B-R POWERGEN LTD.

TENDER DOCUMENT

FOR

CONSTRUCTION OF SREEPUR 150 MW (±10%) HFO BASED POWER PLANT PROJECT.

VOLUME 2 OF 2 (PART B)

TECHNICAL PARTICULARS

OCTOBER- 2016

SCHEDULES AND DRAWINGS

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SCHEDULE-A

GUARANTEES

1. Plant Output Guarantees

The guaranteed performance of the plant (with all units) at Site condition (35^0 C, 1.013 bar, 98% Relative Humidity) and 0.85 generator power factor shall be as follows:

Base Load	**Heavy Fuel Oil (HFO)**
Net Power Output, KW	:----------
Net Heat rate, KJ/Kwh	:----------
NO_X Level [at 15% O_2]	:----------
Noise level (dB) (at distance 100 meter)	:----------
Total Auxiliary consumption in KW	:----------
Lube oil consumption g/kWh	: ----------

i) Net Power Output

Net power output shall mean the total plant power output measured at the high voltage side of the step-up transformer.

ii) Net Heat Rate

Net heat rate shall mean the heat equivalent of the fuel consumed by the total plant, time based upon the Lower Calorific Value, divided by the net power output as defined above.

iii) Fuel

In so far as these performance guarantees are affected, the fuel shall be in accordance with the analysis given in the Technical Specification, (20.4 of Vol 3).

iv) Tolerance

A positive tolerance of 1% in case of Net Heat Rate and no tolerance on Net Power Output shall be allowed. The performance tests shall be carried out on the site in accordance with section 16, Vol. 2 of 3, Technical Specification to prove that the above performance guarantees are available. Also other capability/ parameters shall be verified.

v) Performance Correction Curves

The following curves, which are necessary for correcting Power Output, Heat Rate and Inlet/Outlet Temperature from the test ambient condition to the guarantee reference condition, shall be furnished with the Tender.

- Variation in barometric pressure
- Variation in ambient temperature
- Variation of generator efficiency with Power Factor
- Variation in pressure loss from atmosphere to compressor inlet flange
- Variation in pressure loss from turbine exhaust flange to atmosphere
- Variation in Altitude and Relative Humidity
- Others if any

2. Step-Up Transformers Guarantees

The following items shall be guaranteed by the Contractor :

i) Losses

a. Load loss at ONAF rating under the rated voltage, tap and frequency :

-At 0.8 Power Factor, Lagging, KW :----------
-At Unity Power Factor, KW :----------

b. No-Load loss under the rated voltage, tap and frequency , KW :----------

ii) Impedance at rated power and frequency, % :----------
(Positive Seq.)

3. Date of completion of Initial Commercial Operation

The Initial Commercial Operation of the plant shall be completed within the period after effective Date of Contract.

: ---------- days

SCHEDULE-B

TECHNICAL DATA SHEET

	Item Name	Unit	To be filled by Tenderer
B-1	**Engine and Accessories**		
	General		
	Manufacturer		
	Type		
	Model		
	Net output at site condition		
	Base load	kW	
	Capable of unit load change without structural damage	kw/min	
	Critical speed above and below rated speed		
	Max. vibration		
	Power rating at generator terminal		
	Power rating		
	Ambient temp=45°C	kW	
	Ambient temp=35°C	kW	
	Ambient temp=25°C	kW	
	Ambient temp=20°C	kW	
	Maximum vibration limit	mm/sec	
	Speed		
	Rated Speed, Engine	rpm	
	Rated Speed Generator	rpm	
	Engine Performance		
	Overhaul Life on base load	hours	
	Expected life of cylinder	hours	
	Expected life of reciprocating parts	hours	
	Expected life of stationary parts	hours	
	Number of hours of continuous operation allowed at peak output	hours	
	Number of hours of peak operation allowed per year	hours	
	Overhaul life on peak load		
	Overhaul life on number of hours	hours	
	Overhaul life number of starts	no.	

	Item Name	Unit	To be filled by Tenderer
	Starting time from cold	in min	
	starting time from standby	in min	
	Electrical power required for standby	kWh	
	Indicated hp	hp orkW	
	Brake hp	hp orkW	
	Indicated thermal efficiency		
	Brake thermal efficiency		
	Mechanical efficiency		
	Heat rate		100%
1.	Ambient air temp 45°C	kJ/kWH	
2.	Ambient air temp 35°C	kJ/kWH	
3.	Ambient air temp 25°C	kJ/kWH	
4.	Ambient air temp 20°C	kJ/kWH	
	Out-put		100%
5.	Ambient temp=45°C	kW	
6.	Ambient temp=35°C	kW	
7.	Ambient temp=25°C	kW	
8.	Ambient temp=20°C	kW	
9.			
10.			
	Start up time from cold start to synchronous speed		
	Normal	minut.	
	Emergency	minut.	
	Capable rated load change without structural damage	kW/Min	
	Full Load Heat Balance		
	Useful work		
	Cooling		
	Exhaust		
	Friction, Radiation and others		
	Heat input		100 unit
	Staring Time	hour	
	From Cold	hour	
	From Standby		
	Time required to no load to maximum load		
	Normal	minut.	
	Emergency	minut.	
	Starting reliability	%	

	Item Name	Unit	To be filled by Tenderer
	Number of consequtive starts to prove reliability	no.	
	Sound attenuation		
	100 meter from unit	db	
	50 meter from unit	db	
	1 meter from unit	db	
	Engine data		
	Number of cylinder	no	
	Piston materials		
	Piston ring materials		
	Cylinder with liner material		
	Max allowable gas temperature after combustion	° c	
	brake mean effective pressure	psi	
	Cylinder bore	mm	
	Piston stroke	mm	
	Mean piston speed	mm/sec	
	Complete engine weight	ton	
	Heaviest piece during erection	ton	
	Heaviest piece after erection (disassembled)		
	Engine output (On shaft)	mw	
	Specific fuel consumption	Nm^3/kwh	
	Cooling system		
	Type and description		
	Design ambient temperature for water	° c	
	Lubrication system		
	Type and description		
	Capacity of lube-oil storage tank	liter	
	Cap. of maintenance tank	liter	
	Type of lube-oil purifier		
	Capacity of lube oil purifier	liter/hour	
	Type of filtration unit		
	Manufacturer		
	Type of lube-oil heater		
	Pre lube-oil pump manufacturer		
	Type		

	Item Name	Unit	To be filled by Tenderer
	Motor rating	kW	
	Capacity	liter/ hour	
	Starting system		
	Type of starter		
	Manufacturer		
	Capacity		
	Type of compressor		
	Pr. to stop compressor	bar	
	Pr. to start compressor	bar	
	No. of air bottle	no	
	Air bottle capacity	liter	
	Pipe line pr. to the engine	bar	
	Engine intake air filters		
	Manufacturer		
	Type		
	Material		
	Type of louvers		
	Turbocharger		
	Inlet pr. of turbine	bar	
	Exhaust pr. of turbine	bar	
	Suction pr. of compressor	bar	
	Exhaust pr. of compressor	bar	
	Temp. of air after compressor	°C	

	Engine governor or control & Hardware		
	Manufacturer		
	Type		
	Main CPU unit specification		
	Manufacturer		
	Software manufacturer		
	Name of speed regulation		
	Name of fuel valve control		
	Maximum speed rise after full load rejection to be guaranteed by contractor		
	Housing		

	Item Name	Unit	To be filled by Tenderer
	Material		
	Finish		
	Turning gear		
	Motor rating	hp	
	Main shaft speed on turning gear	rpm	
	fire protection system		
	Fire Fighting Devices		
	Manufacturer		
	Fire water storage tank capacity	liter	
	No of fire hydrants hose cabinets		
	Fire pump rating(motor driven)		
	Fire pump rating(Diesel engine driven)		
	No. of portable extinguishers	CO_2	
	Oil-Fuel System		
	Transfer Pump-Heavy oil		
	Manufacturer		
	Number	no.	
	capacity	liter/hour	
	Motor rating	kW	
	Storage Tank-Heavy oil		
	Capacity	liter	
	Dimension : diameter height	meter meter	
	Fuel Oil(Day) Tank		
	Capacity	liter	
	Dimension :diameter	meter	
	height	meter	
	Maintenance Lifting Device		
	Overhead Maintenance Cranes		
	Manufacturer		
	Type		
	Model		
	Capacity	Ton	
	Control Room Air Conditioning		
	Manufacturer		
	Model		
	Type		
	rating	ton	

	Item Name	Unit	To be filled by Tenderer
	Exhaust heat recovery system		
	Type of Exhaust gas boiler		
	Capacity of boiler	kW	
	No of feed water pumps		
	Motor rating for feed pump	kW	
	Feed Pump capacity	liter/ hour	
	Steam generation	kg/hour	
	Steam pr (Saturated)	bar	
	Feed water temp	°C	
	No of chemical dosing pump		
	Chemical to be dosed		
	Auxiliary boiler (if required)		
	Manufacturer		
	Capacity		
	Fuel type and consumption rate		
	Others		

B-1.2 Emergency Diesel Generator Engine Performance Data at the Site Condition (35^0 C, 1.013 bar, 98% RH)

-Type of EDG set ----------

-Model Number ----------

-Manufacturer of EDG set, Country ----------

-Net output at Site condition

Base Load, KW ----------

-Net Heat Rate at Site Condition

Base Load, KJ/Kwh ----------

-Guaranteed rate of unit load change is ----------

Capable without structural damage, KW/min. ----------

-Noise at a distance of 100 metres ----------

(in each octave band, see section 2, Vol. 2)

-Critical speed above and below ----------

rated speed ----------

- Engine speed, rpm ----------

-Generator, rpm ----------

-Generator rated Voltage & pf ----------

-Engine Starting System ----------

-Max. starting time required from
standstill to full speed, min ----------

-Max. vibration limit, mm/sec ----------

-Min. time required for applying full
load to unit, ----------

From cold standby, min ----------

From warm shutdown, min ----------

-Estimated hours at or below base rating of
between :

Minor inspection, hours ----------

Normal inspection, hours ----------

Major overhaul, hours ----------

-Estimated shutdown period, hour and
Man-hours for : ----------

Minor inspection ----------

Normal inspection ----------

Major overhaul ----------

-Number, type and arrangement of
cylinders ----------

-Number of strokes ----------

-Compressor pressure ratio ----------

-Starting system ----------

-Description of Speed governing system
and fuel control system ----------

-Fuel consumption ----------

-Description of cooling system ----------

-Auxiliary power consumption, KW ----------

B-2 Generator and Ancillaries

2.1 Generator

-Manufacturer, Country ----------

-Type ----------

- KVA rating ----------

- Power factor (0.80) ----------

-Max. leading & lagging KVAR capability ----------

-Rated voltage between lines, KV ----------

-Connection of armature winding ----------

-Rated Current, A ----------

-Rated frequency, Hz ----------

-Efficiency

at pf 0.8, % ----------

at pf 1.0, % ----------

-Stator overloading, % ----------

-Critical speed, rpm ----------

-Max. torque when the stator is short-circuited, Nm ----------

-Generator Characteristics

Instantaneous Max. short-circuit current

at nominal voltage, A_{peak} ----------

sub-transient reactance, Xd" pu ----------

transient reactance, Xd' pu ----------

synchronous reactance, Xd pu ----------

negative sequence reactance, pu ----------

zero sequence reactance, pu ----------

field time Constant, Td'_0 sec ----------

Transient time Constant, Td sec ----------

initial time Constant, Td" sec ----------

-Moment of inertia GD^2 of rotor, Kg-m^2 ----------

-percent rise on voltage when full load is

rejected and operating at pf 0.8 , % ----------

pf 1.0 , % ----------

-Telephone influence factor

Balanced ----------

Residual ----------

-Class of winding insulation

Armature winding ----------

Field winding ----------

-Type of cooling [TEWAC]

-Short circuit ratio, sat

-Generator rated excitation requirements for operation at rated kVA

Excitation voltage ----------

Excitation current ----------

- Generator calculated losses at 100% Base rating

Total generator iron loss, kW ----------
Generator stator I^2 R loss, kW ----------
Generator rotor I^2 R loss, kW ----------
Generator stray load loss, kW ----------
Generator wind-age loss, kW ----------
Total generator loss, kW ----------

-Generator weights

Weight of rotor, kg ----------
Weight of complete stator, kg ----------

2.2 Exciter (Shaft mounted, Brushless)

- Manufacturer, country ----------
- Type ----------
- Rated output, kW ----------

-Rated load field voltage at
0.80 pf/1.00 pf ----------
-Rated exciter current at
0.80 pf./l.00 pf ----------
- Exciter ceiling voltage, V ----------
-Maximum continuous exciter
current, A ----------
-Excitation system voltage
response ratio ----------

2.3 Automatic Voltage Regulator

-Manufacturer, country ----------
- Type ----------
- Description of AVR, Ref. No. ----------

2.4 Generator Protection (Manufacturer Cat. No. or Type)

-Generator differential relay ----------
-Generator ground over-current relay ----------
-Field/rotor ground detection system ----------
-Reverse power relay ----------
-Loss of field relay ----------
-Voltage restraint over-current relays ----------
-Negative phase sequence relay ----------
-Under/Over frequency relay ----------
-Synchro-check relay ----------
-Lockout relays ----------
-EDG protection relays ----------
-Auxiliary relays ----------
-Inter-connection protection [main & back-up] from
plant to grid ----------
-Others: Specify ----------

B-3 11 KV Switchgear

Generator Switchgear
-Manufacturer, country ----------
-Circuit breaker
Catalogue No. ----------
Type ----------
Closing current at 125 volts DC, A ----------
Time to close, m sec ----------
Tripping current at 125 volts DC, A ----------
Time to trip, m sec ----------
- Rating and capabilities
Current rating, A ----------
Voltage rating, V ----------
Nominal 3 phase interrupting capacity, MVA ----------
Maximum symmetrical interrupting capacity, kA ----------
3 second short time rating, kA ----------
Closing and latching capability, kA ----------
- Operating Mechanism ----------

-Instruments and devices Manufacturer Type
Current transformers
Single ratio ----------
Multi ratio ----------
Potential transformers ----------
Control and instrument switches ----------
Indicating lights ----------

-Lightning arresters ----------
-Surge protection devices ----------
-Type of bus insulation ----------
-Type of bus supports ----------
-Type of insulation on connections ----------
-Size of completely assembled switchgear
Length, mm ----------
Width, mm ----------
Height, mm ----------
- Total weight of switchgear, kg ----------
-Attached type test report, No ----------

B-4 132 kV Equipment

4.1 132 kV Circuit Breaker
- Manufacturer, Country ----------
- Type designation ----------
- Number of poles ----------
- Rated voltage, KV ----------
- Maximum design voltage
-Minimum voltage for rated
interrupting capacity, KV ----------
- Rated continuous current, A ----------
- Rated frequency, Hz ----------
- Rated insulation level
Impulse withstand voltage, kV-peak ----------

-Power frequency withstand
voltage (1 mm.), KV ----------
-Rated interrupting capacity, MVA ----------
- Maximum interrupting current, kA ----------
- Rated momentary current ----------
- Rated duration of short-Circuit, 3 sec ----------
- Rated making current, kA-peak ----------
-Operating duty ----------
- Operating time, m sec. ----------
-Rated interrupting time, m sec ----------.
-Closing time, m sec ----------
-Opening time, m sec. ----------
-Minimum dead time, m sec. ----------
-Reclosing time, m sec. ----------
-First-pole-to clear factor
At 100% breaking capacity ----------
At 10% breaking capacity ----------
-Out of phase breaking current
At 2.0 times rated voltage, KA ----------
At 2.5 times rated voltage, KA ----------
-Creepage distance of the insulator, mm ----------
-Weight of complete circuit breaker, Kg ----------
-Type of operating mechanism [Hydraulic] ----------
-Outline drawings, No ----------
-Standard specifications to which the
circuit breaker shall conform ----------
-Attached type test report, No ----------

4.2 132 kV Current Transformer
- Manufacturer, country ----------
- Type designation ----------
- Rated voltage, KV ----------
- Maximum design voltage, KV
- Rated Primary Current, A ----------
- Rated Secondary current, A ----------
- Rated frequency, Hz ----------
- Rated insulation level
Impulse withstand voltage, kV-peak ----------
- Power frequency withstand
voltage (1 mm.), KV ----------
- Number of cores ----------
For metering service ----------
For relaying service ----------
- Accuracy Class ----------
For metering service ----------
For relaying service ----------
- Rated Burden ----------
For metering service, VA ----------.
For relaying service, VA ----------
- Rated continuous thermal current, %
- Short-time current rating,(1 sec), KA ----------

- Creepage distance of insulator, mm ----------
- Weight of single phase unit, Kg
-Out line drawing, No ----------
-Standard specification to which the CT shall conform ----------
-Attached type test report, No ----------

4.3 132 KV Voltage Transformer

- Manufacturer, country ----------
- Type designation ----------
- Rated voltage, KV ----------
- Maximum design voltage, KV ----------
- Rated Primary Voltage, KV ----------
- Rated Secondary Voltage, V ----------
- Rated Secondary Voltage, V ----------
- Rated frequency, Hz ----------
- Rated insulation level
  Impulse withstand voltage, kV-peak ----------
- Power frequency withstand
  voltage (1 mm.), KV ----------
- Number of cores ----------
  For metering service ----------
  For relaying service ----------
- Accuracy Class ----------
  For metering service ----------
  For relaying service ----------
- Rated Burden ----------
  For metering service, VA ----------.
  For relaying service, VA ----------
- Rated continuous thermal current, %
- Short-time current rating,(1 sec), KA ----------
- Creepage distance of insulator, mm ----------
- Weight of single phase unit, Kg
-Out line drawing, No ----------
-Standard specification to which the PT shall conform ----------
-Attached type test report, No ----------

4.4 132 KV Lightning Arrester

- Manufacturer, country ----------
- Type designation ----------
- Rated voltage, KV ----------
- Maximum design voltage, KV ----------
- Rated frequency, Hz ----------
- Rated discharge current, KA ----------
- Min. power frequency spark-over voltage ----------
-Impulse protective level
  Max. spark-over voltage for a standard

full wave, KV_{peak} ----------

Max. front wave impulse spark-over voltage, KV_{peak} ----------

Max. discharge voltage at the rated discharge current, KV_{peak} ----------

- Creepage distance of insulator, mm ----------
- Weight of single phase unit, Kg ----------
- Type of operating counter ----------
-Out line drawing, No ----------
-Standard specification to which the LA shall conform ----------
-Attached type test report, No ----------

4.5 132 KV Isolators

- Manufacturer, Country ----------
- Type ----------
- Rated voltage, KV ----------
- Rated normal current, A ----------
- Rated short time withstand duration, 1 sec., KA ----------
3 sec., KA ----------
Dynamic peak, KA ----------
- Impulse withstand voltage
Across the isolating distance, KV_{peak} ----------
To earth and between poles, KV_{peak} ----------
- Power Frequency withstand voltage, 1 min.
Across the isolating distance, KV ----------
To earth and between poles, KV ----------
- Operating mechanism ----------
- Number of auxiliary contacts ----------
- Method of interlocking ----------
- Creepage distance of insulators ----------
- Weight of complete Isolator ----------
- Out line drawing, No ----------
- Standard specification to which the Isolator shall conform ----------
-Attached type test report, No ----------

4.6 Steel Structure

- Manufacturer, country ----------
- Standard specifications to which the steel structure shall conform ----------
-Type ----------
-Minimum thickness of members ----------
- Outline drawings ----------

4.7 Busbar and Connectors (Busbar / Bay Extension)

- Manufacturer, country ----------
- Standard specifications to which the

busbar and connectors shall conform ----------

-Type of busbar ----------

- Characteristics of bus conductor

Material ----------

Nominal sectional area ----------

Construction of conductor ----------

Calculated sectional area ----------

- Ultimate minimum breaking strength, kg ----------

- Outside diameter, mm ----------

-Standard unit weight, kg/ m ----------

-Calculated resistance at 20^0C, ohm / Km ----------

-Outline drawing of conductor, No. ----------

-Outline drawing of connection, No's ----------

4.8 Post Insulator (if any)

- Manufacturer, country ----------

- Number of units in complete post insulator ----------

- Diameter (max.), mm ----------

- Length of each unit, mm ----------

- Weight of complete post insulator, Kg ----------

- Creepage distance , mm ----------

- Min. Power frequency (dry) flash-over voltage, KV ----------

- 50% lightning impulse (+ve), KV ----------

- 50% lightning impulse (-ve), KV ----------

- Max. vertical working load

Tension, Kg ----------

Compression, Kg ----------

- Mechanical routine test load (tension), Kg ----------

- Mechanical type test load (tension), Kg ----------

- Vertical breaking load (tension), Kg ----------

- Max. torsional working load, Kg-m ----------

- Max. cantilever working load (complete post insulator), Kg ----------

- Min. cantilever breaking load upright (complete post insulator), Kg ----------

- Outline drawings ----------

- Standard specification to which the Post Insulator shall conform ----------

4.9 Suspension Insulator Assembly (if any)

- Manufacturer, country ----------

- Type ----------

- Insulator materials ----------

- Characteristics of disc element Diameter

Diameter, mm ----------

Unit spacing, mm ----------

Creepage distance, mm ----------

Electro-mechanical failing load, Kg ----------
Mechanical routine test load , Kg ----------
Min. Power frequency flash-over voltage
Dry, KV ----------
Wet, KV ----------
50% lightning impulse (+ve), KV ----------
50% lightning impulse (-ve), KV ----------
Ball and Socket size, mm ----------

- Characteristics of Insulator assembly
  Number of discs
  Total length, mm ----------
  Creepage distance, mm ----------
  Min. Power frequency flash-over voltage
  Dry, KV ----------
  Wet, KV ----------
  50% lightning impulse (+ve), KV ----------
  50% lightning impulse (-ve), KV ----------
- Breaking strength of complete set, Kg ----------
- Materials to be used
  Compression type dead end clamp ----------
  Bolted type clamp ----------
  Miscellaneous hardware ----------
- Outline drawings ----------
- Standard specification to which the Post Insulator shall conform ----------

B-5 Step-up Transformers and Associated Equipment

5.1 Step-up or Unit Transformer

- Manufacturer, country ----------
- Standard ----------
- Type ----------
-Rated output (ONAN/ONAF), MVA ----------
-Vector group ----------
-Nominal ratio of transformation at no load, KV/KV ----------
-Type of cooling ----------
-Total range of variation of transformation ratio expressed as percentage of high voltage with low voltage Constant
  Increasing ratio, % ----------
  Decreasing ratio, % ----------
- Size of each step, % ----------
- Type of tap changer (Make : **only MR, Germany or ABB, Sweden**) ----------
- Type of gas/oil actuated relay ----------
- Impedance voltage at 75^{9}C expressed as a percentage of normal voltage (ONAF rating)
  At highest ratio, % ----------
  At normal ratio, % ----------
  At lowest ratio, % ----------
- Voltage regulation at normal ratio,

75^{0}C and a power factor of,
Unity, % ----------
0.8, % ----------

- Magnetising current at normal ratio
High tension winding, A ----------
Low tension winding, A ----------

-Auxiliary Plant losses
Forced air plant, KW ----------

-Fixed losses at normal ratio
and 75^{0}C, KW ----------

-Load losses at IEC rating, normal ratio and 75^0 C
ONAF rating, pf 1.0/0.8, KW ----------
ONAN rating, pf 1.0/0.8, KW ----------

-Total losses at IEC rating, normal ratio and 75^{0}C
At ONAF rating, pf 1.0/0.8, KW ----------
At ONAN rating, pf 1.0/0.8, KW ----------

-Efficiency at IEC rating normal ratio and 75'C
At ONAF rating, pf 1.0/ 0.8, % ----------
At ONAN rating, pf 1.0/0.8, % ----------

-Type of transformer, shell or core ----------

-Type of core joint Minimum magnetic flux density
in core iron at normal voltage and frequency
based upon the net section of iron
Cores, T ----------
Yoke, T ----------

-Type of windings
High tension winding ----------
Low tension winding ----------

- Maximum current density in windings
High tension winding, A/ sq. mm ----------
Low tension winding, A/ sq. mm ----------

-Type of radial coil supports
High tension winding ----------

Low tension winding ----------

-Type of insulation used for,
High tension winding ----------
Low tension winding ----------

-Tapping ----------
-Tapping connection ----------
-Core bolts ----------
-Core bolt washers ----------

-Maximum observable oil temperature
at IEC rating, ^{0}C ----------

- Calculated thermal time Constant
At ONAF rating, hour ----------
At ONAN rating, hour ----------

-Type of winding maximum temperature
indicator ----------

-Total quantity of oil required to fill complete transformer up to lowest visible level in conservator, litres ----------

-Volume of oil to be removed to the level of the top yoke, litres ----------

-Volume of oil required to raise oil in conservator from lowest visible level to highest level, litres ----------

-Total volume of conservators, litres ----------

-High above transformer foundation pad of conservator highest oil, mm ----------

-Proposed filling medium for transformers shipped light and empty of oil ----------

-Makes and grades of oil suitable for filling transformer ----------

-Thickness of transformer tank

Sides, mm ----------

Bottom, mm ----------

-Number of cooling fan unit ----------

-Surface area of each cooler unit, mm^2 ----------

-Heat dissipation of each cooler unit as percentage of total heat dissipation at IEC rating, % ----------

-Average rate of oil flow through each cooler unit, litres/min ----------

-Weight of parts

Weight of copper, Kg ----------

Weight of core sheets, Kg ----------

Weight of all other ferrous parts, Kg ----------

-Weight of core and winding assembly, Kg ----------

-Weight of complete transformer, Kg ----------

-Weight of transformer arranged for shipment, Kg ----------

-Dimension of transformer including all fittings

Length, mm ----------

Breadth, mm ----------

Height, mm ----------

-Dimension of transformer arranged for shipment

Length, mm ----------

Breadth, mm ----------

Height, mm ----------

-Weight of each cooler, Kg

-Lightning impulse insulation level

High tension winding, KV_{peak} ----------

Low tension winding, KV_{peak} ----------

High tension neutral, KV_{peak} ----------

-Power frequency withstand voltage for 1 minute

High tension winding, KV ----------

Low tension winding, KV ----------

- Temperature rise

Winding, ^0C ----------

Top insulation oil, ^0C ----------

- Audible sound level at 1 meter from transformer surface, dB ----------

-Creepage distance of bushing
High tension bushing, mm ----------
Low tension bushing, mm ----------
Neutral bushing, mm ----------
Outline drawing, No ----------
-Attached type test report, No ----------

5.2 Transformer Protection (Manufacturer Cat. No. or Type)

- Differential relay ----------
- Restricted Earth Fault relay ----------
- over-current relays (LV & HV) ----------
- Earth Fault relays (HV, LV & Neutral) ----------
- Pressure relays ----------
- Temperature relays ----------
- Lockout relays ----------
- Auxiliary relays ----------
- Others: specify ----------

B-6 Station Transformers

- Manufacturer, country ----------
- Cooling class ----------
- Continuous kVA rating, kVA ----------
- Impedance at maximum kVA with
ONAN rating, % ----------
-Guaranteed efficiency at 100
per cent of maximum kVA with
ONAN rating, % ----------
- Standard, IEC ----------
-Excitation current at 100 per cent rated voltage,
in per cent based on maximum kVA with
ONAN rating, % ----------
- Guaranteed losses at 100 percent rated voltage
No load loss, kW ----------
Total losses at maximum with
ONAN rating, kW ----------

	Manufacturer	Type
-Bushing		
High voltage	----------	
Low voltage	----------	
Neutral	----------	
- Current transformers	----------	
- Approximate weight, Kg	----------	
- Total assembled, Kg	----------	
- Type of oil preserver system, Ref. No	----------	
-Primary and secondary voltage, V	----------	
- No. of taps	----------	
- Tap range	----------	
- Vector group	----------	

- Class of insulation ----------
- Temperature rise at, ^{0}C ----------
- ambient temperature, ^{0}C ----------
- Winding temperature, ^{0}C ----------
- Oil temperature, ^{0}C ----------

Transformers Protection (Manufacturer Cat. No. or Type)
- over-current relays (LV & HV) ----------
- Earth Fault relays (HV & LV) ----------
- Pressure relays ----------
- Lockout relays ----------
- Auxiliary relays ----------

B-7 Unit Auxiliary Transformer

- Manufacturer, country ----------
- Cooling class ----------
- Continuous kVA rating, kVA ----------
- Impedance at maximum kVA with ONAN rating, % ----------
- Guaranteed efficiency at 100 per cent of maximum kVA with ONAN rating, % ----------
- Standard ----------
- Excitation current at 100 per cent rated voltage, in per cent based on maximum kVA with ONAN rating, % ----------
- Guaranteed losses at 100 per cent rated voltage
  No load loss, kW ----------
  Total losses at maximum with ONAN rating, kW ----------

	Manufacturer	Type
-Bushing		
High voltage	----------	
Low voltage	----------	
Neutral	----------	
-Current transformers	----------	
-Approximate weight, kg	----------	
-Total assembled, Kg	----------	
-Type of oil preserver system, Ref. No.	----------	
- Primary and secondary voltage, V	----------	
- No. of taps	----------	
- Tap range	----------	
- Vector group	----------	
- Class of insulation	----------	
- Temperature rise at 40^{0}C , ^{0}C	----------	
-ambient temperature, ^{0}C	----------	
- Winding temperature, ^{0}C	----------	
Oil temperature, ^{0}C	----------	

Transformer Protection (Manufacturer Cat. No. or Type)

- Differential relay ----------
- Restricted Earth Fault relay ----------
- over-current relays (LV & HV) ----------
- Earth Fault relays (HV, LV & Neutral) ----------
- Pressure relays ----------
- Temperature relays ----------
- Lockout relays ----------
- Auxiliary relays ----------

(Note: The Tenderer shall attach additional sheets as required)

B-8 6.6 kV Switchgear (if required)

- Manufacturer, country ----------
- Circuit breaker ----------
  -Catalogue number ----------
  -Type ----------
  -Operating mechanism ----------
  Closing current at 125 volts DC, A ----------
  Time to close, m sec ----------
  Tripping current at 125 volts DC, A ----------
  Time to close, m sec ----------
- Rating and capabilities
  Current rating, A ----------
  Voltage rating, A ----------
  Nominal 3 phase interrupting capacity, MVA ----------
  Maximum symmetrical interrupting capacity at 6.6 kV, kA (rms)
  3 second short time rating, kA (rms) ----------
  Closing and latching capability, kA(rms) ----------
- Protective relays Manufacturer Type
  Phase over-current ----------
  Ground over-current ----------
  Transformer differential ----------
- Type of bus insulation ----------
- Type of bus supporters ----------
- Type of insulation on connections ----------
- Size of completely assembled switchgear ----------
  Length, mm ----------
  Width, mm ----------
  Weight, Kg ----------
- Total weight of switchgear, Kg ----------

B-9 415 V Switchgear and Motor Control Centre

9.1 415 V Switchgear and Motor Control Centre

- Manufacturer, country ----------

	Manufacturer	Type
- Air circuit breaker		
Type designation	----------	
Nominal current, A	----------	
Rated Voltage, V	----------	
Method of closing	----------	
Power required to:		
Close	----------	
Open	----------	
Short circuit current rating, kA	----------	
Short circuit current, 3 sec, kA	----------	
Combination starter units	----------	
Starter contactor	----------	

	Manufacturer	Type
Control transformer	----------	
Circuit breaker	----------	
Starter contactor coil	----------	

operating characteristics	Size1	Size2
Minimum pickup, V	----------	
Maximum dropout, V	----------	

Dimension of each switchgear	PCC	MCC
Length, mm	----------	
Depth, mm	----------	
Height, mm	----------	
Weight, Kg	----------	
Number of vertical section	----------	

9.2 Switchboard Design

- Degree of protection	----------
-Short time rating	
Current, kA	----------
Associated time, sec	----------
- Type of insulation provided on bus bars and connections	----------
- Type of protection provided within cubicles(shutter, insulating, cover, etc)	----------
-Bus bars	----------
Current rating of bus bars, A	----------
System short time current, 3 sec, kA	----------
Short time current rating, 3 sec, KA	----------
Bus bar material	
Cross sectional area of bus, mm^2	----------
-Type of connection	----------
- Minimum clearance in air:	
Between phases, mm	----------
Live parts and earth, mm	----------

B-10 DC Supply System

10.1 Battery Units (125 V)

- Manufacturer, country ----------
- Type ----------
- Catalogue No. ----------
-Capacity
(AH at 5 Hr discharge) ----------
-Number of cells per unit ----------
-Weight per cell, kg ----------
-Total battery weight, kg ----------

-Overall dimension of
battery rack
length, mm ----------
Width, mm ----------
Height, mm ----------

10.2 Battery Chargers

- Manufacturer, country ----------
- Type ----------
- Capacity, A/kW ----------
- DC Voltage adjusting range ----------

B-11 Lighting and Small Power Supply

	Manufacturer	Cat. No. or Type
- Panel boards, AC	----------	
-Panel boards, DC	----------	
- Lighting fixtures	----------	

B-12 Control and Protection System
(for each unit, transformer, auxiliary etc.)

12.1 Control and Protection panel
-Manufacturer, country ----------
-Type of construction ----------
-Dimension, mm ----------
-Instrument ----------
AC Voltmeter ----------
AC Ammeter ----------
Power factor meter ----------
Wattmeter ----------
Varmeter ----------
Synchroniser ----------
Annunciator ----------
Watt-hour meter ----------
Var-hour meter ----------
Control switch ----------
-Protection relay
Gen. protection relays ----------
Transformer protection relays ----------

Gen. Bus protection relays ----------
Inter-connection protection relays ----------
Auxiliary system protection relays ----------
EDG protection relays ----------
-Lockout relays ----------
-Control relays ----------
-Trip relays ----------
-Auxiliary relays ----------

(Note: The Tenderer shall attach additional sheets as required.)

12.2 Descriptive Matter

-Control system /HMI
[Local & Remote], Ref. No. ----------
-Protection system, Ref. No. ----------
-Data logging system, Ref. No. ----------
-List of annunciator, Ref. No. ----------
-Drawing of panels, Ref. No. ----------
-Detail of GT Control, **----------**

12.3 -Description of standard Weather Station and also to interface with Automatic Plant Control, Protection & Monitoring System, Ref. No. ----------

12.4 Description of Continuous Emission Monitor Module and also to interface with Automatic Plant Control, Protection & Monitoring System, Ref. No. ----------

B-13 Cabling and Grounding

13.1 132 kV Power Cable (Single-core XLPE, Copper)
-Manufacturer, country ----------
-Type designation ----------
-Applicable standard ----------
-Insulation material ----------
-Cross-section of conductor, mm^2 ----------
-Conductor material Type of conductor (round, stranded, compacted) ----------
-Outer sheath material ----------
-Min. Permissible bending radius, mm ----------
-Weight per meter, Kg ----------
-Delivery length, meter ----------
-Voltage designation, V ----------
-Max. operating voltage ----------
-Current carrying capacity at temperatures..... ----------

at laying conditions... ----------

-1 sec. short circuit current after full load at 70^0 C cond. temp., A ----------

-Max. conductor resistance at 20^0C

DC, Ohm / KM ----------

AC, Ohm / KM ----------

(Note: The Tenderer shall attach additional sheets as required.)

13.2 11 kV Bus Duct and Power Cable (XLPE, Copper)

-Manufacturer, country ----------

-Type designation ----------

-Applicable standard ----------

-Number of cores ----------

-Insulation material ----------

-Cross-section of conductor, mm^2 ----------

-Conductor material Type of conductor (round, stranded, compacted) ----------

-Outer sheath material ----------

- Min. Permissible bending radius, mm ----------

-Weight per meter, Kg ----------

-Delivery length, meter ----------

-Voltage designation, V ----------

-1 sec. short circuit current after full load at 70^0 C cond. temp., A ----------

-Max. conductor resistance at 20^0C

DC, Ohm / KM ----------

AC, Ohm / KM ----------

(Note: The Tenderer shall attach additional sheets as required.)

13.3 6.6 kV Power Cable (XLPE, Copper) (if required)

-Manufacturer, country ----------

-Type designation ----------

-Applicable standard ----------

-Number of cores ----------

-Insulation material ----------

-Cross-section of conductor, mm^2 ----------

-Conductor material ----------

-Type of conductor (round, stranded, compacted) ----------

-Outer sheath material ----------

-Min. Permissible bending radius, mm ----------

-Weight per meter, Kg ----------

-Delivery length, meter ----------

-Voltage designation, V

-1 sec. short circuit current after full load at 70^0 C cond. temp., A ----------

-Max. conductor resistance at 20^0C
DC, ohm/KM ----------
AC, ohm/KM ----------

(Note: The Tenderer shall attach additional sheets as required.)

13.4 600 V Power Cable(Copper)

-Manufacturer, country ----------
-Type designation ----------
-Applicable standard ----------
-Number of cores ----------
-Insulation mater ----------
- Cross section of conductor, mm^2 ----------
-Conductor material ----------

- Type of conductor (round, stranded, compacted) ----------
- Outer sheath material ----------
- Min. Permissible bending radius, mm ----------
- Weight per meter, Kg ----------
- Delivery length, meter
-Voltage designation, V ----------
-1 sec. short circuit current after full load at 70^0 C cond. temp. ----------

13.5 Control and Instrument Cable(Copper)

a.
-Type ----------
-Manufacturer, country ----------
-Applicable standard ----------
-Insulation material ----------
-Number of cores ----------
- Core size, mm^2 ----------
- Outer sheath material ----------
-Weight per meter, kg ----------
- Delivery length, m ----------

b.
-Type ----------
-Manufacturer, country ----------
-Applicable standard ----------
-Insulation material ----------
-Number of cores ----------
- Core size,mm^2 ----------
- Over sheath material ----------

- Weight per meter, kg ----------
-Delivery length, m ----------

(Note: The Contractor shall attach additional sheets as required.)

13.6 Grounding Wire

- Manufacturer, country ----------
- Conductor size, mm^2 ----------
- Conductor material ----------
- Type of Conductor ----------
- Short circuit current for 3 sec., A ----------
- Weight per meter, kg ----------
- Delivery length, m ----------

B-14 Maintenance Facilities

14.1 Over head electric Crane

- Manufacturer, country ----------
-Type ----------
- Maximum safe working load
  Main hoist, slow speed, Kg ----------
  Main hoist, fast speed, Kg ----------
  Auxiliary hoist, Kg ----------
-Test load for crane, Kg ----------
-Span of crane,
  Centre to Centre of gantry rails, m----------
-Geared Speeds
a) Main hoist, slow speed
  Raising with full load , m/min ----------
  Raising with no load, m/min ----------
  Lowering with full load, m/min ----------
  Lowering with no load , m/min ----------
  Creep speed, m/min ----------
b) Main hoist, fast speed
  Raising with full load, m/min ----------
  Raising with no load, m/min ----------
  Lowering with full load, m/min ----------
  Lowering with no load , m/min ----------
  Creep speed, m/min ----------
c) Auxiliary hoist
  Raising with full load, m/min ----------
  Raising with no load, m/min ----------
  Lowering with full load, m/min ----------
  Lowering with no load, m/min ----------
  Creep speed, m/min ----------
d) Cross traverse, m/min ----------
e) Long travel, m/min ----------
-Crab
a) Particulars of crab rail ----------
b)Type of wheel bearing ----------
c) Max. load on each wheel, Kg ----------

-Power supply required by crane
-Maximum current demand by crane, A & KW ----------
-Motors

	Main Hoisting	Auxiliary Hoisting	Cross Traverse	Long Travel
a) Number				
b) Type				
c) kW at full load				
d) Speed at full load, rpm				
e) Motor rating				
f) Manufacturer				

-Brakes

a) Number		
b) Type		
c) Dimensions		
d) Lining material		

-.Type of main girder ----------
- End carriage ----------
a) Wheelbase ----------
c) Maximum load excluding impact of travelling wheels, Kg
- Hoisting wire rope ----------

	Main Hoist	Auxiliary Hoist
a) Construction		
b) Quality of steel		
c) Diameter		

- Collector gear

a) Type		
b) Rating		
c) Manufacturer		

- Gantry rails

a) Size		
b) Material		
d) Weight , Kg		

-Maximum deflection at Mid-span on the main girder at maximum loading, mm ----------
- Vertical distance from top of gantry rail to lowest overhead obstruction required, m----------
- Weights
a) Net weight of complete crane, Kg ----------
b) Net weight of complete crab, Kg ----------
c) Weight of motors, Kg ----------

14.2 Hydraulic Mobile Crane

-Manufacturer, country ----------
-Type ----------
-Model ----------
-Capacity ----------
-Maximum lifting capacity, Kg at ---m radius----------
-Basic boom length, m ----------
-Maximum boom length, m ----------
-Wire speed for lifting, m ----------
-Wire speed for boom, m ----------
-Type of carrier ----------
-Maximum running speed, KM/hour ----------
-Climbing capacity, ($\tan^0$) ----------
-Minimum rotating radius, m ----------
-Type of outer rigger ----------
-Safety apparatus ----------

1) Fork Lifter
Manufacturer, country ----------
Type ----------
Model ----------
Capacity ----------
2) Truck/Lorry/Microbus/Jeep/Double Cabs Pickup
Manufacturer, country ----------
Type ----------
Model ----------
capicity ----------

B-15 Communication Equipment

15.1 PABX Telephone Equipment
Manufacturer, country ----------
Type ----------
Supply voltage, V ----------
Line capacity ----------
Traffic capacity ----------
Facilities ----------
Extension Services class ----------
Signals and tones ----------

15.2 Paging Equipment
Manufacturer, country ----------
Type ----------
Capacity ----------
Supply voltage, V ----------

1) Main Amplifier
Type ----------
Output, W ----------
Form ----------
Dimension, mm ----------
Weight, Kg ----------

Power Consumed
Paging , W ----------
Waiting, W ----------
Power Supply, V ----------

2) Hand Set
Type ----------
Form ----------
Dimension, mm ----------
Weight, kg ----------

3) Speaker
Type ----------
Form ----------
Impedance, ohm ----------
Output, w ----------
Dimension, mm ----------
Weight ,kg ----------

Description

15.3 PLC Extension ----------

15.4 Tele-metering Facilities ----------

B-16 Fire Protection Equipment

16.1 Hydrant & Pumps [Motor, Engine & Jockey]
-Number of Hydrant/pumps
for yard ----------
for power house ----------
Hose size and length
(D x L) mm x m ----------

16.2 Portable Fire Extinguisher

a. 100 kg trolley mounted dry powder extinguisher

-Manufacturer, country ----------
-Type of powder ----------
-Weight of powder, Kg ----------

b. 10 kg portable dry powder extinguisher

-Manufacturer, country ----------
-Type of powder ----------
-Weight of powder, Kg ----------

c. 5 kg portable gas extinguisher
-Manufacturer, country ----------
-Type of powder ----------
-Weight of gas, Kg ----------

16.3 Auto-Release CO_2 Fire Extinguishing System

-Manufacturer, country ----------

-Type of powder ----------

-System Description ----------

16.4 Fire detection Equipment

-Manufacturer, country ----------

-Type of Equipment ----------

-Weight of panel, Kg ----------

16.5 Transformer Water Deluge, Ref. No. ----------

B-17 Civil Work and Building Works

17.1 Standards and Codes to be used in design and construction

No.	Work Item	Standard and Codes
1.	Filling Works	----------
2.	Foundation Works	----------
3.	Piling	----------
4.	Steel Sheet Piling Wall	----------
5.	Concrete Works	----------
6.	Reinforcement Works	----------
7.	Structural Steel Works	----------
8.	Road	----------
9.	Brickwork	----------
10.	Painting	----------
11.	Lighting and Power Supply	----------
12.	Air Conditioning System	----------
13.	Plumbing	----------
14.	----------	----------
15.	----------	----------

17.2 Concrete

1) Proposed Materials -Standards:

(i) Cement ----------

(ii) Aggregates ----------

(iii) Concrete Admixture ----------

(iv) Reinforcement ----------

(v) Other ----------

2) Proposed Manufacturers/Source/Quarries

(i) Cement ----------

(ii) Aggregates ----------

(iii) Concrete Admixture ----------

(iv) Reinforcement ----------

(v) Other ----------

3) Compressive Strength of Concrete at 28th Day

1) Engine generator foundation Kg/cm^2 ----------
2) Supper-structure Kg/cm^2 ----------
3) pile Kg/cm^2 ----------
4)Concrete pavement ----------
5) ---------- ----------
6) ---------- ----------

17.3 Piling and Subsoil Improvement

17.3.1 Piling

1) Type of foundation pile ----------
a) Diameter/cross section and length, D= ----------m
L= ----------m
b) Allowable working load of a pile, Kg ----------
c) Method of driving in Piles ----------
d) Piling Plant ----------
e) Method of Jointing Piles ----------
f) Name of structures, equipment and buildings to be applied ----------

2) Type of foundation pile
a) Diameter/cross section and length, D= ---------- m
L= ---------- m
b) Allowable working load of a pile, Kg ----------
c) Method of driving in Piles ----------
d) Piling Plant ----------
e) Method of Jointing Piles ----------
f) Name of structures, equipment and buildings to be applied ----------

3) Type of foundation pile
a) Diameter/cross section and length, D= ----------m
L= ----------m
b) Allowable working load of a pile, Kg ----------
c) Method of driving in Piles ----------
d) Piling Plant ----------
e) Method Of Jointing Piles ----------
f) Name of structures, Equipment and buildings to be applied ----------

17.3.2 Subsoil Improvement (if any)

1) Method of subsoil improvement

2) Expected allowable bearing capacity of subsoil (After improvement) ----------Kg/m^2

3) Name of structures, equipment

and buildings to be applied ----------

17.4 Type and Strength of Steel Sheet Piling Wall

1) Type of Sheet Pile
2) Length of a Pile, m ----------
3) Width of a Pile, mm ----------
4) Yield Point, Kg/cm^2 ----------
5) Ultimate Tensile strength, Kg/cm^2 ----------
6) Supplier ----------
7) Specification of tie rods
   Materials ----------
   Diameter, mm ----------
   Length of a tie rod, m ----------
   Interval, m ----------

17.5 Structure Steel Works

1) Grades of Steel
2) Suppliers of Steel, Bolts & Fasteners
3) Methods of Welding
4) Corrosion Protection
   (i) Method and Materials
   (ii) Place of preparation
5) Proposed Coatings
   (i) Type of Product
   (ii) Manufacturer
   (iii) Dry Film Thickness
   (iv) Means of application
   (v) Place of application
   (vi) Colour
6) Yield Point
7) Ultimate Tensile Strength

17.6 Engine Generator, EDG., Transformers, Switchgears etc.

1) Weight of machine
   Engine, Kg ----------
   Generator, Kg ----------
   Em. Diesel Gen set., kg ----------
   HFO storage tank kg ----------
   LDO storage tank kg ----------
   HFO daily tank kg ----------
   Unit Transformer (15/132 kV), kg ----------
   Aux. Transformer (15/ 6.6 kV), kg ----------
   Station Transformer (6.6/ 0.415 kV), kg ----------
   Others, kg ----------
   Total, Kg ----------

2) Dimension of Engine-Generators, Fuel tanks, EDG, Transformers foundation

(Lx Wx H) meter

Engine-Generator ----------
Fuel tanks ----------

EDG ----------
Unit Transformer ----------
Aux. Transformer (15/ 6.6 kV) ----------
Station Transformer (6.6/ 0.415 kV) ----------

3) Weight of Engine-Generator foundation, Kg----------
4) Weight of Fuel tanks foundation, Kg ----------

17.7 Walls and Roofing
1) Insulation Materials ----------
2) Waterproofing Materials ----------
3) Caulking Materials ----------

17.8 Metal
1) Grades of Steel ----------
2) Suppliers ----------
3) Method and Materials for corrosion protection ----------

17.9 Construction Equipment and Their Specifications
1) Earth Works ----------
2) concrete Works ----------
3) Pavement works ----------
4) Structural Steel Works ----------
5) Piling Works ----------
6) Steel Sheet Piling Wall ----------

17.10 Description of 2X100 % capacity Deep Tube Well Pump set, Ref. No. ----------

17.11 Description of Water Supply System, Ref. No. ----------

17.12 Description of Civil and Building Works Ref. Nos.----------
----

17.13 Description of air-conditioning system for the buildings. Ref No.----------

B - 18 Environmental Impact.

(a) Air Emissions Levels.

With regard to project air emissions, please fill out the following table:

Emission	Percent Removal Efficiency at 100% Capacity	100% Capacity	75% Capacity	50% Capacity
NO_x	----------	----------ppmv	----------ppmv	----------ppmv
	----------	------- ib/hr	------- ib/hr	------- ib/hr
	----------	--------- g/kj	-------- g/kj	-------- g/kj
	----------	------- m^9/m^3	------m^9/m^3	------m^9/m^3
CO_2	----------	------- ppmv	------ppmv	------ppmv
	----------	--------- ib/hr	-------- ib/hr	-------- ib/hr
	----------	--------- g/kj	--------- g/kj	--------- g/kj
	----------	--------m^9/m^3	------ m^9/m^3	------ m^9/m^3
CO	----------	----------ppmv	----------pmv	----------pmv
	----------	----------ib/hr	----------ib/hr	----------ib/hr
	----------	----------g/kj	----------g/kj	----------g/kj
	----------	---------m^9/m^3	--------m^9/m^3	--------m^9/m^3
Air Toxics (list)	----------			

ppm is defined as volumetric parts per million at 15% O_2

(b) Effluent Discharge

P_4	-------mg/e	Cr ----------	----------mg/e
BOD	-------mg/e	Cu----------	----------mg/e
COD	--------mg/e	Fe----------	----------mg/e
TSS	--------mg/e	Ni----------	----------mg/e
PO_4	---------mg/e	Zr----------	----------mg/e
SO_4	---------mg/e	Ac----------	----------mg/e
NH_3	----------mg/e	Cd----------	----------mg/e
CL	----------mg/e	Pb----------	----------mg/e
Detergents	----------mg/e		----------
Oil & grease	----------mg/e	----------	----------

(c) Noise Level

Description	Unit	Equipments
Noise Level	db (A) @ Facility boundary	.....db (A) (Day) .....db (A) (Night)
	Equipment db (A) @ 1 meter	.....db (A)

SCHEDULE-C

DRAWINGS TO BE FURNISHED WITH TENDER

Drawings which adequately indicate the general arrangement of the equipment principle of operation, sizes general appearance and materials of construction shall be submitted. These drawings shall include, but not be limited to, the following.

- Mechanical flow diagrams
- Heat rate curve
- Inlet temperature Power correction curves
- Inlet temperature heat rate correction curves
- Starting and loading curve
- Electrical one-line diagrams of main and auxiliaries
- Generator capability curve
- Generator "V' curves
- Zero Power factor saturation curve
- Major piping connection
- Engine, generator and auxiliaries foundations
- Fuel Oil System
- Heat Balance Diagram.
- Major Control & Protection System.
- Power output vs Ambient temperature
- Lub oil system
- Service / Compressed air system
- Fire protection system.
- Control building layout and section
- Cooling water supply system layout
- Exhaust heat recovery sytem
- No load saturation curve
- Synchronous impedance curve
- Generator unit equipment arrangement
- Layout plan of central control room

- General arrangement of the switchyard

- Foundation, loading and support information

- Dimensioned Outline drawing Of major equipment offered

- Detail drawings and descriptions providing a complete

- Understanding of the equipment offered

- Other drawings specified in the Specification.

SCHEDULE-D

DELIVERY TIME

	Time from Effective date to FOB (Months)	Time Required for Transportation (Months)	Time Required for Erection & Commissioning (Months)	Total time from Effective Date to Completion of ICO (Months)
1. Engine Generating Plant and Ancillary				*
1. 132 kV Switchgear, Equipment				
3. Step-up Transformers				
5. Crane/Forklifter/ Truck				
6. Station Electrical Services				

Note: The contractor shall guarantee the total time from effective date to completion of ICO as marked with asterisk (*)

SCHEDULE - E

TOOLS AND APPLIANCES

The Tenderer shall list below all special tools and equipment for maintenance, which will be supplied and included in total Contract Price. Contractor shall not be permitted to use any equipment/ machinery/ tools, which are to be supplied against the Contract.

No.	Description	Q'ty

Note: The Tenderer shall attach additional sheets as required.

SCHEDULE – F

DEVIATIONS FROM SPECIFICATIONS

The following is a list of deviations from Tender Documents

Clause No. and Page No.	**Description and Reference to Documents submitted by Tender**

Note : The Tenderer shall attach additional sheets as required

SCHEDULE – G

CIVIL AND BUILDING WORKS

The Tenderer shall be reminded that this is Turnkey Contract in which he is entirely responsible for every aspect. No additional costs will be considered for any item which the Tenderer has overlooked, but which is essential for the proper completion of the project in every respect so that the works fulfil the purpose for which they are required.

If the Board or the Engineer require minor modifications, additions or omissions to the scope of the Civil Works during the period of construction or maintenance, adjustment to the Contract Price will be made on the basis of the rates entered in the following Schedule.

The rates entered shall include all costs and expenses involved in the proper construction of the work, including overheads, profits, supervision, accommodation, insurances, transport, duties, all risks, liabilities or obligations etc. but excluding design costs, which are covered by a separate item.

The rates will be used to evaluate Board's or Engineer's minor modifications, omissions or additions to the works. Rates for any item not included shall be based on those quoted or analogous thereto.

Item	Description	Unit	Rate Taka
1.	Foundation Piling		
	1) Mobilisation and Demobilisation (items shall be specified)		
	2) Form of pile type and capacity stated : Type : Capacity :	linear, m	
2.	Excavation		
	1) Excavate to reduce level and remove and deposit where directed on Site – include for timbering, de-watering, etc (measured net sizes as drawing)	m^3	
	2) Excavate to form pit , base or trench as previously described.	m^3	
	3) Additional excavation beyond net sizes for working space to fix and remove formwork and to backfill	m^3	
3.	Concrete work Unreinforced (grade of concrete shall be specified)		
	----------	m^3	
	----------	m^3	
	----------	m^3	
4.	Reinforced Concrete (grade of concrete shall be specified)		
	----------	m^3	
	----------	m^3	
	----------	m^3	
5.	Reinforcement		
	1) 16 mm diameter and upward mild steel bar or round reinforcement hooked, bent and fixed including and necessary tying wire	Kg	
	2) 12 mm diameter as previously described	Kg	
	3) 10 mm diameter and ditto as previously described	Kg	
	4) Fabric reinforced weighing 4 Kg per square meter, including fixing	m^2	
	5) Extra over mild steel rates for high tensile reinforcement (all sizes)	Kg	
6.	Formwork		
	1) To sides of foundations, bases, etc	m^2	
	2) To sides and soffits of beam	m^2	
	3) To wall	m^2	
7.	Structural Steelwork (grades of structure shall be specified)		
	----------	1000x Kg	

SCHEDULE - H

LIST OF SUBCONTRACTORS

The following is a list of subcontractors the Tenderer proposes to employ for supply of materials and equipment and for erection and civil works

No.	Description of part or equipment making reference to specifications	Subcontractors full address

Note : The Tenderer shall attach additional sheets as required

SCHEDULE - I

DESCRIPTION OF TRAINING PROGRAMME

Details of Training programme including curriculum and Training aid to be used

SCHEDULE - J

MOBILISATION AND DEMOBILISATION SCHEDULE FOR CONSTRUCTION EQUIPMENT

The following is the specification, numbers, purpose of use and phasing for the mobilisation and demobilisation of construction equipment to be used on the Contract.

SCHEDULE - K

METHOD OF TRANSPORTATION AND UNLOADING

The following is a description of the Contractor's method for transportation to Site and unloading and installation at Site of the equipment for the Works.

SCHEDULE - L

LIST OF MANUFACTURER

The following is a list of manufacturer the Tenderer proposes to buy materials and equipment and for erection and commissioning

No.	Description of part or equipment	Manufacturer name	Manufacturer full address

Note : The Tenderer shall attach additional sheets as required

SCHEDULE - M

LIST OF SPARE PARTS

The following is a list of spare parts the Tenderer proposes for the life time (20 years) of the plant.

B-R POWERGEN LTD.

TENDER DOCUMENT

FOR

CONSTRUCTION OF SREEPUR 150 MW (±10%) HFO BASED POWER PLANT PROJECT.

VOLUME 2 OF 2 (PART A+PART B)

PART A - TECHNICAL REQUIREMENTS

PART B - TECHNICAL PARTICULARS

OCTOBER- 2016