

# SPECIFICATION FOR BTG EPC CONTRACT

## VOLUME II – GENERAL & SCHEDULES

### CHAPTER 1

#### PROJECT SYNOPSIS

#### 1.0 GENERAL BACKGROUND AND SALIENT FEATURES

##### 1.1 Introduction

Tamilnadu Generation and Distribution Corporation owns the proposed green-field 1600 MW (2 units of 800 MW each) Coal Based Thermal Power Station. The Project Site is located in Uppur, Valamavoor and Thiruppalaikudi villages of Thiruvadana Taluk, Ramanathapuram District.

##### 1.2 Location

The proposed site for main power plant is located at Uppur in Ramnathpuram District of Tamil Nadu.

The nearest Railway station is Thiruppalaikudi Railway Station, 3Kms from site

ECR Connecting Ramanathapuram and Pattukottai is the nearest road access.

The nearest airport is at Madurai at a distance of 140 km.

The nearest port is Tuticorin located at a distance of 130 km.

##### 1.3 Type of Plant

The proposed 2 x 800 MW Super-Critical Power Project consists of coal fired steam generator connected to a reheat type steam turbine generator along with all the required auxiliaries. Circulating cooling water system is envisaged for condenser cooling.

The description and salient technical data of the Steam Generator, Steam Turbine Generator, Auxiliary systems, Electrical, Control & Instrumentation, Civil etc. are explained elsewhere in the specification:

##### 1.4 PROJECT INFORMATION



2 x 800 MW Supercritical Coal Based Uppur  
Thermal Power Project  
Spec. No. SE/E/T&H(P)/OT No.01 /2015-16

Vol. II: 1



1.1	Owner	:	Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)	
1.2	Project Title	:	2 x 800 MW Uppur Thermal Power Project	
1.3	Owner's Engineer	:	Desein Private Limited; New Delhi	
1.4	Project Site Location	:	Place	Uppur
		:	State	Tamil Nadu
		:	Country	India
1.5	Nearest Railway Station	:	Ramanathapuram at 28 KM away	
1.6	Nearest City	:	Ramanathapuram	
1.7	Nearest Highway	:	ECR Connecting Ramanathapuram and Pattukottai	
1.8	Nearest Airport	:	Domestic air port at Madurai (140 KM)	
1.9	Nearest Sea Port	:	Tuticorin Port (130 KM)	
1.10	Site Elevation	:	+ 4.5 m	
1.11	CLIMATOLOGICAL DATA	:		
i.)	HIGHEST TEMPERATURE RECORDED	:	37.8°C	
ii.)	MINIMUM TEMPERATURE RECORDED	:	22.3°C	
iii.)	DRY BULB TEMPERATURE (DBT) FOR DESIGN PURPOSE	:	30 ± 10°C 50°C (for electrical equipment)	
iv.)	RELATIVE HUMIDITY FOR DESIGN PURPOSE	:	75 ± 15%	
v.)	ANNUAL RAINFALL	:	827 mm (avg.)	
1.12	Source of Water (Distance from site)	:	Sea	
1.13	Primary Fuel & Source	:	Imported Coal (Indonesia and S. Africa)	
1.14	Startup Fuel & Source	:	HFO/ L.D.O. (Domestic)	
1.15	Earthquake Data	:	Zone III as defined in IS: 1893-2002	

### 1.5 Access to Site

Site is well connected and located along ECR Connecting Ramanathapuram and Pattukottai. Site is well connected by rail also.

### 1.6 Plant Rating, Capacity, Availability, PLF



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Each of the two units shall have a Turbine maximum continuous rating (TMCR) of 800 MW at generator terminals based on the following site conditions.

- Ambient air temperature
- Condenser cooling water inlet temperature of 33°C and 9°C temperature rise across the condenser.
- Generator power factor of 0.85.
- Fuel specification as given elsewhere.
- Design temperature for electrical equipment is 50°C.

The VVO capacity of the steam turbine shall not be less than 105% of TMCR flow at rated parameters. Boiler maximum Continuous Rating (BMCR) will be established to match the steam flow at VVO conditions, but BMCR flow shall not less than 108% of TMCR flow.

The capacity of the unit is selected so as to deliver the rated output even after ageing that will occur between overhauls, as a result of deposition of salts in turbine blades, wear and tear etc.

The plant load factor (PLF) being considered is 85%.

## 1.7 Power Evacuation

Power will be evacuated from the proposed thermal power station at 765 KV voltage level through 765 KV transmission lines . The power evacuation lines would be double circuit 765 KV lines which will act as Line in & Line out circuit.

## 1.8 Site Selection

The following factors which influence the project site selection have been found very favourable to establish and operate the project.

- a. Availability of fuel.
- b. Existing power plant
- c. Availability of adequate cooling water.
- d. Availability of adequate land for locating the power plant with approach roads.
- e. Suitability of land from topographical and geological aspects
- f. Proximity of National Highways, Ports & Transport of fuel & heavy equipment.
- g. Facility for interconnection with transmission and distribution system for evacuation of power.
- h. Environmental aspects.

Total land required for the project is approx. 900 acres which is under the possession of TANGEDCO.

## 1.9 Fuel

### 1.9.1 Source of Fuel



2 x 800 MW Supercritical Coal Based Uppur  
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Coal shall sourced from Indonesia or any other source Domestic coal requirement for the power plant will be sourced from coal mines in Orissa.

The steam generator shall be designed for the following conditions :

- **Best Coal** – 100% Imported Coal
- **Design Coal** – 70% Imported & 30% Domestic Coal
- **Worst Coal** – 50% Imported & 50% Domestic Coal

The analysis of fuel is given below :

### 1.9.2

#### Coal Analysis:

#### Coal Quality Parameters

SL.NO	DESCRIPTION	DOMESTIC COAL	IMPORTED COAL
1.	HIGHER HEATING VALUE -As Fired basis given Kcal/kg	2800 (GCV as received basis)	6250 ( GCV Air dried basis) 5642 (as received basis)
2.	TOTAL MOISTURE %	During rainy season 20% ( inherent + surface)	16.5%
3.	HGI* Abrasive ness expected YGP Shale and sand stone content Feed coal size	45 to 55 Average 52 50 to 70 mg/kg 20% max. upto 50 mm.	51

\* for SG design the belnded coal is the weighted average of the parent coal. For mill design HGI 45 shall be considered,

#### DOMESTIC COAL

Sr. No.	Particulars	Units	Parameters
A.	<b>Proximate Analysis</b>		
1.	Moisture	%	16.00
2.	Volatile Matter	%	19.00
3.	Ash	%	45.00
4.	Fixed carbon	%	20.00
	Total	%	100
B.	<b>ULTIMATE ANALYSIS, % ( As received)</b>		
1.	Carbon	%	27.70
2.	Hydrogen	%	2.60
3.	Nitrogen	%	0.52
4.	Oxygen	%	7.26
5.	Sulphur	%	0.50
6.	Ash	%	45.00
7.	Moisture	%	16.00



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Sr. No.	Particulars	Units	Parameters
8.	Carbonates	%	0.38
9.	Phosphorous	%	0.04
10.	Others	%	-
	Total	%	100.00
C.	<b>Ash fusion temperature</b>	deg C	
1.	Initial deformation, IT	deg C	1100
2.	Spherical, ST	deg C	1200
3.	Hemispherical, HT	deg C	1300
4.	Fluid, FT	deg C	-
D.	<b>Ash Analysis, %</b>		
1.	SiO <sub>2</sub>	%	59.54
2.	Al <sub>2</sub> O <sub>3</sub>	%	29.00
3.	Fe <sub>2</sub> O <sub>3</sub>	%	6.42
4.	CaO	%	1.50
5.	Na <sub>2</sub> O	%	0.08
6.	K <sub>2</sub> O	%	-
7.	TiO <sub>2</sub>	%	1.60
8.	SO <sub>3</sub>	%	0.25
9.	P <sub>2</sub> O <sub>5</sub>	%	0.51
10.	MgO	%	0.50
11.	Others	%	0.60
12.	Total		100.00
E	<b>Resistivity of fly ash</b>	Ohm - cm	1.73x 10 <sup>12</sup>

**IMPORTED COAL**

Sr. No.	Particulars	Units	Parameters
A.	<b>Proximate Analysis (As received)</b>		
1.	Moisture	%	16.50
2.	Volatile Matter	%	36.45
3.	Ash	%	6.62
4.	Fixed carbon	%	40.43
5.	Total	%	100.00
B.	<b>ULTIMATE ANALYSIS, % (As received)</b>		
1.	Carbon	%	60.12
2.	Hydrogen	%	4.38
3.	Nitrogen	%	1.48
4.	Oxygen	%	10.37
5.	Sulphur	%	0.53
6.	Ash	%	6.62
7.	Moisture	%	16.5
8.	Carbonates	%	-
9.	Phosphorous	%	-
10.	Others	%	-
	Total	%	100.00
C.	<b>Ash fusion temperature</b>	deg C	
1.	Initial deformation, IT	deg C	1230
2.	Spherical, ST	deg C	1270



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Sr. No.	Particulars	Units	Parameters
3.	Hemispherical, HT	deg C	1320
4.	Fluid, FT	deg C	-
D.	<b>Ash Analysis, %</b>		
1.	Sio2	%	36.00
2.	Al 2 O3	%	13.90
3.	Fe2O3	%	14.80
4.	CaO	%	12.70
5.	Na2O	%	0.70
6.	K2O	%	1.70
7.	TiO2	%	0.80
8.	SO3	%	10.60
9.	P2O5	%	0.20
10.	MgO	%	8.60
11.	Others	%	-
12.	Total	%	100.00

The plant should be suitable to accept imported coal sourced from any country. The limiting parameters of imported coal are furnished below :

S. No.	Particulars	Unit	Parameter
1	Total Moisture (ARB)	%	Up to 23 (Max)
2	Ash (ADB)	%	Up to 20 (Max)
3	Gross Calorific Value (ADB)	Kcal / Kg	5800 - 6500
4	Sulphur (ADB)	%	Up to 1 (Max)
5	Fixed Carbon (ADB)	%	30-50
6	Volatile Matter (ADB)	%	25-45
7	HGI		45-60
8	IDT (Under Reducing Atmosphere)	Deg C	1100-1250
9	Size	Mm	< 50

**Note:** ADB stands for "As dried Basis" and ARB for "As Received Basis"

### 1.9.3

#### Specification of LDO

Specific gravity @ 15° C	0.8348
Gross calorific value, Kcal/kg	10400
Pour point "°C" max.	12
Flash point "°C" min.	66
Sulphur % "T" max.	0.5
K. Viscosity in Centistokes @ 50° C max.	7.5
Ash by wt. %	0.01
Water & sediment Vol. Max. %	0.25



2 x 800 MW Supercritical Coal Based Uppur  
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**1.9.4 Specification of HFO**

Flash point “°C” min.	66
K. Viscosity in Centistokes @ 50° C max.	370
Ash by wt. %	0.1
Water content by volume % max	1
Sediment by weight % max	0.25
Total Sulphur by weight % max	4.5
Gross calorific value, Kcal/kg	10800

**1.9.5 Fuel Linkage**

Coal is proposed to be imported from Indonesia or any other country and blended with domestic coal.

**1.9.6 Fuel Transportation**

The coal shall be received at Tuticorin port and transported by rail from there.

**1.10 Source Of Water****1.10.1 Source**

The raw water intake shall be from Bay of Bengal.

**1.10.2 Chemical analysis of Sea Water:**

S.No.	Parameters	Value (ppm)
1.	Total Solids	35,000
2.	Dissolved solids	21,620
3.	Suspended Solids	580
4.	Ignited residue	17,500
5.	Volatiles Solids	4,700
6.	Acid Insolubles	112
7.	Chlorides (as Cl )	20,232
8.	Sulphates (as SO <sub>4</sub> )	1,457
9.	Iron (as Fe )	70
10.	Total alkalinity (as CaCO <sub>3</sub> )	525
11.	Alkalinity due to Normal Carbonates (as CaCO <sub>3</sub> )	Nil
12.	Alkalinity due to bi-Carbonates (as CaCO <sub>3</sub> )	525



13.	Total hardness (as CaCO <sub>3</sub> )	8,155
14.	Permanent hardness (as CaCO <sub>3</sub> )	6,200
15.	Temporary hardness (as CaCO <sub>3</sub> )	1,955
16.	Calcium hardness (as CaCO <sub>3</sub> )	1,255
17.	Magnesium hardness (as CaCO <sub>3</sub> )	6,900
18.	P <sub>H</sub>	8.2

### 1.10.3 Requirement

The requirement of water for the plant will be for meeting the requirement of make up for the re-circulating cooling water system, dust suppression system in coal handling plants, ash disposal system and the RO/ D.M. water plant which will be supplying the power cycle make up requirements, etc. In addition the water requirements will be for drinking and service purposes. Water requirement is estimated as approx. 18000 m<sup>3</sup>/hr.

### 1.11 Source of Equipment

The proposed plant will be supplied, erected and commissioned on EPC basis with BTG & BOP as separate packages..

### 1.12 Power Evacuation Plan

Power will be evacuated from the proposed thermal power station at 765 KV voltage level and fed to Tamil Nadu Transmission Corporation Limited (TANTRANSCO). The Karaikudi substation is about 40 KM north west of the plant.

### 1.13 Average Yearly Generation

The average yearly generation is calculated considering the following.

- The expected plant load factor is 85 %. With this PLF the average yearly generation will be around 11914 Million units.

### 1.14 INFORMATION FOR ENVIRONMENTAL APPRAISAL

#### 1.0 GENERAL INFORMATION ABOUT THE PROJECT

- 1.1 Name / Title of the Project : 2 x 800 MW Supercritical Coal Based Uppur Thermal Power Project
- 1.2 Name of Owner : Tamilnadu Generation and Distribution Corporation (TANGEDCO)



2 x 800 MW Supercritical Coal Based Uppur  
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- 1.3 Location of the Project : Uppur, Valamavoor and Thiruppalaikudi Villages, Ramanathapuram District, Tamil Nadu
- 1.4 Capacity of the project under consideration : 2x 800MW
- 1.4.1 Govt. land / Private land / others : Land being acquired
- 1.45.2 Topographical feature, demographic profile & physiography : Refer Volume VI
- 1.5.3 Nature of soil : Clayey soil
- 1.5.4 Distance from the nearest town / city / major human settlements : Madurai – 140 KM
- 1.5.5 Population to be displaced : Nil
- 1.5.6 Distance from water source : Approx. 1 km
- 1.5.7 Area of forest land, if involved : Nil
- 1.5.8 Distance of forest from the site : N.A
- 1.6 Is this an extension? : No  
If so indicate capacity of existing plant
- 1.7 What is the ultimate capacity envisaged : 2 x 800 MW
- 2.0 GENERAL ENVIRONMENTAL INFORMATION**
- 2.1 Area of the land proposed to be acquired : Refer Plot Plan Land already acquired
- i. Area required for plant : 900 Acres
- ii. Ash disposal : 100 % dry fly ash disposal and 100% wet bottom ash disposal is envisaged to existing ash pond.



- iii. Plant facilities : The area is adequate for locating all the required systems for 2x800 MW.
- 2.2 Area proposed to be built-up or developed : Power station will be built-up in the proposed site as indicated in the plot plan.
- 2.3 Specify site characteristics River basin/ estuarine / coastal / others : Site is adjacent to Bay of Bengal
- 2.4 Is the site situated in the forest area? Give following details : No
- 2.4.1 Area : N.A
- 2.4.2 Type of forests : N.A
- 2.5 Is site situated near to the forests? Give the distance from the site. : N.A.
- 2.6 Give a description of the flora within 25 km of your plant site under the following heads :
- a. Crops :  
b. Forest :  
c. Grass land :  
d. Endangered species :  
e. Others (Specify) :
- 2.6.2 Give details of the following features, if they exist, within a radius of 25 km of the proposed site? :
- i. Fisheries :  
ii. Sanctuary / natural park biosphere reserve :  
iii. Lakes / ponds / reservoir :  
iv. Stream / river :  
v. Estuary / sea : Bay of Bengal is 1 km from site  
vi. Hills / mountains :  
vii. Historic / cultural / tourist / archaeological scenic :
- Refer details in the specification elsewhere.



- sites / defence  
installations
- 2.7 Human settlement :
- 2.7.1 Total number of persons :  
proposed to be employed
- i. During construction : 2500  
1200(0.75person/MW) TANGEDCO
- ii. During operation : direct employees



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