

THE WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED
(A Govt. of West Bengal Enterprise)
Bakreswar Thermal Power Project
P.O.Bk.T.P.P , Dist -Birbhum,Pin -731104

NIT No.WBPDCL/Tend-Adv/PR/12-13/171/BkTPP

Date: 07.02.2013

Job-I

Sealed tenders in two parts, Part A (for technical specification bid) and Part B (for commercial price bid) in duplicate are invited by the General Manager, BkTPP with same material specification for the supply of following material at BkTPP.

1. Description of Material : As per Annexure-I
2. Estimated Cost : Rs. 18,20,000/-
3. Earnest Money : Rs. 35,000/-
4. Cost of Tender Paper : Rs. 1,000/-
5. Sale of Tender Paper : 07.02.2013 to 25.02.2013
6. Pre-bid discussion : 26.02.2013 at 02.45 PM
7. Last Date of Submission : 11.03.2013 at 02.00 PM
of Sealed Tender Paper
8. Opening of Tender
- 8a. Part-A (for technical bid) : 11.03.2013 at 03:00 PM
- 8b. Part-B (for price bid) : Opening date will be intimated to the
successful i.e technically accepted bidders
later on.
- 9a. Material Delivery Period : Twenty (20) weeks from the date of the
order.
- 9b. Installation & : Two (02) months from arrival of material at
Commissioning Period BkTPP Store.

[Qualifying Requirement:

- (i) The bidder should be an original manufacturer of all the protection relays involved in this tender. Bidders should have manufacturing facility in India for protection relays.
- (ii) The Bidder should have supplied at least 15 schemes in India over past 5 years and shall submit necessary reference list along with the offer.
- (ii) The bidder should have supplied, installed and commissioned the similar protection system for various utilities in India.]

Detailed terms & conditions are set forth in the Tender Paper (Non - Transferable) which can be obtained from the Sr. Manager(S&P), BkTPP on application. The cost of Tender Paper is to be deposited in the Account Section, BkTPP from 10.30 AM to 01.30 PM (except Saturday, Sunday and Holiday). Tender Paper will not be issued against DD / MO / Cheque and by post. If any change or extension of due date or any corrigendum, may please visit website. The WBPDCL reserves the right to accept or to reject any or all tender either in full or in part or to split up, if necessary without assigning any reasons whatsoever. For qualifying requirements and other details visit website www.wbpdcl.co.in

T. K. BOSE
SR.MGR(S & P)
BkTPP/WBPDCL

Annexure-I

TECHNICAL SPECIFICATION

FOR

**RETROFITTING JOB OF 400 KV DISTANCE PROTECTION &
AUTO RECLOSE RELAYS AND 33KV DISTANCE PROTECTION
RELAY OF GE MAKE**

Description of Installed Relays:

Sl No.	Item Code	Item Description	Quantity	UOM
1	05R010091	Relay,Numerical,Distance Protection,1Pole Trip,1A/110-120Volt,50Hz,Aux-220-250V DC,Model-DLP 1122 JDH, GE	2	NO
2	05R010051	Relay MRS-2000 220V DC Numerical GE	2	NO
3	05R010095	Relay,Numerical,Distance Protection,3 Pole Trip,1A/110-120 Volt,50Hz,Aux-220-250V DC,Model-DLP3122CDH,GE	1	NO

TABLE OF CONTENTS

1.	INTRODUCTION.....	4
2.	DEFINITIONS AND ABBREVIATIONS.....	5
3.	STANDARDS.....	6
4.	ENVIRONMENTAL CONDITIONS.....	7
5.	SCOPE OF WORK.....	7
6.	GENERAL REQUIREMENT OF RELAYS.....	7&8
7.	FEATURE OF DISTANCE RELAY.....	8,9
8.	<u>FEATURE OF AUTO RECLOSE</u>	
	<u>RELAY.....</u>	10
9.	<u>SITE RECEIVING</u>	
	<u>INSPECTION.....</u>	
	<u>.....</u>	10
10.	<u>PREQUALIFICATION</u>	
	<u>CRITERIA.....</u>	
	<u>.....</u>	10
11.	<u>LOCATION OF RETROFITTING</u>	
	<u>JOBS:.....</u>	10

1. INTRODUCTION

West Bengal Power Development Corporation Limited (WBPDC) is a company owned by the Government of West Bengal with the goal to carry on the business of electric power generation and supply in the state. The main thermal power plants under WBPDC are in Kolaghat, Bakreswar, Sagardighi, Santaldih and Bandel.

WBPDC works in tandem with West Bengal State Electricity Board (WBSEB) and Calcutta Electric Supply Corporation (CESC).

Bakreshwar Thermal Power Station, with an installed capacity of 1050MW (five units of 210MW) is located in Chinpai and Bhurkuna gram panchayat areas of Birbhum district of West Bengal. It is located off the Panagarh–Morgram Highway, on the bank of Bakreshwar River some distance downstream from the hot springs and temple at Bakreshwar. Chinpai railway station on the Andal-Sainthia Branch Line is nearby.

This specification covers the general requirements for design, engineering, manufacture, supply, inspection, retrofitting and testing of microprocessor base advanced distance protection and auto reclose relays for WBPDC-Bakreswar Thermal Power Plant.

2. DEFINITIONS AND ABBREVIATIONS

WBPDCL	West Bengal Power Development Corporation
BKTPP	Bakreswar Thermal Power Plant.
DI	Digital Input
DO	Digital Output
AI	Analogue Input
AO	Analogue Output
CB	Circuit breaker
HMI	Human Machine Interface
IED	Intelligent Electronic Devices
kV	kiloVolts
MW	MegaWatt (Active Power)
MVAR	MegaVar (Reactive Power)
SCADA	Supervisory Control and Data Acquisition
RTU	Remote Terminal Unit
LAN	Local Area Network
RS 485	A physical wiring standard for high speed, noise tolerant network communication often used with the Modbus RTU protocol.
TCP/IP	Transmission Control Protocol / Internet Protocol
Modbus RTU	An industrial network communications protocol.
Open Protocol	A protocol which is published and used by other manufacturers and is, therefore, non-proprietary.
Ethernet	A high performance network communication standard (IEEE 802.3)
Gateway	A device that allows networks of different protocols to communicate with each other, e.g. RS485 Modbus to Ethernet.
FO	Fibre Optic.
LIU	Light guide Interconnection Unit for FO cable Termination
STP	Shielded Twisted Pair
UTP	Unshielded Twisted Pair
OPC	OLE Process Control based on Microsoft Windows, used as industry standard for interface between HMI and RTU/DCU
SOE	Sequence of Events
GPS	Global Positioning System

3. STANDARDS

In general the equipments and the system shall confirm to the latest applicable standards of following professional institutes-

National Electricity Manufacturers Association (NEMA)
The Institute of Electrical and Electronic Engineers (IEEE)
Instrument Society of America (ISA)
American National Standard Institute (ANSI)
International Electro Technical Commission (IEC)
Committee European de Normalization Electro Technique (CENELEC)
European Telecommunication Standard Institute.(ETSI)

The electrical control system shall be designed, built and tested to comply with the following standards

Standard	Title
IEC 60038	IEC Standard Voltages
IEC 60051-9	Direct acting indicating analogue electrical measuring instruments and their accessories
IEC 60255	Electrical Relays
IEC 60304	Standard colours for insulation for low frequency cables and wires
IEC 60391	Marking of insulated conductors
IEC 60409	Guide for inclusion of reliability clauses into specifications for components
IEC 60391	Identification of equipment terminals
IEC 60446	Identification of insulated and bare conductors by colours
IEC 60529	Classification of degrees of protection by enclosures
IEC 60605	Equipment reliability testing
IEC 60706	Guide on maintainability of equipment
IEC 60793	Optical Fiber Cables
IEC 60870	Telecontrol equipment and systems
IEC 61850	Communication networks and systems in substations
IEEE 802.3	Information Processing Systems – Local Area Networks
IEC 60617	Graphical symbols for diagrams
IEC 331	Fire resisting characteristics of electric cables
IEC 801	Electromagnetic compatibility for industrial-process measurement and control Equipment
IEC EN 61508	Functional safety of electrical/electronic/programmable electronic safety related systems.
IEC 1131	Standard for Programmable logic controllers

In event of any conflict between the codes and standards referred to in this specification and the requirement of this specification, the requirements of this specification shall govern. Decision of WBPDC shall be final.

4. ENVIRONMENTAL CONDITIONS

Ambient Temperature : 45 degree Celsius
Shock levels :
Relative humidity : 0 to 95 % non-condensing.

5. SCOPE OF WORK

1. Design and Engineering for the Protection Scheme.
2. Removal of existing Protection scheme.
3. Supply of Wiring Materials, Blanking plates, Ferrules, Lugs etc.,
4. Erection and wiring of new Protection scheme.
5. Testing & Commissioning of New protection Scheme.
6. Training on the Protection Scheme.
7. All quoted relays will be on IEC61850 protocol.
8. Auxiliary & trip relays will be retained; only main protection relay will be replaced.

6. General Requirements of Relays

The numerical protection equipment shall be provided with the following functions and features :

i) **Measurement:**The electrical quantities like voltages, currents, frequency, active and reactive power etc. shall be constantly measured and be available for display. Other desired quantities such as intermediate values in various protection functions processing shall also be measured and displayed on demand. All measured values shall be time tagged with real clock in the system itself and shall be displayed in either primary or secondary quantities.

ii) **Self Diagnosis and supervision & Programmable LEDs:**

Continuous self diagnostics tests on microprocessor, memory, timers and the analog input module and the stand alone relays shall be carried out by the equipment and a watchdog contact should be made on in any abnormalities. Internal and external auxiliary supplies shall also be continuously supervised. The relay should have minimum 8 Programmable LEDs.

iii) **Programmable Logic:** The relay should have facility of programmable scheme logic for allowing customer to customise the protection and control functions. It should also allow to program LEDs, Opto Inputs and Relay Outputs.

The logic should comprise of gate logic and general purpose timers. The gate logic includes OR, AND and majority gate function with ability to invert the inputs and outputs.

iv) **CT Inputs:** The relays shall be provided with both 1A and 5A CT inputs and shall be selectable at site.

v) **Auxiliary Supply:** It shall be possible to energise the relay from either AC or DC auxiliary supply.

vi) **Display and LEDs:**

- 1) At least 32 character alphanumeric backlit LCD display unit.
- 2) LEDs (for trip, Alarm, Relay available & Relay out of service) & programmable at least 8 Tri Colour LEDs which can be assigned to any protection function for local annunciation.
- 3) Tactile keypad for browsing and setting the relay menu.

vii) **Communication Ports**

The relays should have a front RS232 port for local communication for relay settings, modifications, extraction and analysis of fault/event/disturbance records from a laptop and a Rear RS485 for remote communication to SCADA system. **The relay should be IEC-61850 compliant.**

viii) **Fault Diagnostics Tools**

□□**Fault record** – The relay shall have the facility to store at least 5 last fault records with information on cause of trip, date, time, trip values of electrical parameters.

□□**Event record** – The relay shall have the facility to store at least 500 time stamped event records with 1ms resolution.

□□**Disturbance records** – The relay shall have capacity to store at least 75 secs. of disturbance record waveforms with user defined pre-fault and post fault time. The disturbance recorder should have a minimum sampling frequency of 1000Hz, with all the available analogue channels

□□Circuit breaker operations counter and maintenance records.

7. FEATURE OF DISTANCE PROTECTION

□ The distance protection relay shall be fully numerical and be based on a non-switched scheme.

□□Provide protection for the transmission line from all types of faults-phase to earth faults as well as multiphase faults. The protection algorithm shall have dual redundant distance protection algorithms to detect all types of power system faults so as to arrive at a secure trip decision with correct phase selection and proper direction discrimination in the shortest possible time.

□□have non-switched measurement, which implies processing of six possible fault loops (six –loop measurement)

□□have polygonal characteristics with independently adjustable reactive and resistive reaches for maximum selectivity and maximum fault resistance coverage. The zones shall have independent settable earth fault compensation factors to cater to adjacent lines with different zero sequence to positive sequence ratios.

□□Selection shall be so that the first zone of the relay can be set to about 80% - 85% of the protected line without any risk of non-selective tripping.

□□The second and third zone elements shall provide back up protection in the event of the carrier protection or the first zone element failing to clear the fault, zone-2 shall cover full protected section plus 50 % of the next section; zone-3 shall normally cover the two adjacent sections completely.

□□have adequate number of forward zones and a reverse zone. The zone reach setting ranges shall be sufficient to cover line lengths appropriate to each zone. Carrier aided scheme options such as permissive under reach, over reach, & blocking and non-carrier aided schemes of zone 1 extension and Loss of load accelerated tripping schemes shall be available as standard. Weak infeed logic and current reversal guard also shall be provided.

□□In case the carrier channel fails, one out of the non-carrier based schemes cited above should come into operation automatically to ensure high speed and simultaneous opening of breakers at both ends of the line.

□□In addition to the conventional impedance measuring algorithm the distance protection relay should have a separate measuring technique in the same hardware completely different to the conventional impedance measuring principal. Both the algorithms should run in parallel and should take trip decisions independently.

□□Have a maximum operating time up to trip impulse to circuit breaker (complete protection time including applicable carrier and trip relay time) with CVT being used on the line for SIR 0.01-4 : as 40ms at the nearest end and

60ms at the other end of line for SIR 4-15 : as 45ms at the nearest end and 65ms at the other end of line with carrier transmission delay of 20 ms

□□Have a secure directional response under all conditions, achieved by memory voltage polarizing and/or healthy phase voltage polarizing as appropriate.

□□Shall have an independent Directional Earth Fault (DEF) protection element to detect highly resistive faults. This element shall have an inverse time/definite time characteristic with a possibility to configure the DEF as a channel-aided DEF or a channel-independent DEF

□□Have logic to detect loss of single/two phase voltage input as well as three phase voltage loss during energization and normal load conditions. The voltage circuit monitoring logic should in addition to blocking the distance protection element, enable an emergency overcurrent element to provide a standby protection to the feeder till the re-appearance of voltage signal.

□□The VT fuse failure function shall function properly irrespective of the loading on the line. In other words the function shall not be inhibited during operation of line under very low load conditions.

□□Have necessary logic to take care of switch-on-to-fault condition. Energization of transformers at remote line ends and the accompanying inrush current shall not cause any instability to the operation of relay

□□Have power swing blocking feature, with facilities for:

- fast detection of power swing

- selective blocking of zones

- settable unblocking criteria for earth faults, phase faults and three phase faults

□□be suitable for single pole or three pole tripping.

□□Relay should have minimum 16 binary input and 21 output relays which are freely configurable.

□□Shall have inbuilt CT supervision facility. A time-delayed alarm shall be issued if a CT open circuit is detected.

□□Shall have inbuilt Trip circuit supervision facility to monitor both pre- and post close supervision facilities. An alarm shall be generated.

□□Shall have inbuilt Circuit Breaker Failure protection based on undercurrent detection and/or circuit breaker auxiliary contact status and/or distance protection reset status. Provision shall be given to initiate the breaker fail logic using a digital input from external protection devices.

□□Shall have inbuilt broken conductor detection by measuring the ratio of I 2 & I1. The sensitivity of the logic shall not be affected during operation under low load.

□□Shall have a fault locator with an accuracy of □2%. The display shall be in kilometers, miles or percentage impedance. The fault locator should have built in mutual compensation for parallel circuit.

□□The relay shall have a built-in auto-reclose function with facilities for single pole / three pole / single and three pole tripping. It shall be possible to trigger the A/R function from an external protection. A voltage check function which can be programmed for dead line charging/dead bus charging / check synchronizing shall be included.

□□Records containing discrete data on the last five faults shall be made available. In particular the fault resistance value shall be available for each record.

□□Extensive disturbance recording facility shall be available which records a minimum of 8 analogue channels and a minimum of 32 digital channels which shall include various digital inputs, output relays and internal digital signals. The facility must be capable of recording for a maximum of 75 secs.

Necessary software shall be provided for retrieving and analyzing the records.

The relay shall have built in Circuit Breaker Supervision Functions for Condition based Circuit Breaker Maintenance.

The relay shall be able to detect any discrepancy found between NO & NC contacts of breaker.

The relay shall monitor number of breaker trip operations.

The relay shall also monitor the breaker operating time.

8. FEATURE OF AUTO RECLOSE RELAY

- a) The relay shall have standalone auto-reclose function with facilities for single pole / three pole / single and three pole tripping.
- b) Initiate with only operation of the protection relay.
- c) Recloser blocking during the reset time following a manual close.

9. Site receiving inspection:

After arrival of all equipment supplied by the Vendor at site, the Purchaser will perform site-receiving inspection in accordance with the related technical documents and packing list. If any damage, defects or shortages occur because of the Vendor's fault, vendor shall carryout the replacement, repair or supplement at his own expense.

10. Prequalification Criteria

The bidder should be an original manufacturer of all the protection relays involved in this tender.

Bidders should have manufacturing facility in India for protection relays.

The bidder should have supplied, installed and commissioned the similar protection system for various utilities in India.

The Bidder should have supplied at least 15 schemes in India over past 5 years and shall submit necessary reference list along with the offer.

9. Location of Retrofitting jobs:

Retrofitting jobs are to be carried out in these following feeders.

- a) **400KV Arambag Feeder Main-1 Distance Protection (DLP1122JDH, GE make) relay.**
- b) **400KV Jeerat Feeder Main-1 Distance Protection (DLP1122JDH, GE make) relay.**
- c) **400KV Arambag Feeder Auto Reclose relay (MRS 2000, GE make) relay.**
- d) **400KV Jeerat Feeder Auto Reclose relay (MRS 2000, GE make) relay.**
- e) **33KV Tilpara Feeder#1 Distance Protection (DLP3122CDH, GE make) relay.**

Job-II

Sealed tenders in two parts, Part A (for technical specification bid) and Part B (for commercial price bid) in duplicate are invited by the General Manager, BkTPP with same material specification for the supply of following material at BkTPP.

- | | | | |
|-----|---|---|--|
| 1. | Description of Material | : | As per Annexure-I |
| 2. | Estimated Cost | : | Rs.2,16,16,088/- |
| 3. | Earnest Money | : | Rs. 4,00,000/- |
| 4. | Cost of Tender Paper | : | Rs. 1,000/- |
| 5. | Sale of Tender Paper | : | 07.02.2013 to 25.02.2013 |
| 6. | Pre-bid discussion | : | 27.02.2013 at 02.45 PM |
| 7. | Last Date of Submission
of Sealed Tender Paper | : | 11.03.2013 at 02.00 PM |
| 8. | <u>Opening of Tender</u> | | |
| 8a. | Part-A (for technical bid) | : | 11.03.2013 at 02.30 PM |
| 8b. | Part-B (for price bid) | : | Opening date will be intimated to the
successful i.e. technically accepted bidders
later on. |
| 9a. | Material Delivery Period | : | Sixteen (16) weeks from the date of the
order. |
| 9b. | Installation &
Commissioning Period | : | Four (04) months from arrival of material at
BkTPP Store. |

[Qualifying Requirement:

- (i) Vendor should be a leading name in the field with experience in similar work.
(ii) Vendor should be an OEM or authorized partner of the same.]

Detailed terms & conditions are set forth in the Tender Paper (Non - Transferable) which can be obtained from the Sr. Manager(S&P), BkTPP on application. The cost of Tender Paper is to be deposited in the Account Section, BkTPP from 10.30 AM to 01.30 PM (except Saturday, Sunday and Holiday). Tender Paper will not be issued against DD / MO / Cheque and by post. If any change or extension of due date or any corrigendum, may please visit website. The WBPDCL reserves the right to accept or to reject any or all tender either in full or in part or to split up, if necessary without assigning any reasons whatsoever. For qualifying requirements and other details visit website www.wbpdcl.co.in

T. K. BOSE
SR.MGR(S & P)
BkTPP/WBPDCL

Annexure-I
TECHNICAL SPECIFICATION FOR
Replacement of Existing Hydrogen Generator and Power Supply
(Rectifiers)
at BkTPP/ WBPDCCL Hydrogen Gen. Plant:

Description of Hydrogen Generator:

Sl No.	Item Code	Item Description	Quantity	UOM
1	04S070028	H2 Generator Set, H2 purity 99.99%, Discharge Pressure 100psig (7.0 kg/sq.cm.) Discharge flow 11.2 Nm ³ /hr. with integral H2 purifier/drier assembly, Power supply rectifier unit, Standard annunciation and control panel, PC for SCADA with software for PLC. The equipments are to be designed and manufactured in accordance/compliance with Specified Codes and Standards	1.0	SET

GENERAL:

This specification is intended to cover dismantling of old Hydrogen Generator [size: L-110cm, W-94cm, H-171cm and it's Power Supply size: for Rectifier 76cmX76cmX151cm, for TB 76cmX15.5cmX91.5cm] and install new hydrogen generator in that space by design, engineering, manufacture, inspection, testing at manufacturer's works, supply/delivery duly packed (sea worthy packing for imported items) FOR Site Basis, including freight, unloading, storage and handling at site, erection and commissioning, trial run at site, PG test, and plant handing over to WBPDCCL etc. inclusive of all prevailing taxes, duties and other levies of HYDROGEN GENERATOR as specified below:

One (1) Number Hydrogen Generator with Power Supply (Rectifiers) complete with all accessories and PLC based control panel including start up, and commissioning spares as required by for replacement of existing Hydrogen Generator.

Technical Specification:

- 1) Alkaline Bipolar design Hydrogen Generator with following Accessories:
 - i. Alkaline Bipolar Electrolyser with each Electrolysis module minimum 5 NM³/Hr rating.
 - ii. Separate KoH Reservoir/ Phase separators for Hydrogen and Oxygen.
 - iii. Deoxo Tank for removing Oxygen from the Hydrogen gas.

- iv. PLC controlled In-built Hydrogen Dryer having changeover cycle of 6 Hours each.
- v. Recirculation KoH Pumps to feed electrolyte to individual cells and to remove Heat from the Modules.
- vi. PLC controlled DM Water make Pump during operation.
- vii. Heat Exchangers and Condensers for cooling the KoH coming out of Modules.
- viii. Hydrogen in Oxygen Sensor to control and monitor H2 purity and trip the Generator if Purity falls below set point.

2) The equipments are to be designed and manufactured in accordance/compliance with following Codes and Standards. These include, but are not limited to, the applicable sections of the following:

- Pressure Vessels: ASME, Section VII, Div 1
- Piping: ASME B31.1
- Flanges, Fittings/Valve Bodies: ANSI, ASME
- Structures: ANSI/AWS D1 (American Welding Society)
- Electrical Wiring: ANSI/NFPA 70/ USA National Electrical Code
- Electrical Installation: ANSI/NFPA 70, Art. 500 for Class 1, Division 2, Group B
- Electrical Motors: NEMA, MG-1 & UL
- Electrical Enclosures: NEMA 250
- Grounding: NEC, Article 500
- Transformers: NEMA ST20

3) Specification of Hydrogen Gas produced by proposed Hydrogen Generator:

- Hydrogen (H2) Gas Capacity : 11.0 NM3/Hr.
- Hydrogen Purity : 99.999%
- Hydrogen Gas Delivery Pressure : 8 to 10 Bar.
- Oxygen Purity : < 5 PPM
- Oxygen Gas Delivery Pressure : 8 to 10 Bar.
- Dew Point (Moisture Content) : < 60 Dec. C.

4) Availability of Space for installation of new Hydrogen Generator:

- The space available for installation of New Hydrogen Generator (in place of old H2 Generator) is as per below:

Length: 2.00 Meters.

Width: 1.00 Meters.

Hence Hydrogen Generator proposed by the bidder must be installed in the above specified area of 2 Meters X 1 Meter only.

Note: It is to be noted that there is no other space available as the other Hydrogen Generator is in service.

A) Mechanical scope/ Requirement:

- Alkaline Bipolar design Electrolyser of Capacity 11.0 NM³/Hr. Electrolyser have 2 electrolysis modules. Each module shall be more than 5.0 Nm³/hr capacities.
- Electrolyser shall be standalone unit (installed on skid) and all the accessories shall be installed on that skid only.
- Physical dimension of Electrolyser shall be such that it is installed in 2 Meter X 1 Meter area. There is no other space left out as there is running Hydrogen Generator in the same room.
- Phase separators for Hydrogen and Oxygen where KoH is initially filled for operation. DM water inlet/ make up point in one of the Phase separator for Make up of DM water which is consumed during normal operation.
- Nitrogen Purging system. Hydrogen Being Explosive Gas Inert gas or Nitrogen Purging is to be done before startup and after shutdown.
- Adequate Heat exchangers/ condensers to cool down the KoH coming out of Electrolysis Modules.
- Inbuilt Hydrogen Dryer dual tower type with Changeover facility after 6 hours.
- Equipment is to be designed such that it can operate continuously or intermittently as per requirement.

B) Electrical scope/ Requirement:

The scope of electrical works, equipment and services shall be as per following:

- WBPDCCL will provide only one feeder from their existing MCC suitable for Power Supply. No other feeder is available.
- Bidder has to make their own arrangement if they require additional feeders for their equipments.
- Power supply (rectifiers) shall be standalone unit and must be installed in a separate room (non Hazardous area). The Power Supply can be installed on the existing Power Supply panel space on the Cable Trench.
- Bidder has to provide their own DC cables as per requirements.
- Motors present in hazardous area of the hydrogen generation plant shall be Constant speed Sq. cage type Electric motor suitable for group IIC of IS 2148 or equivalent international standards like Class I Div II of NEC/ zone 2 or classification IIC of IEC 60079.

C) Control and instrumentation scope:

- a. All necessary instruments such as transmitters, temperature elements, sensors, switches, gauges, controller, analyzer, solenoid valves, etc shall be provided for safe, efficient & reliable operation and maintenance of the H₂ generation plant. All instrument devices shall be intrinsically safe provided with explosion proof enclosure suitable for hazardous area described in National Electric Code (USA), Article 500, class – I, Division – 2 or EN60079 14 or shall comply with the essential requirements of ATEX directives as approved by CCE,

- India and other statutory authorities. All fittings, cable glands, etc. shall be strictly as per NEC recommendation article, 500 to 503.
- b. The control of hydrogen generation plant shall be Cold Redundant processor based PLC system, PLC unit shall be provided with power supply and necessary I/O cards etc for normal operation.
 - c. The PLC system shall be provided with UPS system for uninterrupted power source for safe operation and shutdown in case of any abnormality.
 - d. All the instruments and controls shall have Device Net control system. Signal from the Hydrogen Generator Instruments shall be transmitted to PLC control Panel installed in the control room.
 - e. Following Instruments for proposed Hydrogen Generator are envisaged as a minimum:
 - Level Transmitter for measuring KoH Level in Phase Separator.
 - Pressure Transducers for measuring the Pressure of Hydrogen and Oxygen Gases as well as Dryer Pressures for normal operation and safe shutdown.
 - Flow Switch to measure the KoH Flow entering the Electrolysis Modules.
 - Thermo couples to measure KoH Temp at inlet and outlet of Modules, to measure de-oxo temp etc.

D) Civil scope:

All civil foundation of equipment if required will be done by bidder. Bidder has to do the complete grouting of their equipments.

E) Others Requirement:

I. COMMISSIONING SPARES:

All the necessary commissioning spares shall be supplied as a part of base offer. Bidder will submit the list of commissioning spares for hydrogen generation plant along with the Bid.

II. QUALITY ASSURANCE PLANS:

Bidder has to submit Quality Assurance Plan after successful award of Contract alongwith Drawings and documents for WBPDCCL approval. Detailed QAP, inspection checklist etc, shall be approved by WBPDCCL. All inspection & testing etc. shall be carried out as per the approved Quality plan.

Any changes/additional tests insisted upon by WBPDCCL during detailed engineering shall be accepted by bidder without any commercial implication.

III. SUB VENDOR:

Bidder to note the sub vendors shall be selected from the sub vendor list enclosed as annexure. Additionally proposed sub vendor over and above specified in the enclosed list shall be subjected to WBPDCCL approval during detailed engineering without any commercial / delivery implication to WBPDCCL. Decision of WBPDCCL shall be binding on vendor in this regard.

IV. PG TEST:

Bidder shall perform required tests in presence of WBPDCCL to prove and guarantee the performance guarantee parameters as indicated in Technical Proposal of the bid to the satisfaction of WBPDCCL. The exact modalities of verifying guarantee for the parameters indicated in the specification shall be finally as agreed with the WBPDCCL during detailed engineering & mutually agreed.

The Bidder shall arrange all the monitoring gadgets / instruments / equipment required for performing guarantee parameters (returnable after PG test). Site facility as available or as extended by WBPDCCL shall only be provided.

V. INSTRUMENT AIR/SERVICE AIR:

Instrument air and service air shall not be provided by WBPDCCL. If Instrument air or Service air is required then bidder has to make their own arrangement.

[1. Mandatory Spares, Manual, Drawing, Other relevant certificates is to be supplied.

2. Training is to be provided by the party.]