8.00.00 DILUTION WATER HEATER	
Number required	One (1) no. common for 1 x 800 MW Unit
Type	Vertical cylindrical with dished ends.
Type of fluid to be handled	DM Water
Effective capacity	Suitable to meet the requirements for alkali injection and alkali displacement in course of single regeneration of a Condensate Polisher Mixed Bed, plus 20% margin.
MOC	
Dished Ends	SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
Shell	Shell –SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
Inside Protection	Natural Rubber (suitable for temperature 70^{o}C-8 mm thick in (6) layers
9.00.00 PUMPS	

	Acid Transfer Pumps	Alkali Transfer Pumps	DM Water Regeneration/ Resin Transfer Pump	Neutralized Waste Disposal Pump
Number required	Two (2) nos. for 1 x 800MW Unit-One (1) no. in operation and other as standby	Two (2) nos. for 1 x 800 MW Unit-One (1) no. in operation and other as standby	Two (2) nos. for 1 x 800 MW Unit-One (1) no. in operation and other as standby	[Two (2) nos. for 1 x 800 MW Unit-One (1) no. in operation and other as standby
Description (applicable for each pump)				
Type	Horizontal Centrifugal	Horizontal Centrifugal	Horizontal Centrifugal	Vertical Centrifugal
Rated capacity, Cu.m/hr.	10	10	To be selected by the Bidder as necessary to meet the system requirements	100 minimum (To be increased by the Bidder if necessary to transfer the waste of single regeneration of the resins of a Condensate Polisher Mixed Bed within four (4) hours)
Head to be developed	10 mlc	10 mlc	To be specified by the Bidder.	To be specified by the Bidder.
Material of Construction				
Casing	Polypropylene	Stainless Steel	Stainless Steel	Stainless Steel

		type 304	type 316	type 316
Impeller	Polypropylene	Stainless Steel type 304	Stainless Steel type 316	Stainless Steel type 316
Shaft	Hardened Carbon Steel - EN 8	Stainless Steel type 410	Stainless Steel type 410	Stainless Steel type 410

10. HYDROCHLORIC ACID DOSING PUMPS	
Number	Two (2) [one (1) no. to be under operation and one (1) no. will be as common standby].
Description for each Pump	
Type of Pump	Positive displacement and hydraulic diaphragm type with stroke adjustment.
Location	Indoor.
Fluid to be handled	Commercial (30-33%) Hydrochloric Acid
Service	To dose Acid solution to the Cation Regeneration Vessel
Duty	Continuous and suitable for parallel operation
Suction Condition	Flooded
Rated Capacity, m^3/hr	The Capacity of each pump shall be suitable to cater the requirement of One Regeneration of MB plus 20% margin.
Tentative head to be developed at rated capacity, MLC	To be specified by the Supplier to meet the system requirements
Design Standard	As per Tender Specification
Design Temperature, ^{0}C	60
Range of Operation (%)	0 – 100
Pump Speed, (RPM)	1500 preferred
Material of construction	
a) All wetted parts	PP
b) Diaphragm	PTFE
Type of drive	Electrical Motor
Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
Rated speed (RPM)	1500 (Sync.) maximum.
Voltage, Phase & Frequency (± % Variation)	415 V (±10%), 3 Phase, 50 HZ (+3 to –5%).
Type of coupling between Pump & Motor	Flexible Spacer.
Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
Painting for complete set of Pump & Motor	
a) Primer	As per the requirements of Painting Specification.
b) Finish paint	As per the requirements of Painting Specification.
c) Shade	As approved by Purchaser.
Tests and Inspection	

Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
Hydro-test	As per IS-1520 and IS-5120.
Dynamic Balancing Test	To be provided
Performance Test	Required as per Tender Specification
Instruments along with alarms, interlocks and accessories	To be provided as per the requirements of the Tender Specification and Drawings, enclosed with it.
Start and stop facility provided both at local and remote	To be provided in conjunction with Auto Start Facility.
Trip interlock	To be provided.
Accessories to be provided	
a) Pulsation Dampener	To be provided.
b) Pressure Relief Valve	To be provided.

11. ALKALI DOSING PUMPS	
Number	Two (2) [one (1) no. to be under operation and one (1) no. will be as common standby].
Description for each Pump	
Type of Pump	Positive displacement and hydraulic diaphragm type with stroke adjustment.
Location	Indoor.
Fluid to be handled	Commercial (40-48%) Sodium Hydroxide
Service	To dose Alkali solution to the Anion Regeneration Vessel
Duty	Continuous and suitable for parallel operation
Suction Condition	Flooded
Rated Capacity, m^3/hr	The Capacity of each pump shall be suitable to cater the requirement of One Regeneration of MB plus 20% margin.
Tentative head to be developed at rated capacity, MLC	To be specified by the Supplier to meet the system requirements
Design Standard	As per Tender Specification
Design Temperature, ^{0}C	60
Range of Operation (%)	0 – 100
Pump Speed, (RPM)	1500 preferred
Material of construction	
c) All wetted parts	SS-316.
d) Diaphragm	PTFE
Type of drive	Electrical Motor
Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
Rated speed (RPM)	1500 (Sync.) maximum.
Voltage, Phase & Frequency (± % Variation)	415 V (±10%), 3 Phase, 50 HZ (+3 to –5%).
Type of coupling between Pump & Motor	Flexible Spacer.
Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
Painting for complete set of Pump & Motor	
a) Primer	As per the requirements of Painting Specification.
b) Finish paint	As per the requirements of Painting Specification.
c) Shade	As approved by Purchaser.
Tests and Inspection	
Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
Hydro-test	As per IS-1520 and IS-5120.
Dynamic Balancing Test	To be provided
Performance Test	Required as per Tender Specification
Instruments along with alarms, interlocks and accessories	To be provided as per the requirements of the Tender Specification and Drawings, enclosed with it.
Start and stop facility provided both at local and remote	To be provided in conjunction with Auto Start Facility.
Trip interlock	To be provided.
Accessories to be provided	
a) Pulsation Dampener	To be provided.
b) Pressure Relief Valve	To be provided

13. ACTIVATED CARBON FILTER FOR ALKALI SERVICE

Number	One (1) no.
Description for each unit	
Type	Vertical cylindrical with dished ends.
Location	Indoor.
Effective Capacity in m^3/hr	Not less than 10
Time Period for each Service Cycle between two consecutive regenerations, in hrs	24.
Design surface flow rate in $m^3/m^2/hr$	Not more than 15.
Design Temperature in ^{o} C	60.
Design Pressure in kg/cm^2 (g).	Design pressure should be the maximum expected pressure to which the vessel may be subjected plus 5% extra margin. Maximum expected pressure for a vessel placed in the discharge line of a pump shall be based on the shut-off head of the pump plus static head at pump suction, if any.
Design Inlet Alkali Quality	As per the stipulations of Tender Specification.
Design Treated Alkali Quality	As per the stipulations of Tender Specification.
Design Code	As per the requirements of Tender Specification.
Code for Tests and Inspections	As per the requirements of Tender Specification.
Filter Media	
a) Type	Activated Carbon.
b) Characteristics of Activated Carbon	Grade : Suitable Grade. Bulk Density : Not less than 400 kg/m^3. Particle Density wetted in water : 1.3-1.4 gm/cc. Effective size, mm : 0.8-0.9 mm. Uniformity Coefficient : 1.5-1.6. Mean particle dia : 1.2-1.4 mm. Total surface area : Not less than 850 m^2/gm. Iodine no. : Minimum 850. Carbon content : Not less than 90%. Moisture content : 5% (max). Ash content : 8% (max).
c) Bed depth in mm	Activated Carbon - minimum 1200 and Support Gravel - minimum 300.
d) Percentage freeboard	75 % minimum.
Details of Regeneration of Filter Media	
a) Backwash	Backwash by reversible flow of filtered water.
b) Backwash Velocity	To be specified by the Tenderer.
Material of construction	
a) Shell	Carbon steel as per IS 2062 or ASTM A 515 Gr.60/70 or better.

b) Dished ends	Carbon steel as per IS 2002 or ASTM A 515 Gr.60/70 or better.
Protection	
a) Internal	
• Material	As per Painting Sub- section.
• Thickness	As per the requirements of Tender Specification.
b) External	
• Primer	As per Painting Sub- section.
• Finish paint	As per Painting Sub- section.
• Shade	As approved by Purchaser.
Design code	ASME SEC-VIII Div-I
Hydrostatic Test Pressure	1.5 thmes of Design Pressure.
Influent Distributor Material	SS-316
Manhole	Two (2) nos. minimum each of Davit type and 500 mm dia.
Sight windows	One (1) no. in Backwash Space.
Hand hole	One (1) no. of 150 mm dia. for removal of Activated Carbon.
Instruments, alarm and Interlock	To be provided as per the Tender Specification and Tender P&ID.

14. **RINSE RECIRCULATION PUMPS**	
Number required	Two (2) nos. for 1 x 800MW Unit-One (1) no. in operation and other as standby
Description (applicable for each pump)	
Type	Horizontal Centrifugal
Rated capacity, Cu.m/hr.	To be selected by the Bidder as necessary to meet the system requirements
Head to be developed	To be specified by the Bidder.
Material of Construction	
Casing	Stainless Steel type 316
Impeller	Stainless Steel type 316
Shaft	Stainless Steel type 410

15. **BLOWERS**		
	Air Blowers for Service Vessels	Air Blowers for Regeneration Vessels
Numbers required	Two (2) nos. for 800 MW Unit -One in operation and other as stand-by.	Two (2) nos. for 1 x 800 MW Unit-One in operation and other as stand-by.
Location	Indoor	Outdoor
Type	Rotary, Twin Lobe, oil free, positive displacement	Rotary, Twin Lobe, oil free, positive displacement
Material of Construction	Casing – Cast Iron Lobe – Cast Iron Shaft – Carbon steel to EN 8	Casing – Cast Iron Lobe – Cast Iron Shaft – Carbon steel to EN 8

LEAD SPECIFICATION FOR PROJECT

CONTENT

LEAD SPECIFICATION

INTENT OF SPECIFICATION

INTENT OF SPECIFICATION

1.00.00 This specification is intended to cover supply and installation of complete Plant Equipment & accessories along with all facilities as detailed hereinafter for 1 x 800 MW Kothagudem Thermal Power Station (KTPS), Stage-VII, Unit-12 for Telangana State Power Generation Corporation Ltd. (TSGENCO) at Kothagudem, Telangana.

The scope shall include design, engineering, manufacture, inspection and testing at manufacturer's works, packing and shipment, transit insurance and delivery at site. In addition, the Bidder's scope shall also include all necessary civil/structural/ architectural works, erection/installation including unloading storage and handling at site, site testing, commissioning, trial run, performance and guarantee tests and other services including supply co-ordination, engineering and project management related to the equipment/systems comprising 1 x 800 MW Unit, as specified hereinafter and in accordance with the requirements, conditions, appendices, drawings etc. stated in Volume-I and Volumes II-B to X which shall be considered as a part of this volume as completely as if bound herewith.

The specification consists of Volumes : I to X, the detailed index of which has been furnished elsewhere. This specification shall be read and construed in conjunction with the drawings and annexures to determine the scope of work. The quantities shown on drawings and annexures are indicative. Any variation arising during detailed engineering stage will be taken into account by the Contractor without any extra cost and time to the Owner.

The Bidder shall be responsible for providing all material, equipment and services, specified or otherwise which are required to meet the intent of this specification, ensuring high degree of reliability and ease of operation and maintenance. The equipment and system/sub-systems shall conform to all aspects of high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to the Owner and shall also be in line with the current practice for reliable and efficient functioning of the plant.

Owner shall interpret the meaning of the specification, drawings, requirement of operation, maintenance, redundancy etc., and shall have a right to reject or accept any work or material which in his assessments is not technically complete to meet the requirements of this specification and/or applicable National and International Standards mentioned elsewhere in this specification.

Bidder is required to carefully examine and understand the specifications and seek clarifications, if required, to ensure that he has understood the specifications as intended by the Owner. In the absence of any specific clarifications made by the Owner during bidding stage, the interpretation of

Owner shall be final. The Bidder's offer should not carry any sections like clarifications, interpretations and/or assumptions. All such points are required to be clarified during bidding stage.

In the event of conflict between requirements of any two clauses of this specification/documents or requirements of different codes/standards, specified, the more stringent requirement as per the interpretation of the Owner shall apply.

The Bidder may also make alternate offer, provided such offers are superior in his opinion, in which case, adequate technical information and justifications, operating feed back data etc. shall be enclosed with the offer, to enable the Owner to assess the superiority and reliability of the alternative offered without the need to seek any further clarification or explanation. In case of each alternative offer, its implications on the performance, guaranteed efficiency, heat rate auxiliary power consumptions and definite advantages the Owner can positively derive shall all be clearly brought out along with commercial implications, if any for the Owner to make an overall assessment. In any case, the base offer shall necessarily be in line with this specification. Under no circumstances shall the specified equipment/plant be brought out as an alternative offer.

In case all the above requirements are not complied with, the offer may be considered as incomplete and liable to be treated as non-responsive.

2.00.00 Whenever a material or article is specified or described by the name of a particular brand, manufacturer or vendor, the specific items mentioned shall be understood as establishing type, function and quality desired.

3.00.00 In case there is any difference of content/information between ‘”Hard Copy” and “Soft Copy” of this specification document, the statement/information as printed in hard copy shall prevail.

PROJECT SYNOPSIS AND GENERAL INFORMATION

CONTENT

PROJECT SYNOPSIS AND GENERAL INFORMATION

1.00.00 INTRODUCTION

The proposed 1x800 MW Kothagudem Thermal Power Station (KTPS), Stage-VII, Unit-12 would be set up by Telangana State Power Corporation Ltd. (TSGENCO) at Kothagudem, Telangana. The proposed Power Plant will be installed adjacent to the existing D colony of Kothagudem Thermal Power Station, at Kothagudem.

The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on the Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

2.00.00 APPROACH TO SITE

Site is located in the existing D Colony of Kothagudem Thermal Power Station, which is at a distance 30 km from temple town of Bhadrachalam and 300 km from Hyderabad by road. The Nearest railway station is Bhadrachalam Road (Known as Kothagudem) at a distance of 12 km. Kothagudem- Bhadrachalam National Highway branches off to the power station site near village Paloncha.

3.00.00 LAND

Land is primarily required for the main plant & auxiliaries (BTG) and balance of plant (BOP) like ash handling, coal storage, cooling tower, switchyard etc., which is available within the existing plant boundary.

The existing colony is to be dismantled, and the land of about 137 acres will be used for the main plant building, water facilities, switchyard, coal handling etc. The raw water reservoir will be located adjacent to the existing raw water reservoirs.

230 acres of land required for Ash Dyke will be procured. Land is available for staff colony, which is to be constructed by the EPC contractor.

4.00.00 SOURCE OF COAL

100% Imported and Blended coal (50% imported + 50% indigenous) will be used. Indigenous coal shall be sourced from Suliyari coal mines, Madhya Pradesh.

5.00.00 SOURCE OF WATER

Source of water (total quantity of water is 2192 m^3/hr) is Godavari River near Burgampahad & water will be pumped through existing GRP pipe line (of length approx. 26 km).

6.00.00 ASH DISPOSAL AREA

Ash shall be dumped in the ash dump area which will be about 9 km from plant. The ash dyke area of 230 acres is adequate for 1x800 MW unit as per MOEF norms.

7.00.00 SALIENT DESIGN DATA

7.01.00 Meteorological data of site is given below:-

Elevation above MSL		:	89 m
Monthly highest temperature		:	44.9 ºC
Monthly lowest temperature.		:	12.9 ºC
Rainfall			
	Average.	:	1031 mm
	Max.	:	100 mm/ hr
Mean Wind speed		:	5.8 kmph
Relative Humidity			
	Max	:	82%
	Min	:	35%
Seismic Zone		:	Zone-III as per IS- 1893 (Part-IV)

[Climatological data of Khammam is attached for reference].

SCOPE OF SUPPLY AND SERVICES

CONTENT

SCOPE OF SUPPLY AND SERVICES

A. SUPPLY OF EQUIPMENT AND SYSTEMS

The Works as detailed hereinafter of this Project for 1x800 MW Kothagudem Thermal Power Station (KTPS), Stage-VII, Unit-12 shall be contracted on a Single Package turnkey basis for complete plant, equipment and systems.

The plant shall be designed to operate as a base load station. However, continuous operation under two shift and cyclic modes during certain periods is also envisaged. The design would cover adequate provision for quick start-up and loading of the units to full load at a fast rate. The main plant and its auxiliaries with their controls would be designed to permit operation of the units on house load without there being any necessity to shut down the units in the event of sudden loss of total load due to tripping of transmission lines or any other grid disturbances. The design of the plant equipments and control system would permit participation of the plant in automatic load frequency control.

1.00.00 One (1) no. super-critical once through dry bottom, balanced draft, outdoor type pulverized coal fired with oil as start-up and stabilising fuel steam generating unit, complete with all major auxiliary plant and equipment consisting of, but not limited to, the following :

a) Furnace/ evaporator complete with spiral/ vertical rifle/ ribbed tubes, headers, steam generating tubes, risers, furnace bottom hoppers etc. for once through boiler.

b) Economiser, Superheater, Reheater, Separator other Pressure Parts, Soot Blowing System etc. including circulation pumps (for low load and start up).

c) Integral pipework, valves and specialties along with supporting system.

d) Draft plant including tri-sector type air-preheaters, ducting and accessories upto chimney inlet flange.

e) Fuel (Coal) preparation and firing systems including start-up/ stabilisation system with fuel oil and mill rejects handling & disposal system.

f) Integral instrumentation, safety interlocks and controls for steam generator.

g) Galleries, platforms and structural steelwork.

h) Electrostatic precipitators.

i) Chemical Dosing System

j) Thermal Insulation.

For detailed scope, refer to Volume: IIB of this specification.

2.00.00 Fuel Oil System

Heavy Fuel Oil (HFO) and Light Diesel Oil (LDO)/ High Speed Diesel (HSD) Oil unloading, storage, pressurizing and heating System as detailed in Volume: IIB of this specification.

3.00.00 Multi-cylinder (three cylinders) tandem compound, one single flow HP, one single flow IP, two double flow LP cylinders, single/double reheat, regenerative, condensing type turbine-generator sets complete with all related auxiliaries matching super critical boiler parameters and consisting of, but not limited to, the following major sub-systems:

a) Steam turbine proper along with auxiliary systems e.g. gland sealing, turbine lube oil and control oil system for lubrication protection-governing, water spray, steam washing systems etc. as applicable.

b) Stop and control valves on Main Steam (MS) and Hot Reheat (HR) inlet with strainers, quick closing non-return valves on extraction lines and Cold Reheat (CR) outlet, H.P.& L.P. Bypass valves etc. together with hydraulic actuation system, reheater isolating device, blanking pieces etc. as necessary for protection during steam blowing.

c) All integral piping for turbine steam, drain and vent systems including flash boxes, oil, air and water systems.

d) Condensate Polishing System.

e) Generator coupled to steam turbines and complete with auxiliary systems e.g. excitation, seal oil, hydrogen cooling, stator cooling, carbon-di-oxide purging systems etc. as necessary.

f) Integral instrumentation, safety interlocks and controls for the turbo-generator.

g) Thermal Insulation and Noise Insulation.

For detailed Scope, refer to Volume : II-C of this specification.

4.00.00 Water cooled, two nos. single pass with cooling water (CW) side of condenser in series, horizontal surface condensers complete with integral accessories, CW line pressure balanced expansion joints, butterfly valves, water box handling devices, air evacuation, on load tube cleaning system etc. as specified in Volume: IIC of this specification.

5.00.00 All power cycle pumps and drives as required including Boiler Feed Pumps, Condensate Extraction Pumps, Heater Drain Pumps (if applicable); the

pumps are to be complete with accessories for sealing and lubrication, flexible/hydraulic couplings, gear box, integral instrumentation, handling devices, etc. and Auxiliary steam turbine and ancillaries for Boiler feed pump device as specified in Volume: IIC of this specification.

6.00.00 Low pressure and high pressure feed heaters and deaerator complete with integral instrumentation and valves, supports, platforms, rails, handling devices etc. as specified in Volume: IIC of this specification.

7.00.00 Turbine oil purification system and central turbine oil storage and transfer system as specified in Volume: IIC of this specification.

8.00.00 Complete piping, valves and specialties as indicated hereunder, but not limited to, the following:

a) Power cycle piping consisting of main steam, hot reheat, cold reheat, extractions, auxiliary steam, air evacuation, cascade drains, condensate, feed water, cycle make-up, drains to waste and atmospheric vents etc. Blanking devices for emergency stop and reheat stop valves and other items as required for steam blowing operation along with steam blowing piping and quick opening valve as specified in Volume: IID of this specification.

b) Large diameter piping for condenser and auxiliaries Cooling Water Systems as detailed in Volume III-E of this specification.

c) Low pressure piping for various water (cooling, service, drinking, plant make-up etc.) air (instrument, service air etc.), steam (other than that covered in item [a] above) and other services as detailed in Volume III-E of this specification.

9.00.00 Steel storage tanks/ vessels such as, condensate storage tank, potable water tank to be constructed under this specification, waste drain and other tanks not specifically mentioned but required for completion of various systems supplied under this specification. Refer Volume III-E of this specification for detailed scope.

10.00.00 Thermal insulation including cladding material as required for conservation of heat and for personnel protection, as specified in Volume: II-D of this specification.

11.00.00 Complete Control and Instrumentation (C&I) systems in turnkey basis. Any item not specifically mentioned in this specification but required for completion of the total C&I system shall be included. The major C&I systems shall comprise of but not be limited to Distributed Digital Control and Management Information System (DDCMIS), SG and TG integral control and instrumentation systems, Plant Auxiliaries and Off site Plants Controls and monitoring systems, Performance Analysis Diagnostics and Optimisation (PADO) system, Master Clock system (MCS), Rotating Machine Condition Monitoring System (RMCMS) , Close Circuit Television (CCTV) System for plant surveillance, Furnace and Flame viewing System, PA and EPABX systems, Computerised Maintenance & Inventory Management System (CMIMS), Ambient Air Quality Monitoring System (AAQMS), Steam and

Water Analysis System (SWAS), Continuous Emissions Monitoring System (CEMS), Microprocessor based Alarm Annunciation System, HART management system, Power supply, C&I Laboratory, Erection Hardware Field instruments and sensors, Performance and Guarantee test instruments, Primary flow elements, Pneumatic, motorized and hydraulically operated valves and dampers, cables, Panel, desks and cabinets, Racks, Maintenance, calibration, commissioning, site testing instruments, Special tools and tackle, Spares and Consumables etc.

Volume VI of this specification shall be referred for further details of C&I requirements.

12.00.00 Complete cooling water system consisting of, but not limited to, the following major equipment :

a) Cooling Tower

b) Condenser Circulating Water (CW) pumps, drives and accessories.

c) Auxiliary Cooling Water (ACW) pumps, drives and accessories.

d) Closed circuit DM cooling water pumps, drives and accessories.

e) Heat exchangers for closed circuit DM cooling water systems.

f) Cycle make-up pumps, Condensate Transfer Pumps and Condensate Storage Tank.

For detailed scope, refer to Volume: III-A and VII-D of this specification.

13.00.00 Complete Instrument Air and Service Air System consisting of but not limited to the following:

a) 3x50% Instrument Air Compressor

b) 3x50% Service Air Compressor

c) 3x50% Refrigerant type Air Dryer

d) 6 Nos. Air Receiver

For detailed scope, refer to Volume III-E of this specification.

14.00.00 Ventilation and Air-conditioning system including all equipment, piping, false ceiling, insulation, ducting etc. as required for all buildings and facilities.

14.01.00 The Air-conditioning system shall cover the following areas as a minimum :

a) TG Building Room

Unit Control Room, Control Equipment Rooms, Shift Charge Engineer's Rooms, Computer Room, Uninterrupted Power Supply (UPS) Rooms, Automatic Voltage Regulator (AVR) Rooms if any, Steam and Water Analyzer

(SWAS) Panel Rooms (dry panel), Excitation Room, Relay Panel Room and other office areas like Telephone Exchange Room, Conference Hall, Library, Laboratory Rooms etc. if any on the operating floor.

b) Service Building

i. Maintenance Office areas, conference rooms, lecture rooms and any other areas needs Air Conditioning.

ii. AC plant control room (in Central AC plant equipment room proposed to be located in ground floor of Service Building)

c) ESP Control Room.

d) VFD Control Room (if applicable).

e) Ash Handling Plant Control Room.

f) DM plant control room, office and Laboratory area.

g) Switchyard Control Room.

h) Chemical Laboratory Building.

i) Coal Handling Plant control room.

j) Any other Local Control Rooms / Cubicles of different Auxiliary Buildings housing Programmable Logic Controllers (PLC) Panels and other Input / Output (I/O) modules.

k) Rooms having the equipment required controlled temperature by nature for their operating feature.

l) Any other area requiring Air conditioning as per manufacturer's recommendation.

All the buildings described above shall preferably be provided with separate air conditioning systems because they may be far apart from each other.

14.02.00 The Ventilation system shall cover the following areas as a minimum :

14.02.01 Evaporative Cooling System with Air Washer Units (AWU) shall be adopted for the ventilation of the following areas of Power House Building :

i) TG Hall

ii) MCC, Switchgear rooms and cable spreader rooms

iii) Battery Charger Rooms

14.02.02 Mechanical Dry Ventilation System with either Supply or Exhaust Fans shall be provided for the following areas of the Power House Building:

i) Battery Rooms

ii) Elevator Machine Rooms

iii) Toilets

14.02.03 Mechanical Dry Ventilation System with Exhaust Fans shall be provided for the following areas of Mill Bay:

i) Coal Conveyor Tripper floor

14.02.04 Similarly evaporative cooling system with Unitary Air Filtration Units (UAF) shall be provided for the ventilation system for the MCC / Switchgear Rooms and other non-AC areas of the following areas :

i) Non-AC areas of ESP Control Building

ii) Ash Handling Electrical / Control Building.

iii) CHP Control Building

14.02.05 Dry Ventilation System with either Supply or Exhaust Fans shall also be provided for the following Auxiliary Buildings:

i) DG and Compressor House

ii) Ash slurry pump House

iii) HFO & LDO forwarding Pump House

iv) CW Treatment Building

v) DM Plant Building

vi) DM, Service and Potable Water Pump House

vii) Non-AC areas of Chemical House

viii) CPU Regeneration Building

ix) Switch-yard Control Building

x) CW Pump House

xi) AHP Compressor Building

xii) Non-AC areas of Service Building

xiii) Silo Utility-cum-HCSD Pump House

xiv) Vacuum Pump House

xv) Ash Water Pump House

xvi) Clarified Water Pump House

xvii) Centrifuge Building

xviii) Store Building

However, for detailed scope, refer to Volume III-D of this specification.

15.00.00 Fire Protection System for all plant, equipment and facilities under this specification comprising of, but not limited to, the following :

a) Hydrant Protection System.

b) Spray Water System.

c) Smoke/Fire Detection System.

d) Inert Gas Flooding System

e) Fixed foam Protection System

g) Portable Fire Extinguishers

h) Fire Tender

For detailed scope, refer to Volume III-E of this specification.

16.00.00 Sump Pumps complete with drives and accessories for drainage of pits from all buildings/facilities, inclusive of, but not limited to the following areas:

a) Power House and Boiler Area.

b) Fuel Oil (F.O) Unloading, Forwarding and Pressurizing Pump House.

c) Transformer Area.

d) Coal handling plant.

e) Other Auxiliary Buildings.

For detailed scope, refer Volume III-F of this specification.

17.00.00 Miscellaneous Cranes complete with drives, electrical and all other accessories for the following buildings, as a minimum.

a) Turbine Hall
.

b) Mill building

c) CW Pump House.

d) Store Building

e) ESP Control-cum-Fly Ash Equipment Bldg.

f) Air Compressor Building

g) Clarified Water Pump House

h) Fire Water Pump House

i) Coal handling plant

For detailed scope, refer Volume III-F of this specification.

18.00.00 Miscellaneous hoists & Lifting devices complete with drives and accessories for all buildings and facilities, not covered by item 17.00.00 above as also required for handling during operation & maintenance of any equipment weighing above 500 Kg supplied under this specification but not covered by any of the cranes mentioned under item 17.00.00. For detailed scope refer Volume III-F of this specification.

19.00.00 Elevators complete with drives, electricals, control and instrumentation and all other accessories, inclusive of, but not limited to the following facilities.

a) Stack Elevator.

b) Boiler Elevator.

c) Power House Building Elevator.

d) Service Building Elevator

e) Elevators in coal handling plant

For detailed scope refer Volume III-F of this specification.

20.00.00 Not used.

21.00.00 Plant Water System

Raw Water System, Clarified Water System, Potable Water System, Service Water System consisting of all equipment, facilities and auxiliaries but not limited to the following :

a) Rerouting of existing raw water 1200 NB GRP pipe with MS pipe inside plant boundary of approximate length 2 km is under TSGENCO scope. However, the supply of Raw water pumps are under the bidder's scope.

b) Raw Water Reservoir and pump house

c) Intake Valve Chamber modification and extension

d) Coal Handling Plant Dust Suppression system

e) Ash Handling Plant Supply Pumps

f) Service Water Pumps.

g) Plant Water Transportation Pumps.

h) Potable Water Storage Tank

i) Service Water Storage Tank

For detailed scope refer Volume III-B of this specification.

22.00.00 Water Treatment System

All equipment/system consisting of, but not limited to the following :

a) River Water Pre-Treatment System

b) Demineralisation System.

b) Side Stream Filtration System.

c) CW Chemical Treatment.

d) CW Chlorination System.

For detailed scope refer Volume III-C of this specification.

23.00.00 Waste Water Treatment System

a) Complete Waste Water Treatment System with all equipment and auxiliaries as detailed in Volume III-C.

Bidder to note that the plant will be a Zero Discharge Plant.

b) Centralised Sewage Treatment System

24.00.00 Coal Handling Plant

Complete Coal Handling Plant including all equipment and auxiliaries as detailed in Volume IV-A..

25.00.00 Ash Handling Plant

Complete Ash Handling Plant including all equipment and systems as detailed in Volume IV-A..

26.00.00 Complete Mill Reject System

27.00.00 H_2, CO_2 and N_2 Gas Cylinders as detailed in Volume III-E.

28.00.00 Complete electrical equipment and accessories as specified under “Electrical Equipment & Accessories – “Volume V-A and Volume V-B” of this bid document.

29.00.00 Complete civil, structural, architectural & building service works, underground and overground, including all design, preparation of design and construction

drawing for power house, miscellaneous plant buildings & other indoor/outdoor facilities as included in this package including supply of materials, labour, tools & machinery as required. The services shall include but not be limited to the following:

a) Foundation for all the equipment supplied under this package including installation of anchor bolts, sleeves and other embedded fixtures. Foundation of Turbine generators, TDBFPs located on operating floor, MDBFP located on mezzanine floor, ID fans, FD fans, PA Fans and Coal Mills shall be conventional machine foundations.

b) Fabrication & erection of all types of steel work as required for buildings, platforms, stairs, ladders, hangers & supports, pipe and cable rack structures, conveyor galleries and trestles, equipment mounting structures, switchyard gantries and towers etc.

c) Installation of grounding & lightning protection mat for all equipment & building including risers, sub-grids, down conductors, shielding masts etc. as necessary.

d) Soil investigation of area under this package, Land grading over existing grades as necessary for installation of equipment/structures including provision for retaining walls where required, excavation, backfilling, disposal of excess soil, concrete paving, boulder soling of various areas as specified.

e) Brickwork, plastering, flooring and floor finish, doors, rolling/ sliding shutters, windows/louvers, internal partitions, glazing, false ceiling, false flooring, external cladding, roof protection, painting, sanitary & plumbing works etc. as specified and necessary for all the buildings constructed under this package.

f) Permanent & construction roads around power house and other buildings, as well as arterial roads, culverts and area drainage as specified elsewhere in this specification.

Apart from the power house building & mill building the following miscellaneous plant buildings/structures will be required to be constructed under this specification package:

g) C.W. Pump house with electrical annex including cooling tower, water conveying concrete duct from cooling towers, forebay, etc.

h) ESP Control-cum-Fly Ash Equipment Building.

j) Mill Reject System Compressor House, Mill reject Silo
k) Condensate Transfer RCC Pump House

l) Pipe and Cable Racks, Trenches & Culverts.

m) Transformer foundation with fire barrier wall, pits, rails etc.

n) Fire water storage tanks & fire water pump house including

equipment, foundation & pipe supports with their foundation.

o) Fire Station Building

p) Ash Silo , ash dyke and pump-houses and sumps required for ash handling plant

q) Coal Handling Plant

r) Chimney

s) Service building and all other non-plant building and utilities mentioned elsewhere in this specification

The above list is not exhaustive and any building required to be constructed, as incidental to this contract shall be deemed to be included under the scope of the present specification.

For further details refer Volume VII-A & Volume VII-B of this specification.

Set of spares for all plants and equipment for all systems, as recommended by the respective manufacturer/bidder for regular reliable operation of minimum two (2) years. Bidder is to develop recommended list of spare parts with prices by items and this shall be furnished separately in the prescribed format. Sufficient description and drawings are to be provided to permit analysis and evaluation of spares recommended.

Set of tools and tackle, fixtures etc. in new condition, as required for regular operation and maintenance of the plant and equipment offered. Adequate means shall be provided for lifting and handling of each item of plant and equipment including slings etc. Price for such tools & tackle, fixtures etc. shall be furnished separately in the prescribed format.

B. SERVICES TO BE RENDERED BY THE BIDDER

The services to be rendered by the Bidder shall include but not be limited to the following :

1.00.00 Dismantling of all existing structures/buildings in colony (excluding the temple) needs to be done by the EPC contractor, and the disposal of the debris is to be made at a distance of about 5 km from the plant site, location of which will be identified by the TSGENCO site engineer.

2.00.00 Construction of residential colony including recreation club, hospital building, indoor stadium, shopping complex, STP in residential colony, rain water harvesting structures, potable water treatment plant in colony, Bank building including ATM building

3.00.00 Services for complete engineering, co-ordination and project management as detailed in Section-IV of this specification volume. Necessary site survey, measurement, collection of data/detail about existing installations wherever

applicable for interfacing with existing plant.

4.00.00 Services for shop tests and quality assurance, etc. as detailed elsewhere in this specification.

5.00.00 Services for construction, fabrication, equipment erection, testing as well as trial run & commissioning of various equipment and accessories under the contract. The details of such services are indicated in Section-VI of this specification volume. Bidder shall arrange tower crane for erection and construction work, wherever necessary. Moreover, all erection tools and tackle necessary for all the equipment as well as for generator stator handling and erection shall be arranged by the bidder.

6.00.00 Supply of all mandatory, erection/commissioning and recommended spares, special tools & tackle including required after-sales services during and after the warranty period.

7.00.00 Supply of all consumables required for the works as per provision of respective clauses specified in conditions of contract.

8.00.00 Furnishing of all document, drawings, design basis reports, optimization, study reports, instruction manuals, etc. including "As built" drawings, as called for in the specification both in requisite no. of hard copies and in soft form (CD).

9.00.00 Operation and Maintenance training.

10.00.00 Obtaining approval from statutory bodies in India. However, Owner shall provide assistance to do so.

11.00.00 Equipment shop painting.

12.00.00 Any other service, although not specifically called for but required for a turn-key contract of the size and nature indicated in this specification.

13.00.00 For details of services under clause B, subsequent sections of this Lead specification may be referred.

C. EXCLUSIONS

Raw water intake system, other than modification of the GRP pipe with MS pipe inside plant boundary.

D. TERMINAL POINTS

The terminal points of the complete package to be supplied shall be as follows. For all terminal points scope of this contract shall include making the joint including supply of mating flanges, gaskets, bolts, nuts etc and including any isolation valve. Terminal Points mean Engineering, Procurement and Erection in entirety.

1.00.00 Railway line terminal point

For railway line terminal point, refer to RITES report attached.

2.00.00 Plant Water System

Inlet of existing intake valve chamber. However, intake GRP pipe needs to be rerouted/modified by MS pipe as detailed in Volume III-B of this specification.

3.00.00 **Electrical**

400kV Switchyard line take-off gantry (including droppers for line side equipment) for power evcuation through new switchyard/transmission lines.

E. FACILITIES TO BE PROVIDED BY THE OWNER

1.00.00 Land, free of charge as available for the construction of plant.

2.00.00 Construction water shall be provided free of cost at one point.

3.00.00 Employer will arrange power source free of cost at 11 kV level at one point. Street lighting and distribution system to be done by EPC contractor. High mast lighting is to be provided. Adequate lighting from safety point of view is to be provided in the construction area.

4.00.00 Potable/drinking water to be provided at one point.

GENERAL TECHNICAL REQUIREMENTS

CONTENT

GENERAL TECHNICAL REQUIREMENTS

1.00.00 CODES AND STANDARDS

1.01.00 Except where otherwise specified, the Plant shall comply with the appropriate Indian Standard or an agreed internationally accepted Standard Specification as listed in the annexure to this Section and mentioned in detailed specifications, each incorporating the latest revisions at the time of tendering. Where no internationally accepted standard is applicable, the Bidder shall give all particulars and details as necessary; to enable the Owner to identify all of the Plant in the same detail as would be possible had there been a Standard Specification.

1.02.00 Where the Bidder proposes alternative codes or standards he shall include in his tender one copy (in English) of each Standard Specification to which materials offered shall comply. In such case, the adopted alternative standard shall be equivalent or superior to the standards mentioned in the specification.

1.03.00 The plant will be designed in compliance with applicable National and International Codes and Standards such as ASME, ASTM, DIN, BS, IEC, IEEE, IS, etc. Wherever specified or required the Plant shall conform to various statutory regulations such as Indian Boiler Regulations, Indian Explosives Act, Indian Factories Act, Indian Electricity Act, Environmental Regulations, etc. Wherever required, approval for the plant supplied under the specification from statutory authorities shall be the responsibility of the Contractor.

1.04.00 In the event of any conflict between the codes and standards referred above, and the requirements of this specification, the requirements, which are more stringent, shall govern.

1.05.00 In case of any change of code, standards and regulations between the date of purchase order and the date the Contractor proceeds with manufacturing the Owner shall have the option to incorporate the changed requirements. It shall be the responsibility of the Contractor to advise Owner of the resulting effect.

1.06.00 Successful Bidder to furnish two (2) sets of latest of national/inter-national codes and standards to owner.

2.00.00 RESPONSIBILITY FOR DESIGN

2.01.00 The Contractor shall assume full responsibility for the design of the whole and every portion of the Plant, whether or not the design work was undertaken specifically in relation to the Contract and whether or not the Contractor was directly involved in the design work.

2.02.00 Notwithstanding the Owner's wish to receive the benefits of new, advanced and improved technologies, a prime requirement is that all the systems and components proposed shall have been already adequately developed and shall have demonstrated good reliability under similar, or more arduous conditions elsewhere, at least for continuous 2 years in two different power station.

2.03.00 The successful bidder shall have to carry out surge analysis, BFP transient analysis and other transient condition studies as may be necessary and as required by the Owner as per proven engineering practice.

2.04.00 The Bid shall include a detailed discussion on the development status of, and the reasons for any changes made in proposed systems or components for the Plant, as compared with similar items previously supplied in other installations cited by the bidder as reference plants.

2.05.00 The Bidder may also make alternate offers, provided such offers are superior in his opinion in which case adequate technical information, operating feed back, etc. are to be enclosed with the offer, to enable the Owner to assess the superiority and reliability of the alternatives offered. In case of each alternative offer, its implications on the performance, guaranteed efficiency, auxiliary power consumptions, etc. shall be clearly brought out to the Owner to make an overall assessment. In any case, the base offer shall necessarily be in line with the specifications i.e. Base offer shall be as per the technical specifications and the same will be considered for techno-commercial evaluation.

3.00.00 NAME PLATES (RATING PLATES)

3.01.00 Instruction plates, name plates or labels shall be permanently attached to each main and auxiliary item of plant in a conspicuous position. These plates shall be engraved with the identifying name, type and manufacturers serial number, together with the loading conditions under which the item of plant has been designed to operate.

3.02.00 Items such as valves, etc. which are subject to hand operation, shall be provided with nameplates so constructed as to remain clearly legible throughout the life of the plant giving due consideration to the difficult climatic conditions to be encountered. Nameplates shall be securely mounted where they will not be obscured in service by insulation, cladding, actuators or other equipment. Direction of flow is also to be engraved.

3.03.00 All trade nameplates and labels shall be in English language. All measurements shall be in M.K.S. Units.

3.04.00 The size and location of nameplates shall be subject to Approval of the Engineer.

4.00.00 SAFETY AND SECURITY

4.01.00 The design shall incorporate every reasonable precaution and provision for the safety of all personnel and for the safety and security of all persons and

property. The design shall comply with all appropriate statutory regulations relating to safety. All structures and equipment shall be designed and constructed to withstand every foreseeable static and dynamic loading condition, including loading under earthquake conditions, with an adequate margin of safety.

4.02.00 Ready and safe access with clear head room shall be provided to all parts of the plant for operation, inspection, cleaning and maintenance.

4.03.00 Escape routes and clear ways shall be provided to allow speedy evacuation of the plant in the event of fire or explosion, and the plant layout shall allow for ease of access to all parts of the Works by rescue and fire fighting teams. The plant layout shall be designed to localise and minimise the effects of any fire or explosion. The recommendations of NFPA, OSHA, and TAC etc. as necessary shall be followed in all respects.

4.04.00 The use of corrosive, explosive, toxic or otherwise hazardous materials shall be kept to a minimum during construction and the design of the plant shall minimise the requirement for such materials during operation and maintenance. Where such materials must be used, all necessary precautions shall be taken in the design, manufacture and layout of equipment to minimise the resulting hazard, and all equipment necessary for the protection and first-aid treatment of personnel in the event of accidents shall be provided. Particular attention is drawn to avoid the use of materials containing asbestos in any form.

5.00.00 **GUARDS**

5.01.00 Effective guards and fences must be provided to prevent injury to operators through accident or malpractice.

5.02.00 Mesh guards which allow visual inspection of equipment with the guard in place are generally preferable. The guards shall be constructed of mesh attached to a rigid framework of mild steel rod, tube, or angle and the whole galvanised to prevent loss of strength by rusting or corrosion. The guards shall be designed to facilitate removal and replacement during maintenance.

5.03.00 All drive belts, couplings, gears, sharp metallic edges and chains must be safely guarded. Any lubricating nipple requiring attention during normal running must be positioned where they can be reached without moving the guards.

5.04.00 Guards for couplings and rotating shafts shall be in accordance with BS 5304-1975 or similar approved standard. All rotating shafts and parts of shafts must be covered.

5.05.00 Suitable fencing shall be provided to enclose all openings or doorways used for the hoisting and lowering of machinery etc. This fencing must be securely fixed but quickly detachable when required. A secure hand hold must be provided on each side of the opening or doorway.

6.00.00 LOCATION AND LAYOUT REQUIREMENTS

The majority of plant and equipment (excluding steam generator and some other auxiliaries) shall all be of indoor installation. A broad list of buildings housing such equipment is given elsewhere in this specification. Layout should facilitate access for operation-maintenance and inspection of any one or more equipment/components at a time without disturbing the operation or installation of rest of the plant. Further, Bidder should comply with the criteria given under the various equipment and system specifications as well as those stipulated in Annexure-II attached to this section.

Enclosed General Layout and other tender layout drawings show the location of major installations and auxiliary buildings. The Bidder shall try to retain these locations as far as practicable. The layout of equipment within the power house as shown in the tender drawings is indicative. The Bidder may, subject to Owner's approval alter the same to suit the space requirement of the equipment offered.

Bidder may give as an alternative his own preferred layout clearly indicating the advantages and other implications, if any. Such alternative will not be considered for evaluating the bid, but may be considered with the successful Bidder if Owner/Engineer finds the proposal more attractive in terms of techno-economic consideration.

While developing the layout of buildings the following criteria shall be given effect :

a) The minimum width of clear access corridors around equipment shall be 1.2 meter.

b) Each building shall have an identified vacant space for equipment unloading and maintenance and preferably a separate bay altogether in buildings housing heavy equipment. Provision for handling equipment by monorail hoist and/or overhead crane shall be made as specified.

c) The minimum clear height available between two consecutive floor slabs shall not be less than five (5) meters. A clear head room of 2.5m shall be maintained between the floor and any overhead piping/ cables or other obstruction. Adequate provision for natural ventilation and illumination shall be made as per good engineering practices.

d) There shall be at least two (2) nos. main access doors, one on either side of each building, of which one shall be minimum 3 meters wide with rolling shutters for equipment entry. For multistoried buildings, at least two (2) nos. regular staircases diagonally opposite to each other shall be provided connecting all the floors and roof. These minimum requirements shall be augmented as required depending on the floor area, statutory requirements and TAC recommendations.

e) All buildings shall have provision for toilet and associated effluent discharge system together with facility for drinking water. The criteria for ventilation, fire protection and illumination of building spaces specified

elsewhere in this specification shall be complied with.

f) All rail/road crossings for pipe/cable racks shall be done with minimum 8 meters headroom from top of rail/road to bottom of rack. Similarly top cover over underground pipes/cables shall be minimum one (1) meter. For other detail refer to Annexure-II.

g) Cubicle for operating personnel shall be located at safe place near the equipment.

h) Interplant cable routing will be on overhead cable trays on pipe cum cable trestle or on cable trestle except where approved by purchaser/consultant. In exceptional case, small stretch of outdoor run of interplant cable routing may be taken through cable trench only with the Employer's prior approval.

i) Concept of various mechanical and electrical equipment location and building dimensions (including column-row spacing) as shown in Plot Plan/Floor Plan drawing are to be adhered to. Any departure from this suggestive layout is primarily not recommended.

7.00.00 OPERATION, MAINTENANCE & AVAILABILITY CONSIDERATIONS

7.01.00 Equipment/works offered shall be designed for high availability, high reliability, low maintenance and ease of operation & maintenance. The Bidder shall specifically state the design features incorporated to achieve high degree of reliability, availability, operability and ease of maintenance. He shall also furnish details of availability records in plants stated in his experience list.

7.02.00 Ample space for ease of operation and maintenance including equipment removal, tube bundle/cartridge/rotor pulling etc. shall be provided. All valves, gates, dampers and other devices shall be located and oriented in such a way that they are accessible from operating floor levels. Where this cannot be adhered to, platforms and walkways with access ladders shall be provided to facilitate operation and maintenance.

7.03.0 Motorised lifting devices, i.e. hoists, chain pulleys, jacks, etc. shall be provided for handling and carrying out maintenance of any equipment and/or part having weight in excess of 3000 Kg. Suitable beams, hooks etc. for this purpose shall be provided in the buildings.

No lifting arrangement is necessary for part having weight less than 500 Kg. Hoist shall be well protected by environment. Suitable painting and coating covering hoist at outdoor shall be provided.

Lifting devices like lifting tackles, slings, etc. to be connected to hook of the hoist/crane shall be provided by the Bidder for lifting the equipment, accessories covered under this specification.

7.04.00 All similar parts of the equipment shall be made to gauge and shall be interchangeable with and shall be made of same material and workmanship as the corresponding parts of the equipment. Where feasible common

components shall be employed in different pieces of equipment in order to optimize the spares inventory and utilization.

8.00.00 MATERIALS

8.01.00 In selecting materials of construction of equipment, the Contractor shall pay particular attention to the atmospheric conditions existing at the Site and the nature of material/fluid handled. Wherever deviations are taken in respect of materials specified, the reasons shall be spelt out clearly in the proposal.

All materials shall be new, and shall be of the quality most suited to the proposed application.

8.02.00 In as far as is possible; materials shall be in accordance with Indian or international standard specifications and shall be used in accordance with Indian or international codes of practice. Where such standards or codes of practice are not available sufficient information shall be provided to allow the Owner to assess the suitability of the material for the particular application.

All materials used shall have performed lengthy satisfactory service in similar or more arduous conditions to those proposed by the Contractor.

8.03.00 All parts which could deteriorate or corrode under the influence of the atmospheric, meteorological or soil conditions at the Site, or under the influence of the working conditions shall be suitably and effectively protected so that such deterioration or corrosion is a minimum over the life of the plant.

9.00.00 LUBRICATION

9.01.00 Provision shall be made for suitable efficient lubrication where necessary to ensure smooth operation free from undue wear.

9.02.00 Non ferrous capillary tubing shall be used throughout.

9.03.00 Gear boxes and oil baths shall be provided with filling and drain plugs, both of adequate size. An approved means of oil indication including level switches and temperature indication shall be provided.

9.04.00 All high speed gears shall be oil bath lubricated. Low speed gears shall be lubricated by means of soft grease. Removable and accessible drip pans shall be provided to collect lubricant which may drop from operating parts.

9.05.00 All lubrication points shall be conveniently situated for maintenance purposes. It must be possible to carry out lubrication from a gangway or landing and without the removal of guarding or having to insert the hand into it. Where accessibility to a bearing for oiling purposes would be difficult a method of remote lubrication shall be fitted.

9.06.00 The Contractor shall supply grease gun equipment suitable to service each type of nipple fitted.

10.00.00 **LUBRICANTS AND CONTROL FLUIDS**

10.01.00 The Contractor shall provide a detailed and comprehensive specification for all lubricating oils, greases and control fluids required for the entire plant. A sufficient supply of these shall be provided by the Contractor for initial commissioning, first fill and till COD of the unit.

10.02.00 The Contractor shall supply a detailed schedule giving the lubricant testing, cleaning and replacement procedures. All equipment and facilities necessary for the testing, cleaning and changing of lubricants and control fluids shall be provided. The Contractor shall endeavor to reduce the varieties and grades of required lubricants and control fluids to a minimum, matching them where possible to those already in use in the generating station in order to simplify procurement and minimise storage requirements. All lubricants and control fluids shall be of internationally recognised standards and shall be easily obtainable from a large number of Indian suppliers. Bidder shall also indicate the equivalent Indian Standard for the above for easy procurement in future.

10.03.00 No lubricant or control fluid shall have toxic or other harmful effects on personnel or on the environment.

11.00.00 **OPERATION AND MAINTENANCE**

11.01.00 The plant shall be designed and constructed so that operation and maintenance manpower requirements are minimised.

The design and layout shall facilitate inspection, cleaning, maintenance and repair. The importance of continuity of operation is second only to that of safety.

11.02.00 Spare parts for equipment shall be interchangeable with the original components and, so far as possible, be of common design and manufacture.

11.03.00 All similar standard components/parts of similar standard equipment provided shall be interchangeable with one another. Further identical equipments shall be provided for similar duties so that the same are interchangeable with one another in totality and component wise.

11.04.00 All heavy parts (500 Kg and above) must be provided with a convenient arrangement for slinging and handling during erection and overhaul. Any item of plant normally stripped or lifted during periods of maintenance and weighing one tonne or above, shall be clearly marked with its weight.

11.05.00 On completion of commissioning, a complete set of tools for the maintenance of the entire plant shall be provided by the Contractor. This shall include all necessary spanners, special wrenches, extraction equipment and any special tools reasonably required by the Engineer. Tools used during erection and commissioning shall not be accepted except with the specific approval of the Engineer.

11.06.00 All equipment and major valves should be provided with adequate maintenance approach and facility.