karnataka, India
2.0	Project Title		1x370 MW Yelahanka CCPP
3.0	Location	:	Doddaballapur Road, S N Halli post, Near Puttenehalli, Yelahanka, Bangalore.- 560064 Bangalore Dist Karnataka state,
4.0	Latitude and Longitude	:	13° 07' N Latitude India 77° 35' E Longitude
5.0	Elevation above mean sea level	:	900 meters
6.0	<u>Climatic Conditions</u>		
	(a) <u>Temperature</u>		
	i. <u>Monthly basis</u>		
	Mean of daily maximum temperature	:	37° C
	Mean of daily minimum temperature	:	11.5° C
	ii Highest temperature recorded	:	39°C
	iii Lowest temperature recorded	:	9.9°C
	(b) Relative Humidity	:	Varies between 60% and 90%
	(c) <u>Rainfall</u>		
	Annual average rain	:	970 mm
	(d) <u>Wind Speed</u>		
	i. Annual mean wind speed	:	2.82 m/s
	ii. Maximum mean wind speed	:	3.71 m/s in the month of June.
	iii Design Wind Speed	:	33 M/sec (As per IS: 875)
	Design Temperature	:	28°
7.0	Seismic data Zone	:	Seismic Zone II As per IS 1893
8.0	Distance from the nearest town / city / major human settlement	:	18 kms. from Bangalore, 25 kms from Bangalore International Airport
9.0	Distance from water source	:	Tertiary sewage treatment plant situated in Jakkur/Yelahanka which is 5-6 kms. from site.



PROJECT INFORMATION

- 10 Fuel for Combined Cycle Power plant Regassified Natural gas : Refer Table – 1
- 11 Raw water Analysis Bangalore Sewage Tertiary Treated : Refer Table – 2
- 12.0 Guarantee Conditions for Cooling Tower Performance:
- 12.1 Design Wet Bulb Temperature : 23°C
- 12.2 Maximum Wet Bulb Temperature : 26°C

While guarantee conditions indicates design WBT of 23°C for CT design, however, CT (no. of cells and duty) shall also be designed in such a way so as to take care of the max. WBT condition of 26 °C.

- 13.0 Design ambient for electrical equipment / System : 40° C
- 14.0 Out Door Design Conditions- Dry Bulb, Wet Bulb, RH for A/C & Ventilation System :
- 14.1 Summer : 35.6°C 25.6°C 45%
- 14.2 Monsoon : 27.8°C 25.6°C 82%
- 14.3 Winter : 14.4°C 12.2°C 78%
- 15.0 Design Wind speed : 33 m / sec (as per IS: 875)
- 16.0 Auxiliary Power Supply : Auxiliary equipment to be supplied against this specification shall be suitable for for operation on the following supply:
- 16.1 AC Motors rated 200 kW and above : 6.6 kV, 3 ϕ , 3 wire, AC Supply (Medium resistance earthed)
- 16.2 AC Motors below 200 kW and other LT loads : 415 V, 3 ϕ , 3 wire, AC Supply (Effectively earthed)
- 16.3 Plant lighting, utility power sockets, space heating of panels and space heating of motors > 30 kW : 240 V, 1 ϕ , AC Supply (Effectively earthed)
- 16.4 Control Circuit of local panels (like compressor control, crane control etc.) and 415 V switchgear outgoing feeder modules controls. : 110 V, 1 ϕ , AC Supply System (Derived from 415/110V step down transformer)





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- 16.5 Utility power sockets required for hand lamps for inspection of internals of condensers, boilers, etc. : 24 V, 1 ϕ , AC Supply
- 16.6 For control of switchgears, switchyard equipment, DC emergency drives, DC emergency lights, switchyard and generator protection panels, etc. : : 220V DC Supply
- 16.7 For Instrumentation & Control : : ± 24 V DC or 48V DC or 110 V AC supply
 (These voltage levels shall be derived from 230 V AC UPS supply)
- 17.0 Tropicalisation : : (a) All equipment supplied against this specification shall be given tropical and fungicidal treatment
 (b) Tropical protection shall conform to BS: CP-104:1963 entitled "Protection of Electrical Power Equipment against Climatic Condition".
- 18.0 Unless otherwise specified all electrical system shall be designed for the following voltage and frequency variations :
- 18.1 A C System: :
- a) Voltage variations : ± 10 %
- b) Frequency Variation : ± 5 %
- c) Combined Voltage & Frequency Variation : 10 %
- 18.2 DC System :
- a) Voltage variation (220V) : ± 10 %
- b) Voltage variation (24V or 48V) : To suit equipment of I&C system
- :
- 18.3 UPS : : ± 10 %

+10% to -15%

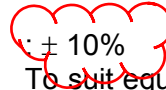




TABLE-1
NATURAL GAS ANALYSIS

Fuel	Volume%
Methane	93.2301
Ethane	4.35123
Propane	1.52104
i-Butane	0.27922
n-Butane	0.35011
i-Pentane	0.01553
n-Pentane	0.00828
n-Hexane	0.004067
Nitrogen	0.20734
Z-Compressibility factor	0.99714
GCV	9651.86 K.Cal/M³
NCV	8710.83 K.Cal/M³

**TABLE-2****TERTIARY TREATED WATER ANALYSIS**

SL. NO	PARAMETERS	UNIT	RESULT
1	Colour	Hazen Units	<5
2	Odour		Unobjectionable
3	Turbidity	NTU	<0.6
4	pH Value		7.1~7.3
5	BOD	ppm	1.2
6	COD	ppm	4.9
7	Total Suspended Solids	ppm	4.0
8	Total dissolved solids (Note 1)	ppm	774
9	Alkalinity	ppm	24.7
10	Chloride as Cl	ppm	41.45
11	Sulphate as SO ₄	ppm	129
12	Silica-Dissolved as SiO ₂	ppm	23.5
13	Silica-Colloidal as SiO ₂	ppm	3
14	Ca Hardness as CaCO ₃	ppm	140
15	Mg Hardness as CaCO ₃	ppm	94
16	Total Hardness as CaCO ₃	ppm	234
17	% sodium	ppm	12.14
18	Ammonical Nitrogen	ppm	6.57
19	Iron as Fe	ppm	0.31
20	Manganese as Mn	ppm	<0.05
21	Total Kjeldhal Nitrogen	ppm	3.4
22	Total Residual Chlorine	ppm	<0.5
23	Phosphate as PO ₄	ppm	1.3
24	Free Ammonia	ppm	<0.1
25	Total phosphorus	ppm	0.56
26	Oil and Grease	ppm	<1.0
27	Nitrate Nitrogen	ppm	1.3
28	Sulphide	ppm	<0.05
29	Fluoride as F	ppm	0.39
30	Copper as Cu	ppm	<0.05
31	Zinc as Zn	ppm	<0.05
32	Lead as Pb	ppm	<0.02
33	Total Chromium as Cr	ppm	<0.05



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SL. NO	PARAMETERS	UNIT	RESULT
34	Mercury as Hg	ppm	<0.001
35	Cyanide as CN	Ppm	<0.05
36	Phenolic components as C ₆ H ₅ OH	Ppm	<0.05
37	Nickel as Ni	ppm	<0.05
38	Arsenic as As	ppm	<0.001
39	Coliform Organisms/100 ml	ppm	15X10 ⁶
40	Faecal Coliform Organisms/100 ml	ppm	15X10 ⁶
41	MPN count/100	ppm	2
42	E-coil	ppm	Present
43	Temperature	Deg C	28

- Note**
1. The worst TDS Expected from Tertiary water is about 800 ppm.
 2. All effort should be made to remove the colour and unpleasant odour as far as practicable
 3. Any other feed parameter not listed above is assumed as "Nil".



METEOROLOGICAL DATA

STATION : BANGALORE CITY

Month	2003							2004						
	Temperature in deg.Celsius				Mean RH %			Temperature in deg.Celsius				Mean RH %		
	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.		
Jan	28.6	31.6	16.0	13.9	80	43	28.8	31.1	16.2	13.7	81	42		
Feb	31.7	33.2	18.9	16.9	75	35	31.1	34.1	16.9	15.1	64	31		
Mar	33.6	35.4	20.4	17.2	67	33	34.3	36.2	20.0	15.7	58	22		
Apr	34.2	36.0	22.3	19.9	74	41	34.2	37.0	22.4	18.7	72	39		
May	35.2	37.6	22.8	21.0	71	34	29.9	34.6	20.8	18.7	84	71		
Jun	31.6	38.1	21.1	19.5	84	62	29.0	31.2	20.0	19.2	86	65		
Jul	29.3	31.3	20.5	19.5	87	68	28.3	31.8	19.8	17.7	89	71		
Aug	28.6	31.6	20.3	19.0	88	68	28.1	30.7	19.7	18.9	86	69		
Sep	29.1	31.8	19.8	18.7	81	58	28.0	31.1	19.9	18.6	88	72		
Oct	28.7	30.6	19.9	17.3	85	72	28.0	31.4	19.4	17.7	86	71		
Nov	27.8	29.4	18.0	15.0	80	60	26.8	29.0	17.6	14.8	79	62		
Dec	27.8	31.1	16.0	13.0	76	48	28.1	29.9	15.4	13.0	76	46		

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 Central Observatory Complex,
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STATION : BANGALORE CITY

Month	2005							2006						
	Temperature in deg.Celsius				Mean RH %			Temperature in deg.Celsius				Mean RH %		
	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.		
Jan	29.3	31.8	16.8	13.9	79	42	28.5	32.5	16.0	13.4	72	42		
Feb	31.6	35.9	17.9	14.3	64	29	30.6	34.1	15.5	12.3	59	25		
Mar	33.6	36.4	20.5	17.2	68	27	32.0	34.4	19.9	17.9	69	37		
Apr	32.7	35.4	21.7	19.9	72	47	33.8	36.3	22.3	19.6	72	37		
May	33.9	37.4	21.7	18.5	78	47	32.4	37.0	21.4	19.4	76	55		
Jun	30.3	33.8	20.8	19.3	84	60	29.6	32.2	20.4	19.0	83	66		
Jul	28.5	30.4	20.2	18.3	89	70	28.5	30.9	20.1	18.5	84	63		
Aug	28.1	30.5	19.9	18.6	87	68	29.0	31.6	20.1	19.3	83	62		
Sep	28.2	31.5	19.9	18.8	87	66	29.9	32.4	20.5	19.5	91	61		
Oct	27.4	30.5	19.7	16.6	91	78	29.5	31.4	20.0	18.8	81	63		
Nov	26.2	29.9	17.3	13.5	82	67	27.7	30.6	19.0	16.6	83	68		
Dec	26.8	29.4	16.6	13.6	80	61	27.1	28.2	15.8	14.2	83	56		

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19.71 37.4 19.42 18.5 29.88 37 19.25 12.3

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STATION : BANGALORE CITY

Month	2007							2008						
	Temperature in deg.Celsius				Mean RH %			Temperature in deg.Celsius				Mean RH %		
	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.		
Jan	28.9	32.1	15.8	14.2	79	40	29.2	31.2	16.1	13.6	77	38		
Feb	30.9	33.8	17.3	13.7	73	38	29.9	33.1	18.6	16.0	75	41		
Mar	33.9	35.9	20.8	18.6	65	25	30.3	32.6	19.1	14.4	69	44		
Apr	34.1	36.4	21.7	18.2	71	34	33.0	36.9	21.5	18.9	71	37		
May	33.4	35.8	22.0	20.0	76	52	34.1	36.0	21.6	20.3	76	46		
Jun	29.9	34.4	20.9	19.7	81	61	29.5	32.0	20.4	18.7	83	59		
Jul	28.8	30.2	20.4	18.8	86	68	28.7	32.4	20.1	18.6	87	67		
Aug	27.9	31.7	20.1	19.1	88	71	27.7	29.9	20.2	19.2	89	72		
Sep	28.0	31.3	20.0	18.8	88	69	28.5	31.6	19.8	18.4	85	60		
Oct	28.5	32.3	19.7	16.7	82	64	28.1	31.4	19.4	14.7	85	70		
Nov	27.9	30.1	17.4	12.7	71	56	27.6	30.0	17.9	15.0	78	58		
Dec	26.3	29.6	16.5	11.8	81	57	27.3	28.7	16.4	13.9	80	49		

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 29.19 36.7 19.25 13.6
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STATION : BANGALORE CITY

Month	2009										2010					
	Temperature in deg.Celsius					Mean RH %					Temperature in deg.Celsius					
	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean RH %	0830 hrs.	1730 hrs.	
Jan	28.1	31.9	15.3	12.1	78	38	28.1	29.5	17.1	14.1	82	41	82	41		
Feb	31.8	35.2	17.7	15.3	63	26	31.8	34.4	18.2	14.3	72	29	72	29		
Mar	33.1	35.5	20.4	17.3	66	28	34.5	35.7	21.3	18.5	68	27	68	27		
Apr	34.5	37.0	22.2	20.0	70	30	34.5	37.6	22.7	20.3	71	43	71	43		
May	32.8	36.9	21.6	19.2	79	53	33.0	36.2	22.3	19.3	78	52	78	52		
Jun	29.7	31.8	20.4	18.4	84	61	29.9	34.0	21.2	19.5	86	66	86	66		
Jul	27.9	30.0	20.1	19.4	86	66	27.5	30.2	20.3	19.1	89	72	89	72		
Aug	28.6	31.1	20.3	19.3	87	65	27.4	29.8	20.5	18.8	88	69	88	69		
Sep	28.1	31.3	20.2	18.2*	88	73	27.8	31.8	20.2	18.7	89	67	89	67		
Oct	28.8	31.0	19.4	17.9	77	53	28.5	30.4	20.4	18.4	87	69	87	69		
Nov	27.4	29.9	19.3	15.5	84	67	26.4	29.2	19.3	17.5	88	74	88	74		
Dec	27.0	29.3	17.7	15.0	84	62	26.4	29.9	16.9	12.9	85	56	85	56		

Handwritten notes: 29.65 34.4 26.03 18.9, 29.82 31 19.55 12.1

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STATION : BANGALORE CITY

Month	2011						2012					
	Temperature in deg.Celsius			Mean RH %			Temperature in deg.Celsius			Mean RH %		
	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830hrs.	1730hrs.	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830hrs.	1730hrs.
Jan	28.9	31.3	15.7	12.6	71	34	28.9	30.6	16.2	12.0	78	38
Feb	30.1	32.2	16.9	14.0	64	29	31.4	35.4	17.2	14.0	69	25
Mar	33.1	34.8	19.4	15.2	61	22	34.4	35.6	20.6	17.7	66	23
Apr	33.1	34.6	21.6	19.1	78	44	34.9	37.5	22.6	20.7	72	34
May	32.4	34.8	21.3	19.3	80	55	33.0	35.2	22.1	19.5	79	47
Jun	29.0	30.9	20.4	19.2	88	69	30.9	34.1	21.0	20.0	77	51
Jul	28.1	30.4	20.1	18.9	88	68	28.8	32.2	20.4	19.2	84	59
Aug	27.5	30.2	20.1	19.2	89	73	28.5	32.4	20.2	19.5	86	66
Sep	28.3	30.8	20.1	18.2	86	62	29.2	32.5	20.3	19.2	82	56
Oct	29.3	31.0	20.3	18.2	87	71	28.5	32.3	19.6	18.0	81	61
Nov	27.3	29.5	17.9	15.0	78	61	28.1	30.8	17.6	13.3	75	52
Dec	27.4	29.8	16.3	12.8	77	47	28.0	30.7	16.9	14.4	81	48

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