Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)
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CORRIGENDUM - 02 TO NIT NO-77865

Dated 16.11.2023

Subject: Corrigendum-02 to Tender enquiry for Supply GIS parts FOR NLC Talabira PROJECT.

Project	: NLC Talabira Project
Equipment / Item	: SUPPLY & SERVICES OF 400kV GIS
Enquiry No/Date	: Enquiry No. 61Q2400199 Dated 30-10-2023
BHEL NIT NO	: 77865
Original Tender due date	**: 09.11.2023**

This Corrigendum is issued by BHEL-TBG against above mentioned NIT/ enquiry for-

a) Technical Corrigendum,
b) Technical clarifications in response to pre-bid queries of bidders (as provided by TBEM) along with **revised BOQ** and **revised Price bid format** in line with revised BOQ and,
c) Extension of due date of tender upto **23-11-2023**,
d) Bidders shall submit their offer on tender box as per clause-4 of STC.

Note- Commercial clarifications/ changes in Commercial terms of NIT based on pre-bid meeting discussions shall be issued separately.

All other terms and conditions for this tender enquiry shall remain unchanged.

Bidder to ensure submission of offer on or before due.

Note: Tender ID in CPP Portal is **2023_BHEL_29913_1.**

Thanking you

-------Sd/------
Gaurav Agarwal
BHEL TBG, NOIDA

TECHNICAL CORRIGENDUM - 1 (400kV GIS Talabira) **10-Nov-23**

SL	SECTION	DESCRIPTION	REMARKS
1	BPS	ANNEXURE_BOQ_400kV_GIS, Rev.1	ANNEXURE_BOQ_400kV_GIS has been updated. Updates has been highlighted Yellow. Bidder to follow the same.
2	BPS 1.20	ONLINE PARTIAL DISCHARGE MONITORING SYSTEM FOR 400KV GIS, Qty 1 Set	TS attached
3	Section-1 Part-A Clause 5	SUPPORT STRUCTURE & HARDWARES (INCLUDING STRUCTURE STEEL)	Additional Clause Added - Mechanical / Chemical Anchors Fasteners are to be provided in place of foundation bolts. Design of the same tobe submitted in detailed engineering stage. Bidder to please consider it in scope of supply

TECHNICAL CORRIGENDUM - 1 (400kV GIS Talabira) **10-Nov-23**

SL	SECTION	DESCRIPTION	REMARKS
4	Nil	GIS BUILDING DIMENTION	Size of 400kV GIS Hall are to be designed meeting technical requirements for GIS Layout and other subsystems. The same shall be finalised in contract stage. While designing following aspect may please be taken care off 1. Reserved Space for RCC Column of GIS Building shall be minimum 0.9m x 1.4m. Actual shall be derived during detailed engineering stage. **Bidder to indicate column in tender stage drawing for estimation purpose.** **2**. Column to Column centreline spacing along the length of building (w.r.t. centre lines) shall be limited to max 6.5 m 3. GIS Hall width shall be derived meeting all technical requirements i.e. clearance required around GIS as per TS, Required hook approach for offered GIS & relevant EOT crane & walkway functional spacing requirements during detailed engineering stage.
5		PLAN LAYOUT DRAWING	AutoCAD attached. This is tender stage indicative planned drawing for tendering purpose only. The same shall be finalised during detailed engineering stage.

Testing & Maintenance Equipment as per BID Price Schedule

27. TESTING & MAINTENACE EQUIPMENT

Testing & Maintenance equipment shall be offered, as per relevant schedule of BPS.

27.1. SF6 Gas leakage detector.

The detector shall be portable, battery operated, hand held type and having a minimum SF6 gas leakage sensitivity of 5gm/year. The sensor shall be connected through a flexible wand for easy accessibility to joints, seals and couplings in GIS equipment and provided with a protection filter. The equipment shall have on/off switch & suitable indicating lamps/LEDs, variable pitch audible signal for leakage indication. The equipment shall have automatic zeroing of background signals suitable for detecting SF6 gas leakage in charged switchyard. The test kit shall be compatible for EMI/EMC environment as per IEC 1000.

27.2. Gas filling and evacuating plant : (Gas Processing unit)

- The plant necessary for filling and evacuating the SF6 gas in the switchgear shall be supplied to enable any maintenance work to be carried out. This shall include all the necessary gas cylinders for temporarily storing the evacuated SF6 gas. The capacity of the temporary storage facilities shall at least be sufficient for storing the maximum quantity of gas that could be removed from at least one phase of one complete bay (switchgear and associated equipment).
- Where any item of the filling and evacuating plant is of such a weight that it cannot easily be carried by maintenance personnel, it shall be provided with lifting hooks for lifting and moving with the overhead cranes.
- The minimum capacity parameters of evacuation plant will be as under :

Oil Free Suction (Recovery) Pump:	30 M^3/Hour
Compressor (Two Stage):	15 M^3/Hour
Oil Free Vacuum Pump:	100 M^3/Hour

- The evacuation equipment shall be provided with all the necessary pipes, couplings, flexible tubes and valves for coupling up to the switchgear for filling or evacuating all the gases.

  Details of the filling and evacuating plant that will be supplied, as well as the description of the filling and evacuating procedures shall be furnished

27.3. SF6 gas analyzer:

The SF6 gas analyser should be of portable type and instruments shall have following features:

a. In-built calibration facility.
b. Sensitivity of the equipment shall not be affected by any atmospheric conditions like dust, humidity, heat, wind etc.

c. Equipment shall work on zero gas loss principle i.e. gas should be pumped back to the compartment after measurement without any exposure to the atmosphere.

d. Equipment shall be supplied with suitable regulator which can be used to connect SF6 cylinder if required.

e. Following acidic/impurities products should be detected as per IEC 60480 and IEC 60376

i) SF6 purity – Range: 0-100 % & Accuracy: +/- 2 deg

ii) Dew point - Range : -60 to +20 deg C & Accuracy: +/- 4 deg C

iii) SO2 - Range : 0-150 ppm & Accuracy : +/- 2 %

iv) HF - Range : 0-10ppm & Accuracy : +/- 10 %

f. Instrument should work on AC source as well as on rechargeable battery

g. Input pressure: upto 10 bar

h. It should be housed in a robust IP67 case with wheels

27.4. Portable Partial Discharge(PD) monitoring system (Shall generally applicable for 220kV&132 kV)

- The equipment shall be used for detecting different types of defects in Gas Insulated Stations (GIS) such as Particles, Loose shields and Partial Discharges as well as for detection of Partial discharges in other types of equipment such as Cable Joints, CTs and PTs.
- It shall be capable for measuring PD in charged GIS environment as EHV which shall have bandwidth in order of 100 MHz–2GHz with possibility to select a wide range of intermediate bandwidths for best measurement results. The principle of operation shall be based on UHF principle of detection. The instrument should also be able to detect partial discharges in cable joints and terminations.
- Detection and measurement of PD and bouncing particles shall be displayed on built in large LCD display and the measurement shall be stored in the instrument and further downloadable to a PC for further analysis to locate actual source of PD such as free conducting particles, floating components, voids in spacers, particle on spacer surfaces etc. Software for display and diagnosis of PD signals and an expert software system for accurate interpretation of cause of PD shall also be supplied and installed by the contractor.
- The equipment shall meet the following requirements

    1. Measurement shall be possible in noisy environment.
    2. Stable reading shall be possible in presence of vibrations within complex GIS assemblies, which can produce signals similar to PD.
    3. Equipment should have necessary synchronizing circuits to obtain PD correlation with power cycle and power frequency.
    4. The equipment shall be battery operated with built-in-battery charger. It shall also be suitable for 230V AC/50 Hz input.

5. Measurement shall be possible in the charged switchyard in the presence of EMI/EMC. Supplier should have supplied similar detector for GIS application to other utilities. Performance certificate and the list of users shall be supplied along with the offer.
6. Instrument shall be supplied with standard accessories i.e., re-locatable sensors with mounting arrangements, connecting cables (duly screened) to sensors, Lap-top PC, diagnostic and expert interpretation software, carrying case, rechargeable battery pack with charger suitable for 230V AC, 50Hz supply connecting cables (duly screened) to view in storage.
7. The function of software shall be covering the following:
    a) Data recording, storage and retrieval in computer
    b) Data base analysis
    c) Template analysis for easy location of fault inside the GIS
    d) Evaluation of PD measurement i.e, Amplitude, Phase Synchronization etc.
    e) Evaluation of bouncing/loose particles with flight time and estimation on size of particle.
    f) Expert software system for accurate interpretation of cause of PD.
    g) Report generation.
8. To prove the suitability in charged switchyard condition, practical demonstration shall be conducted before acceptance.
9. Supplier shall have "Adequate after sales service" facility in India and shall provide the document in support of this.
10. Necessary training may be accorded to personnel to make use of the kit for locating PD sources inside the GIS
11. Instrument shall be robust and conform to relevant standard.

- **Calibration:** The UHF Couplers have to be first calibrated as per CIGRE Document No. 654 as part of factory acceptance tests to guarantee detection sensitivity of 5pC or better. The GIS of same design shall be used as test specimen during the coupler calibration. The pulse injection level determined through above factory calibration tests shall only be used as reference for site sensitivity checks during commissioning of PDM system. The data sheet/frequency response characteristics shall be submitted for reference.
- Pulse generator, same type as that of used during factory testing for UHF sensor sensitivity test shall be supplied as a standard accessory.

27.5. Online Partial Discharge Monitoring System (Applicable for 765kV& 400 kV GIS)

- GIS equipment shall be designed so as to minimize partial discharge or other electrical discharge. A state-of-the art Partial Discharge Monitoring system shall be provided to monitor the entire GIS installation.

- An on-line continuous Partial Discharge Monitoring (PDM) system shall be designed to provide an automatic facility for the simultaneous collection of PD data at multiple points on the GIS & its associated GIB ducts and Voltage Transformers adopting UHF technique. The data stored shall provide a historical record of the progress of PD sources and shall identify the areas of maximum activity.
- On-line continuous Partial Discharge Monitoring (PDM) system shall be capable for measuring PD in charged GIS environment as EHV which shall have bandwidth in order of 100 MHz–2GHz with possibility to select a wide range of intermediate bandwidths for best measurement results. The principle of operation shall be based on UHF principle of detection.
- The scope shall cover Engineering, supply, installation, testing and commissioning of partial discharge continuous monitoring system, with all necessary auxiliaries and accessories to make a complete system as per technical specification, including site demonstration of successful operation. Any items/accessories necessary to make the system fully functional for the trouble free online PD monitoring of complete GIS installation shall be considered as included in the scope.

  The PDM system shall be provided with all its hardware and software, with readily interfacing to the UHF PD couplers installed in the GIS of present bays and future bays as shown in SLD plus 20% additional as extra. Details of this shall be submitted during engineering stage for approval.

  The integration of UHF PD coupler in future GIS bays shall be done in respective package. The number of UHF PD coupler for future bays shall be decided based on GIS layout finalized under present scope (considering present GIS equipment with future provision).

  The PD Monitoring PC Work Station shall be housed in a lockable cabinet with duplicate keys and shall be located in the control room of the GIS substation. Workstation PCs shall be pre-loaded with all necessary Hardware & Software. The PCs shall have each Combo drive & Retrievable disk drive (1 TB), Ethernet port 100Mbps, printer. The workstation PC shall be powered by suitable dedicated UPS and same is included in the present scope.
- Design of on-line PDM System
  1. The technical proposal for PDM system along with detailed design documentation shall be submitted for EMPLOYER'S approval during engineering stage.
  2. To guarantee that sufficient coverage is available for complete GIS installation to monitor PD activity all design details shall be submitted as part of the above for review.
  3. The sensitivity of the offered system shall be in accordance with CIGRE Document No. 654 that will be verified as part of site sensitivity tests.

4. UHF attenuation data of GIS shall be submitted for the switching devices, spacers, bends etc.
5. The signal attenuation level of co-axial cable per meter length and justification for the length of cable connection between the couplers and detector units shall be furnished.
6. The overall sensitivity of PD detection system shall take into account the spacing between couplers and the associated cabling, filters, amplifiers, etc.
7. The Sub-station GIS layout as a separate drawing indicating position of spacers, spread over of PD sensors with distance, sensor identification, the detector unit identification etc. shall be submitted during engineering stage for approval.
8. The PD sensors shall be identified / coordinated with the corresponding detector unit etc. with proper identification labeling and indicated in the substation PDM SLD.
9. Internal arrangement/wiring diagram is to be submitted for detector units/control cabinet etc. All internal items are to be identified / labeled to facilitate troubleshooting.
10. Supply requirement (AC & DC) to be specified for the complete monitoring system.
11. Power supply to PDM PC shall have protection against surges, overload and short circuit. A dedicated on-line UPS system shall also be provided as a backup during supply interruption, to ensure trouble-free & reliable running of the PDM System for a minimum of 15 minutes duration. Ratings of UPS shall be proposed for the approval of EMPLOYER'S. The UPS shall have enough capacity to initiate a 'safe' shut down of the PDM PC and the peripherals after this 15-minute period if normal supply fails to resume. The PDM PCs shall restart automatically on resumption of normal supply. The UPS shall not generate spikes during changeover of supply. UPS shall automatically give indication / alarm when it requires battery replacement. Potential Free Contacts shall be generated to signal these events. These contacts shall be wired out to Annunciation / Monitoring systems. Alternately, inverter of suitable capacity is also acceptable. Critical Process and Status alarms of the PDM system shall be displayed.
12. PDM System shall be provided with a user security for accessing the system with a log-on and password entry procedure. The user levels shall be defined as a Master User and other users for the modification of system, update, and entry of parameters or manual operation. System shall be able to generate 3D point on wave pattern whenever any PD activity detected by the system. System shall be able to give online 3D point on wave pattern, online PRPD (phase resolved PD) and online short time trend etc. System shall be able to generate the all the logs related to system fault, system access, PD event, and any changes in system setting etc.
13. Method of electrical isolation/protection provided between PD sensor and detector circuitry in case of flashover/high potential stress inside GIS should be furnished.
14. The selected mode of propagation of PD signal (electromagnetic wave) inside GIS for the design of sensors shall be furnished.
15. The protection available for electronics against transient over voltages caused by switching operations shall be furnished.

16. The capacity of each detector unit to be specified to accommodate as many numbers of PD sensors signal.
17. The applicable standards to meet IEC & IEEE requirements for electromagnetic compatibility shall be specified. The offered system should have been tested for the same for working in a 400kV & above substation environment. The necessary documentation has to be submitted in this regard.
18. Guaranteed technical particulars & data sheet for various components used in the system shall be submitted.

- **Calibration:** The UHF Couplers have to be first calibrated as per CIGRE procedure TF 15/330305 as part of factory acceptance tests to guarantee detection sensitivity of 5pC or better. The GIS of same design shall be used as test specimen during the coupler calibration. The pulse injection level determined through above factory calibration tests shall only be used as reference for site sensitivity checks during commissioning of PDM system. The data sheet/frequency response characteristics shall be submitted for reference.

- **Every Day Use & Maintenance** : The system shall be designed suitable for an unmanned s/s and operate automatically. The system shall generate alarms if suspected partial discharge activity is noticed or the system itself is in failure, thereby eliminating the necessity of periodic system access by the user and one such alarm shall be connected to Substation automation system (SAS). The alarms shall be configured coupler wise.

- **Computers and Peripherals:** The PC operating system shall be the latest version of MS Windows. It should be suitable for continuous process application and should have been tested for the same. The hardware configuration of PC should be the latest available in the market of industrial type subject to EMPLOYER'S / Engineer approval. For storing the historical PD database, sufficient storage facility in the form of hard disc and retrievable hard disk drive of 1TB as specified shall be available in the substation. The PC monitor shall be 21" LCD type of reputed make.

- **Filtering Facility:** The filtering facility has to be provided in order to distinguish real PD from internal/external noise such as switching operations, self-test signal, radio, communication signal etc. The PDM system itself shall be able to discriminate the noise from real PD. The exposed gas barriers of the GIS shall be shielded effectively against noise interference & tested. The gas barrier shields/belts shall be suitable for outdoor use also & able to withstand high ambient temperature. Site measurements have to be performed after installation of the PDM system in order to identify the various sources of external noise to incorporate the same in the filtering facility. This filtering will preferably be through software by band pass, which can be manually activated (as an option) to filter out noise signals in the trend plot display. If hardware filtering is employed then adequate measures have to be taken to avoid masking of other signals, which may lie in the same frequency range. The method adopted for the above shall be specified taking into account the sensitivity requirement of PDM system as per CIGRE document. The noise filters shall be selectable individually coupler-wise.

- **Self-Test (Diagnostic) Facility**: Built-in self-checking facility shall be incorporated in the control system which will continuously verify the correct operation of the whole monitoring system with the simulated PD signal viz. checking of the sensitivity of individual detector units, response of PD sensors in addition to the checking of the system functioning. The periodicity of such self-check operation shall be specified. In case of system failure this shall trigger an alarm for communication to SAS. External check facility: Propose the arrangement/device available for externally checking the healthiness of PD sensors by pulse injection in addition to built-in monitoring facility.
- **Detector Units**: The sensitivity of each detector unit shall be furnished. The sensitivity level of individual detector units shall be selectable depending on the site background noise level.
- **Trend Plot**: The trend plot facility shall be available with the update period of hourly/daily/weekly/monthly/yearly. It shall be possible to view the historical trends for the complete archived data accumulated over several years.
- **PD Monitoring modes**: There shall be two different modes of system operation viz. a dedicated Continuous PD Monitoring mode for the normal day today operation of the system & a dedicated HV commissioning test mode which is exclusively for PD monitoring during HV commissioning test. The HV commissioning mode shall also operate as an independent feature.

  In the HV Commissioning mode the real time display shall be possible for a minimum of two complete bays with associated bus bars and at with one second update period. The HV test software shall automatically record the HV voltage information along with PD so as to check PD inception & extinction voltages precisely. The complete HV & PD data recorded during HV test shall be possible to be reviewed in replay mode after the HV test.
- **Alarm Facility:** The PDM system shall generate alarm when action is required; viz. a) PD alarm (abnormal PD activity indicating a risk of failure) & b) PD system fail alarm to be connected to SAS.
- **Real Time Display:** The PDM system should have the facility of Real Time display, which will give an instant indication of PD activity coupler wise, with one-second-update period. The PDM system shall be able to capture the PD data triggered by associated switching operations of CBs & isolators.
- **Schematics: The** PDM system should have GIS schemes bay-wise incorporating PD sensor identification and location along with spacer location. The sectional view of typical bay arrangement of GIS showing active parts shall also be included as part of the PDM software.
- **Print Option/Facility:** PDM system should have the option/facility of printing all trend plots/reports/POW patterns/displays, etc. Laser Colour printer shall be provided for this purpose at substation.

- **Data Archives:** This is to provide access to historical data and file storage with date and time stamp. Sufficient storage facility shall be available to review historical data updated for the lifetime of switchgear. The substation & headquarters PCs shall have a backup device in the form of a retrievable disk drive of 1TB capacity for this purpose.

- **PD Fault Identification & Location/Pattern Recognition/Predictive Maintenance**

  Diagnostic Software: In order to interpret various types of PD defects, intelligent diagnostics software (expert system) shall be built- in as part of the PDM software capability. This is mainly to reduce the dependence on PD specialist. The bidder shall also make available typical point-on-wave patters as library pictures to train the user.

  Software Updates: It shall be possible to upgrade / update the system software throughout the lifetime of the system with the ongoing development / refinement in PD technology.

- Fault investigation : In case of any indication of suspected PD activity by the on line system, further investigation has to be carried out by the contractor for the PD defect identification and location during the warranty period

- Special Tools / equipment, Spare Parts, software packages

  Special Tools: Special tools for cutting and crimping of coaxial cable with 'N Connectors' shall be supplied.

  Spare parts: The contractor has to supply critical spares with replacement procedure for the trouble free operation of the system during its expected lifetime as part of the contract. A detailed list shall be included in the tender and also submitted for EMPLOYER'S approval during the detailed engineering stage.

  Software Packages: The complete software package shall be supplied as part of a back-up facility in the form of DVD/CDs viz. Windows operating system with end user license, PDM Software including HV Test, Drivers for modems etc., software for remote access, printer etc. The list shall be submitted for reference.

  Pulse generator for UHF sensor sensitivity test shall also be supplied as a standard accessory.

- Operation & Maintenance Manual :A complete O&M manual covering all aspects of trouble shooting of PDM system in six sets in original shall be provided & also in CD's. For diagram references colour pictures shall be provided. A step-by-step procedure for spare parts replacement shall also be included.

- **Factory / Site Test Formats**: The factory & site tests format to be submitted for approval. The format shall cover all possible tests to confirm healthiness of the system and to record the test values.

- List of References: The bidder shall provide a reference list of PD monitoring system, which is supplied by them and in successful operation worldwide in a power utility.

SL	DESCRIPTION	UNIT	QTY	REMARKS
1	SUPPLY- GIS : 400KV, 63KA FOR 1S, GAS INSULATED SWITCHGEAR (GIS) AS PER TS			
1.01	400 KV, SF6 GIS LINE FEEDER BAY	Set	3	
1.02	400 KV, SF6 GIS BUS REACTOR BAY	Set	2	
1.03	400 KV, SF6 GIS IBT BAY	Set	2	
1.04	400 KV, SF6 GIS ST BAY	Set	3	
1.05	400 KV, SF6 GIS ICT BAY	Set	2	
1.06	400KV SF6 GIS TIE BAY	Set	6	
1.07	400KV GIS BUS BAR MODULE	Set	2	
1.08	400KV SF6 GIS BUS MEASUREMENT ASSEMBLY FOR MAIN BUS INCLUDING LA, VT, DS & ES AS PER SLD & TENCHNICAL SPECTIFCATION	Set	2	
1.09	400KV SINGLE PHASE, SF6 GAS INSULATED BUS DUCT (GIB) OUTSIDE GIS HALL ALONGWITH ASSOCIATED SUPPORT STRUCTURE & EARTHING	Meter	4200	
1.10	400KV SF6 GIS ADAPTER BOX FOR EXTENSION OF GIS, SET OF 3 PHASE	Set	4	
1.11	400KV SF6 TO AIR BUSHING (1 PHASE)	Nos.	36	

SL	DESCRIPTION	UNIT	QTY	REMARKS
1.12	SF6 GAS REQUIRED FOR PLACING GIS INTO SUCCESSFUL OPERATION	Lot	1	
1.13	CONTROLLED SWITCHING DEVICE FOR 400 KV, 3-PH CIRCUIT BREAKER	Set	15	
1.14	LOCAL CONTROL CUBICLES (LCC)	Nos.	18	
1.15	STRUCTURE MATERIAL INCLUDING FOUNDATION BOLTS, EMBEDDED ITEMS, RAILS AND/ OR OTHER MATERIALS ETC.	Lot	1	
1.16	EARTHING MATERIALS INCLUDING HIGH FREQUENCY EARTHING	Lot	1	
1.17	ONLINE PARTIAL DISCHARGE MONITORING SYSTEM FOR 400KV GIS.	Set	1	
1.18	SF6 GAS PROCESSING UNIT FOR 400KV GIS STATION	Set	1	
1.19	SF6 GAS LEAKAGE DETECTOR	Set	1	
2	SPARES- GIS : 400KV, 50KA FOR 1S, GAS INSULATED SWITCHGEAR (GIS) AS PER TS			
2.01	SPARE - O-RING AND GASKETS (ONE OF EACH TYPE & SIZE)	Set	3	
2.02	SPARE - SF6 GAS PRESSURE RELIEF DEVICES (ONE OF EACH TYPE & RATING ALONG WITH Ó'RINGS)	Set	2	
2.03	SPARE - SF6 GAS CYLINDER (20% OF TOTAL QUANTITY)	Set	1	

SL	DESCRIPTION	UNIT	QTY	REMARKS
2.04	SPARE - MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS (5% OF TOTAL QUANTITY)	Set	1	
2.05	SPARE - ALL TYPES OF CONTROL VALVES FOR SF6 (ONE OF EACH TYPE & RATING)	Nos.	3	
2.06	SPARE - LOCKING DEVICE TO KEEP THE DISCONNECTORS /ISOLATORS AND EARTHING SWITCHES IN CLOSE OR OPEN POSITION IN CASE OF REMOVAL OF DRIVING MECHANISM	Nos.	3	
2.07	SPARE - SPARES FOR LOCAL CONTROL CABINET INCLUDING MCB, FUSES, TIMER, AUXILIARY RELAYS, CONTACTORS, PUSH BUTTONS, SWITCHES, LAMPS & ANNUNCIATION WINDOWS, TERMINAL BLOCKS (ONE OF EACH TYPE & RATING, SIZE, RATING & MAKE)	Nos.	2	
2.08	SPARE - SF6 TO AIR BUSHING COMPLETE WITH CONNECTORS (ONE OF EACH TYPE & RATING & RATING)	Nos.	1	
2.09	SPARE - SINGLE PHASE POTENTIAL TRANSFORMER (ONE OF EACH TYPE & RATING, ACCURACY CLASS, BURDEN)	Set	1	
2.1	SPARE - SINGLE PHASE CURRENT TRANSFORMER (ONE OF EACH TYPE & RATING, RATIO, ACCURACY CLASS, BURDEN) WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR COMPLETE IN ALLRESPECT	Set	1	
2.11	SPARE - EXPLOSION VENT DIAPHRAGMS (5% OF TOTAL POPULATION)	Set	1	
2.12	SPARE - BUS SUPPORT INSULATOR (5% OF TOTAL POPULATION)	Set	1	
2.13	SPARE - SURGE ARRESTOR (ONE OF EACH TYPE & RATING & RATING AND DISCHARGE CLASS)	Nos.	1	
2.14	SPARE - SURGE COUNTER WITH LEAKAGE CURRENT MONITOR	Nos.	1	
2.15	SPARE - 400 KV CIRCUIT BREAKER (BELOW LIST SHALL BE PROVIDED FOR 400 KV CIRCUIT BREAKER)			
2.15.1	CB SPARE - COMPLETE POLE ASSEMBLY (1 PHASE) OF CIRCUIT BREAKER OF EACH TYPE AND RATING COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE, MARSHALLING BOX WITH OPERATING MECHANISM (APPLICABLE FOR CB WITHOUT PIR)	Set	1	

SL	DESCRIPTION	UNIT	QTY	REMARKS
2.15.2	CB SPARE - COMPLETE POLE ASSEMBLY (1 PHASE) OF CIRCUIT BREAKER OF EACH TYPE AND RATING COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE, MARSHALLING BOX WITH OPERATING MECHANISM (APPLICABLE FOR CB WITH PIR)	Set	0	
2.15.3	CB SPARE - CIRCUIT BREAKER CLOSING AND OPENING COIL ASSEMBLY (ONE OF EACH TYPE & RATING)	Set	2	
2.15.4	CB SPARE - CIRCUIT BREAKER OPERATING MECHANISM (ONE OF EACH TYPE & RATING)	Set	1	
2.15.5	CB SPARE - CIRCUIT BREAKER OPERATION COUNTER (ONE OF EACH TYPE & RATING)	Nos.	3	
2.15.6	CB SPARE - AUXILIARY SWITCH ASSEMBLY (ONE OF EACH TYPE & RATING)	Nos.	3	
2.16	400 KV ISOLATOR / DISCONNECTOR, EARTH SWITCHES (BELOW LIST SHALL BE SEPARATELY PROVIDED FOR 400 KV GIS)			
2.16.01	SPARE - COMPLETE SET OF 3 NOS. OF SINGLE PHASE / ONE 3 PHASE ISOLATOR OF EACH TYPE , DIMENSION, CURRENT, & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM	Set	1	
2.16.02	SPARE - 3 NOS OF SINGLE PHASE / ONE 3 PHASE MAINTENANCE EARTH SWITCH OF EACH TYPE , DIMENSION, CURRENT, & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM	Set	1	
2.16.03	SPARE - 3 NOS OF SINGLE PHASE / ONE 3 PHASE FAST ACTING EARTH SWITCH OF EACH TYPE , DIMENSION, CURRENT, & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM	Set	1	
2.16.04	SPARE - OPEN & CLOSE CONTACTOR ASSEMBLY INCLUDING TIMER, INTERLOCKING COILS, KEY INTERLOCK, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTER, FUSES, MCB FOR ONE COMPLETE DISCONNECTOR (3 PHASE) (ONE OF EACH TYPE & RATING)	Nos.	1	
2.16.05	SPARE - OPEN & CLOSE CONTACTOR ASSEMBLY INCLUDING TIMER, INTERLOCKING COILS, KEY INTERLOCK, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTER, FUSES, MCB FOR ONE COMPLETE MAINTENANCE EARTH SWITCH (3 PHASE) (ONE OF EACH TYPE & RATING)	Nos.	1	
2.16.06	SPARE - OPEN & CLOSE CONTACTOR ASSEMBLY INCLUDING TIMER, INTERLOCKING COILS, KEY INTERLOCK, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTER, FUSES, MCB FOR ONE COMPLETE FAST ACTING EARTH SWITCH (3 PHASE) (ONE OF EACH TYPE & RATING)	Nos.	1	

SL	DESCRIPTION	UNIT	QTY	REMARKS
2.16.07	SPARE - ISOLATOR CONTACTS (ONE OF EACH TYPE & RATING & CURRENT RATING)	Set	1	
2.16.08	SPARE - MAINTENANCE EARTH SWITCH CONTACTS (ONE OF EACH TYPE & RATING & CURRENT RATING)	Set	1	
2.16.09	SPARE - FAST ACTING EARTH SWITCH CONTACTS (ONE OF EACH TYPE & RATING & CURRENT RATING)	Set	1	
2.16.1	SPARE - ISOLATOR OPERATING MECHANISM (ONE OF EACH TYPE & RATING)	Nos.	3	
2.16.11	SPARE - MAINTENANCE EARTH SWITCH OPERATING MECHANISM (ONE OF EACH TYPE & RATING)	Nos.	3	
2.16.12	SPARE - FAST ACTING EARTH SWITCH OPERATING MECHANISM (ONE OF EACH TYPE & RATING)	Nos.	3	
2.16.13	SPARE - LIMIT SWITCH ASSEMBLY FOR DISCONNECTOR (ONE OF EACH TYPE & RATING)	Set	2	
2.16.14	SPARE - LIMIT SWITCH ASSEMBLY FOR MAINTENANCE EARTH SWITCH (ONE OF EACH TYPE & RATING)	Set	2	
2.16.15	SPARE - LIMIT SWITCH ASSEMBLY FOR FAST ACTING EARTH SWITCH(ONE OF EACH TYPE & RATING)	Set	2	
2.17	SPARE - STATIC FILTER(ADSORBENT) (5% OF TOTAL POPULATION)	Set	1	
2.18	SPARE - GAS BARRIER & RUPTURE DISK (ONE OF EACH TYPE & RATING) (5% OF TOTAL POPULATION)	Set	1	
2.19	SPARE - GAS DENSITY MONITOR (PRESSURE SWITCH WITH GAUGE) (5% OF TOTAL POPULATION)	Set	1	
2.20	SPARE - COUPLING DEVICES ONE OF EACH TYPE & RATING OF PRESSURE GAUGE CUM SWITCH FOR CONNECTING GAS HANDLING PLANT	Set	2	
3	SPARES- GIS : REFERENCE UNIT PRICE FOR ADDITION / DELETION OF SUPPLY ITEMS: (Unit Prices of Individual Equipment included here or in manadatory spares are required for any Addition/Deletion of Equipment and replacement of damaged items. Vendor to ensure that the unit prices have a logical relationship with prices of assemblies in main items. Quoting for unit prices is mandatory and shall be considered for evaluation)			
3.1	AUGMENTATION OF 1 PHASE GIS CTA / CTB FOR ADDITION OF 1 CORE (IF REQUIRED IN DETAILED ENGINEERING)	Set	18	
3.2	AUGMENTATION OF 1 PHASE GIS VOLTAGE TRANSFORMER FOR ADDITION OF 1 NO. SECONDARY WINDING (IF REQUIRED IN DETAILED ENGINEERING	Set	18	
4	SERVICES- GIS : 400KV, 50KA FOR 1S, GAS INSULATED SWITCHGEAR (GIS) AS PER TS			

SL	DESCRIPTION	UNIT	QTY	REMARKS
4.01	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS	Lot	1	Supervision of erection of 400kV GIS, complete in all respect including LCC. It also includes supervision of unloading & verification of materials for proper storage at site. In the event of changes in scope, payment shall be made on pro-rata basis of circuit breaker bays only. This includes services for complete GIS system excluding GIB & SAB.
4.02	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GAS INSULATED BUS DUCT	Set	1	
4.03	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF SF6 TO AIR BUSHING	Set	36	Single phase SF6 Bushing.
4.04	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS	Lot	1	Testing and commissioning of complete 400kV GIS system is to be executed by contractor (excluding HV Test which is covered in a separate line item below). All testing instruments, kits, T&P etc. are to be arranged by contractor on returnable basis. Please refer relevant section of technical specification for details. (This also includes Testing & commissioning of GIB, SAB & CSD etc complete in all aspect)
4.05	SERVICES- GIS : 400KV, FINAL SUCCESSFUL HV/ POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	Lot	1	Carrying out successful HV/ Power Frequency Testing of GIS as per IEC including Arrangement of HV Test kit (on returnable basis) shall be in scope of bidder, which includes charges HV test kit with operator, accessories & tools required for completion of HV testing. Bays may be commissioned separately.
4.06	SERVICES- GIS : STUDIES INSULATION CO-ORDINATION VFTO REPORT e.t.c. complete	Lot	1	Complete study as per technical specification
4.07	SERVICES- GIS : TRAINING AT GIS FACTORY	Lot	1	

SL	DESCRIPTION	UNIT	QTY	REMARKS
4.08	SERVICES- GIS : TRAINING AT SITE	Lot	1	
5	SERVICES- GIS : REFERENCE UNIT PRICE FOR ADDITION / DELETION OF SERVICES: (UNIT PRICES OF INDIVIDUAL SERVICES INCLUDED HERE ARE REQUIRED FOR ANY ADDITION/DELETION OF EQUIPMENT AND REPLACEMENT OF DAMAGED ITEMS. VENDOR TO ENSURE THAT THE UNIT PRICES HAVE A LOGICAL RELATIONSHIP WITH PRICES OF ASSEMBLIES IN MAIN ITEMS. QUOTING FOR UNIT PRICES IS MANDATORY AND SHALL BE CONSIDERED FOR EVALUATION)			
5.1	SERVICES- GIS : REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR SUPERVISION OF ERECTION OF GIS	MANDAY	10	Charges for repetition of services - (if required due to reasons not attributed to the contractor) This item will be executed only if repetition of services is required by BHEL.
5.2	SERVICES- GIS : REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR TESTING & COMMISSIONING OF GIS	MANDAY	10	Charges for repetition of services - (if required due to reasons not attributed to the contractor) This item will be executed only if repetition of services is required by BHEL.
5.3	SERVICES- GIS : 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - CHARGES OF HV TEST KIT WITH OPERATOR	Lot	1	Additional HV test kit charges including charges of operator, HV test kit, accessories & tools required for completion of HV test (Dielectric Test after installation of GIS). This item is executed only if repetition/ additional HV Test is required by BHEL i.e. post successful commissioning of GIS. (if required due to reasons not attributed to the contractor)

TECHNICAL CLARIFICATION FOR 400kV GIS

S.No	Reference Document	Reference Clause/DocNo.	Technical Issue	Customer's Requirement	Bidder's Remarks_07-11-2023	Customer's Reply
1	PriceBid Format (400 kV)	Sr.No. 1.15	Anchor bolts	STRUCTURE MATERIAL INCLUDING ANCHOR BOLTS, EMBEDDED ITEMS, RAILS AND/ OR OTHER MATERIALS ETC.	We would like to inform you that, Anchor bolts, Embedded rails will be in EPC scope of supply. Kindly accept the same.	Bidder to please considers the same under it's scope of supply. Further please refer technical corrigendum-1 for scope of supply of mechanical / chemical anchor fastener instead of foundation bolts.
2	-	-	Dimensions	Not provided	We would like to inform you that, we have not received the building dimensions of 765kV & 400 kV. Kindly provide the same.	Noted, please refer technical corrigendum-1
3	Volume-II-F/2	Section-XII Cl. 3.06.00	Studies	The contractor shall be fully responsible for carrying out all co-ordination & liasion work as may be required.	We would like to inform you that, the clause does not contain exact information for studies to be performed. Kindly provide the exact details.	Coordination with Statutory Bodies and Outside Agencies not relevant to GIS manufacturing NOT in GIS manufacturer's scope
4	Volume-II-F/2	Section-XII Cl. 5.01.01 18 e	Circuit breaker operational requirement	Noise Level - As per IEC 61672	We would like to inform you that, we follow NEMA standards for the noise level. Kindly accept the same.	Noise level - as per IEC 61672. Please Refer 5.01.01 Circuit Breakers 18 e). Bidder to comply the same
5	Volume-II-F/2	Section-XII Cl. 5.01.03 3 Cl. 5.01.04 12 Cl. 01.05 8	Voltage Transformer, Disconnector & Earting switch	The bus bar VT shall be connected through hand operated isoltors, which are to be provided with padlock facilities and padlocks.	We would like to inform you that, we shall provide the provision for padlocking. However padlocks shall be EPC scope of supply. Kindly accept the same.	Padlock facilities and padlock are in bidder's scope as per TS
6	Volume-II-F/2	Section-XII Cl. 5.01.17	Grounding of GIS	Refer clause 5.01.17 Point 1 & 2	We would like to inform you that, we shall supply earting material from GIS equipment to nearest earth riser only. The supply of earthing material below FFL shall be complete EPC scope. Kindly accept the same.	Section-1 & Section-XII Cl. 5.01.17 with other section of TS are to be read together for bidder's scope. Please comply technical specification.
7	Volume-II-F/2	Section-XII Cl. 7.03.00 e, g & x	Documents and drawings submission	g) Design calculations in support of selection of equipment rating and system design x) Relay Setting and co-ordination Insulation coordination study report, Very fast transient over voltages (VFTO) Report	g. Design calcultion are Hyosung confidential and can not be submitted. x. The mentioned studies are under EPC scope of supply. Kindly accept the same.	g) noted, subject to customer approval during contract stage x) Relay settling & co ordination not in bidder's scope x) Insulation coordination study report, Very fast transient over voltages (VFTO) Report are in bidder's scope

S.No	Reference Document	Reference Clause/DocNo.	Technical Issue	Customer's Requirement	Bidder's Remarks_07-11-2023	Customer's Reply
8	Volume-II-F/2	-	System Parameters	Maximun RIV for frequency between 0.5 to 2MHz in open and close condition (micro volt) For 400kV GIS 2500 at 508kVrms	We would like to inform you that, our GIS is type tested as per the IEC standards. We shall confirm the mentioned parameter as per the same, Kindly accept the same.	Please refer Annexure-A System Parameters Maximum radio interference voltage for frequency between 0.5 to 2MHz in open & close condition (Micro volt): 1000 (at 320kV rms)
9	Volume-II-F/2	-	System Parameters	Noise level -dB	We would like to inform you that, we follow NEMA standards for the noise level. Kindly accept the same.	Noise level - as per IEC 61672. Please Refer 5.01.01 Circuit Breakers 18 e). Bidder to comply the same
10	Volume-II-F/2	-	System Parameters	Material of enclosure - Porcelain	We would like to inform you that, we shall provide the composite type SF6 to Air bushing. The composite bushing is more advantageous over porcelain. Kindly accept the same.	Noted Subject to customer approval during detailed engineering stage
11	Volume-II-F/2	-	-	The scheme for all protections, controls, indications, interlocking, metering, AC distribution and all other schemes shall be prepared in such a way that cables shall be laid in radial pattern.	We would like to inform you that, All all protections, controls, indications, interlocking, metering, AC distribution cables will be in EPC scope.	Please refer Section-1 Clause 7 for scope of cable. Bidder to pl comply.

TECHNICAL CLARIFICATION FOR 400kV GIS

No.	Chapter/ page	Specification	Queries/Comments/Deviations	BHEL Reply
		Plot plant drawing: 18A03-DWG-M-002A & SLD Drawing: 18A03-DWG-E-0002 Rev1		
1	Technical specification pg 34	Plot Plan Drawing: 18A03-DWG-M-002A	The given pdf file of plot plan drawing does not have dimensions to scale. Please provide AutoCAD format of layout drawing to obtain precise scaling and bushing termination points for busduct routing.	Attached
2	Technical specification pg 34	Plot Plan Drawing: 18A03-DWG-M-002A, SLD Drawing: 18A03-DWG-E-0002 Rev1	Bay sequence indicated in given SLD and given layout differs. Since layout is given, we understand bay sequence to follow as per customer given layout. Please clarify. (If bay sequence as per SLD to follow, we request to provide updated layout with bay sequence as per SLD in layout).	Please refer Section-1 IV.1 Bidder to note that number of bays / breakers shall be as per SLD. Plot plan Layout is indicative and shall be finalized during detailed engineering stage. Overall GIS Hall & GIB Length optimization shall be under consideration Shall be shared with successful bidder during contract stage
3	SLD given & Spec:Vol.II.F2/Sec-XII 5.01.11 pg 35	Gas barriers shall be provided in line with Gas Single Line	Gas barriers shall be provided as per GIS manufacturer's type tested design, however will meet the service continuity requirements.	Bidder to please follow tech specification
4	SLD & Layout given	400kV GIS present scope	As per customer SLD and layout we observed for 400kV GIS there is no future extension space for future bays to be considered. Please clarify.	Bidder to please follow tech specification
5	SLD & Layout given	400kVGIS Bus VT & LA	Bus LA and Bus VT location indicated in given SLD differs with customer given GIS plot plan drawing.Please clarify.	Placement of Bus LA & VT shall be done based on optimization in GIS Hall size & GIB length
6	General	400kV GIS	Please provide the 400kV GIS BOQ.	PI ref tender doc
		Specification: Vol.II-F2 / Section-XII		
7	2.02.01 pg 2/116 & 4.23.00 pg 15/116	400kV GIS shall have following bays: v) Adapter box for extension of GIS Each line up of switchgear shall be suitable and prepared for future extension on either end……	Future Extension interface enclosure suitable for Bidder's make GIS shall be offered in one end of the busbar.	Bidder to please follow TS
8	5.01.12 pg 35/116	Gas Monitoring Devices: Temperature-compensated two(2) independent gas density monitoring devices shall be provided for each gas compartment to improve the reliability.	As per our type tested design, we propose one No. temperature compensated density switch for each compartment. Reliability of density switches are ensured during site testing & during periodic maintenance.	Bidder to please follow TS

9	5.02.05 pg 39/116	Local control cabinet for GIS: All terminals shall be of stud and nut type and mounted on DIN channels	The Stud type terminal block shall be offered for CT&PT control circuits. All other control circuits shall be provided with Pin type terminal blocks.	Bidder to please follow TS
10	6.02.02 c) pg 106/116	Routine Tests: Atleast one local control cubicle(LCC) shall be tested together with the GIS during factory acceptance tests.	LCC shall be tested with test simulator at factory. LCCs shall be tested with GIS during commissioning.	Bidder to please follow TS
11	6.02.02 c) pg 106/116	Routine Tests: Chattering time of the arc contact shall be measured and	Not applicable for offered GIS CB.	Noted, subject to customer approval during contract stage
12	Annexure-B pg 111/116	22.Noise level - 48 dB	Noise level shall be ≥100 dB during switching of CB.	Clarified earlier
13	Annexure-B pg 111/116	24. Max. SF6 operating	SF6 operating pressure should be relative to the proposed GIS	Noted, subject to customer approval during contract stage
14	Annexure-B pg 112/116	High Voltage Outdoor Bushing (Porcelain	GIS SF6 to airbushing shall be composite type.	

TECHNICAL CLARIFICATION FOR 400kV GIS

Sr. No	Document	Clause no.	Clause	Bidder's Clarification	BHEL Clarification
1	TS Section-1 (Part-A)	3	4. Total contract value may vary up to ±30% at contract stage.	Consideirng the overall scope of GIS to be substantial, request to restrict the variation in total upto +/- 10% of contract value only.	Please refer commercial clarification for the same
2	TS Section-1 (Part-A)	3	7. BHEL reserve rights to amend Bay sequence during contract stage, no separate claim shall be admissible in this regards.	we understand the Bay sequence in Tender SLD is final and same shall be followed for offer submission. Any change in Bay sequence during execution can lead to price implication.	Most likely it will be the same. However please refer Section-1 (Part-A) Clause 3.7 7. BHEL reserve rights to amend Bay sequence during contract stage, no separate claim shall be admissible in this regards.
3	TS Section-1 (Part-A)	3	7. BHEL reserve rights to amend Bay sequence during contract stage, no separate claim shall be admissible in this regards.	Kindly confirm if any modifications are allowed in tender layout. To avoid any over crossing of bus duct, can we change the bay sequence in tender SLD/Layout?	The same shall be reviewed during detailed engineering stage and subject to customer approval. Optimization of bus duct length shall also be taken care off.
4	TS Section-1 (Part-A)	3	3. Any change in bay pitch (distance between bays): In a case where shifting of GIS bays shall be called by BHEL (during contract stage) due to layout requirement / cost optimization / revision / change in civil architectural requirement or due to expansion joint requirement in the GIS building, Bidder to incorporate the same with full compliance of technical requirement. Payment equivalent of BPS / BOQ item under head “Gas Insulated Bus Duct” shall be operated for additional length of Main Bus, subject to such shifting is not attributed to bidder.	(1) We understand Tender layout shall be base reference to calculate any variation of busbar length. Kindly confirm. (2) Further we request to have separate line item for for Gas insulated bus duct and Gas insluated mainbusbars.	Please refer Technical Corrigendum-1 for conceptual sizing of GIS Hall. Bidder to design with full compliance and the same shall be reviewed and comment during detailed engineering only. Beyond the compliance of fullest technical requirement if BHEL call for addition of bay pitch, the same shall be considered as per TS. No separate line item for Bus may be considered.
5	TS Section-1 (Part-A)	8	8. Bidder shall check and ensure adequacy of system protection for successful operation of GIS.	We understand adequacy check of protection system that is Control and protection relay etc are not in scope of GIS manufacturer. System adequacy check is limited/related to scope of GIS supply only. Kindly confirm.	Noted. Bidder to comply the technical requirement to meet protection system requirements within the GIS scope of supply.
6	TS Section-1 (Part-A)	11	GIS and its associated materials shall be subject to inspection by BHEL/ Customer / authorized representative at bidder / manufacturing works. Hence, Bidder shall furnish all necessary information concerning the supply to BHEL. During fabrication, the equipment shall be subject to inspection by BHEL/ Customer or by an agency authorized by BHEL/ Customer to assess the progress of work as well as to ascertain that only quality raw material is used.	The charges for lodging / boarding / to and fro travel of inspecting engineers shall not be in scope of Bidder.	Bidder's understanding is in order
7	TS Section-1 (Part-A)	15	4. The equipment may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains and high ambient temperature.	GIS storage in outdoor is not recommended. Bidder confirms packing suffice for indoor storage upto 6 months. Bidder shall submit storage insturctions along with tender bid.	Bidder to please follow technical requirement

8	TS Section-1 (Part-B)	III	8. For GIS equipment, high frequency earth grid shall be provided by bidder. Dedicated Copper Earth mat of adequate size embedded in the concrete i.e. below FFL of GIS building shall be provided. Same shall be connected to below ground earth mat of GIS building. In the proposed HF earthing grid, welding of copper bars shall be made to ensure the proper continuity. The connection between below ground mat & HF earthing grid shall be made in such a way that the connection of earth grid conductors shall be intact for 30 years.	(1) Request to remove the scope of earth Mat below GIS FFL as same is handled by EPC having requisite expertise. GIS manufacturer do not have any expertise for laying of earth mat as earthing design has to be done consideirng overall scope of substation. Further same is done during civil execution phase and GIS manufacturer will not have any role during same time. GIS body earthing shall be in bidders scope and further any relavant technical inputs required shall be provided by the bidder. (2) Further it is standard practice to use MS rod for GIS earth mat, copper is not required.	Bidder to please follow technical requirement
9	TS Section-1 (Part-B)	III	13. LCC for Bus Measurement Bay if any separately required, the same shall be deemed inclusive in the scope of supply with respective Bus Measurement Bay BOQ line item.	We understand supply of LCC shall be as per qty mentioned in line item 1.14 in Price Bid. We understand if any additional LCC is required for Bus measurement (Bus VT) then qty will be modified in line item 1.14. Kindly confirm	Please refer Section-1 Part-B Clause III. SPECIFIC TECHNICAL REQUIREMENTS 13. LCC for Bus Measurement Bay if any separately required, the same shall be deemed inclusive in the scope of supply with respective Bus Measurement Bay BOQ line item.
10	TS Section-1 (Part-B)	III	11. Any clarification(s) for GIS published by M/s NLC with reference to subject project will also valid for this specification.	We request to provide the list of clarifications published by NLC for this project	Existing clarification had already been included in specification.
11	TS Section-1 (Part-B)	IV	11. GIS Painting as per OEM design is acceptable. Suggested Colour Coding of Equipment: GIS Colour RAL Code7030.	We understand color code RAL 7035 as per OEM recommendation is also acceptable inline with OEM type tested design. Kindly confirm.	Bidder to please follow technical requirement. Further clarification may be discussed during detailed engineering stage and subject to customer approvals.
12	TS Section-1 (Part-B)	VIII	The equipment shall be designed to withstand normal operating voltage even if the inside gas pressure decreases to atmospheric pressure as long as no switching operations are performed.	We wish to inform that operating or running GIS at atmosperic pressure is not recommended strictly considering the safety aspect and thus there are provision of alarms and GIS block functions in case Gas pressure levels are reached below certain recommended pressures indicated by OEM. Hope the recommended practice by OEMs are acceptable.	Bidder to please follow technical requirement. Further clarification may be discussed during detailed engineering stage and subject to customer approvals.
13	Section-2 Vol. II-F2/Section-Xii	4.35.00	Due to safety requirement for working on the pressurised equipment, whenever the pressure of the adjacent gas compartment is reduced, it should be ensured by the bidder that adjacent compartment would remain in service with reduced pressure	In view of safety of operating personnel working at site in case of repair, maintenance or replacement of gas compartment, the pressure of adjacent compartment shall be reduced and hence the same shall not be in service. Hope the same is acceptable.	Bidder to please follow technical requirement. Further clarification may be discussed during detailed engineering stage and subject to customer approvals.
14	Section-2 Vol. II-F2/Section-Xii	4.41.00	Each gas compartment must provide the following: - Indicator of actual gas pressure, stage-I pressure alarm, stage II pressure alarm pressure for all gas filled compartments - Monitoring of pressure & alarm for pressure losses in two adjustable stages	We understand tha the requirement is for standard density monitors without analog/digital output. Two stage alarms shall be provided based on OEM recommended gas pressure. Alarm 1 will be for Low gas pressure and alarm 2 will be for very low/lock out prossure. Further, auxiliary contacts for alarm and trip shall be provided with density monitor and provision of access of terminals for the same shall be provided in LCC panel. Further connection and integration from LCC onwards shall be in BEHL scope. Kindly confirm.	Bidder to please follow technical requirement. Further clarification may be discussed during detailed engineering stage and subject to customer approvals. Scope of cable already illustrated in TS

15	Section-2 Vol. II-F2/Section-Xii	5.01.01	7) Spring/Hydraulic Operating Mechanism, one for each pole, shall be employed for closing and tripping the circuit breakers. 220V DC will be used for control / tripping.	We wish to clarify that offered GIS drive is of hybrid type HMB drive which is patented design of bidder, its fucntion is same as spring drive with combination of hydraulic oil which is used for the purpose of smooth energy transition and avoid any kind damping. Same drive is supplied from past more than 25 years and acceptable in all major utlites such as PGCIL, NTPC, GETCO, UPPTCL etc. hope same shall be acceptable.	Noted. Subject to customer approval during contract stage
16	Section-2 Vol. II-F2/Section-Xii	5.01.01 18 (f-2)	e. However, even at 50% of rated supply voltage the breaker shall be able to operate.	We wish to clarify that this requirement is not in line with IEC.offered GIS product is design and tested in line with IEC 62271-203 only.	Noted. Subject to customer approval during contract stage
17	Section-2 Vol. II-F2/Section-Xii	5.01.01 18 (f-8)	8. Central Control Cabinet - A central control cabinet shall be provided which shall house all the control equipment required for operation, indication, lockout and all requirements as per detailed list given below: Local / remote changeover switch Operation counters Pneumatic / hydraulic pressure gauges SF6 pressure gauges Power supply control switches Fuses Anti-pumping relay Pole discrepancy relay AC/DC supervision relays	Below provision are not applicable for offered design : 1. Pnematic/hydraulic pressure gauge 2. SF6 pressure gauge (same shall be placed on individual enclosure module and not in LCC panel.)	Adequacy of supervision, monitoring and protection are to be ensured by bidder's offered design. Subject to customer approval during contract stage
18	Section-2 Vol. II-F2/Section-Xii	5.01.01 18 (f-23)	23) The breaker shall also withstand all dielectric stresses in open position at SF6 lockout pressure for 15 minutes.		The breaker should be able to withstand all dielectric stresses imposed on it in open condition at lockout pressure continuously (i.e. 2 p.u. power frequency voltage across the breaker continuously)
19	Section-2 Vol. II-F2/Section-Xii	5.01.03	3) The busbar VT's shall be connected through hand-operated isolators, which are to be provided with padlock facilities & padlocks.	As per tender sld we understand that there are already dedicated Disconnectors modues to be provided for Bus VT and hence there is not rquirement of any hand operated isolators (integrated manual isolator) for Bus VT. Kindly confirm.	Noted, subject to customer approval during contract stage
20	Section-2 Vol. II-F2/Section-Xii	5.01.03	4) Furthermore, to allow the testing of cables without the removal of a V.T., disconnection facilities shall be provided.	We understand there is no HV cable connection here and hence any kind of disconnecting facilities are not required in VT. Kindly confirm.	Noted, subject to customer approval during contract stage
21	Section-2 Vol. II-F2/Section-Xii	5.01.05	3) Each maintenance-earthing switch shall be electrically interlocked with its associated disconnecting switch and circuit breaker such that it can only be closed if both the circuit breaker and disconnecting switch are open.	we wish to clarify that offered GIS design having combined disconnector and earth switch design having natural fail proof mechanical interlock and hence electrical interlock is not envisaged here. Hope same shall be acceptable.	Noted, subject to customer approval during contract stage

22	Section-2 Vol. II-F2/Section-Xii	5.01.05	12) Electrical endurance for earthing switches: Earthing switches with short-circuit making capability class E1 and shall conform to the requirements of IEC 62271-102.	We understand normal maintenance earthswitches shall be with E0 electrical endurance in line with IEC. Fast acting earths witch (HSES) with short-circuit making capability will be with E1 class. Kindly confirm.	Noted, subject to customer approval during contract stage
23	Section-2 Vol. II-F2/Section-Xii	5.01.11	4) Gas Monitoring Devices Temperature-compensated two (2) independent gas density monitoring devices shall be provided for each gas compartment to improve the reliability.	We wish to clarify that as per standard practice only one Gas density monitor shall be provided for each indiviusual gas compartment. Same is not practically possible considering the design constraint of each module enclosure in line with type tested design.	Bidder to please follow technical requirement. Further clarification may be discussed during detailed engineering stage and subject to customer approvals.
24	Section-2 Vol. II-F2/Section-Xii	5.01.11	Hybrid / Mechanical & Electronic type density monitor shall also be provided per gas compartment to improve the reliability.	We understand that requirement is of standard temperature compensated gas density monitor. Kindly confirm.	Bidder to please follow technical requirement. Further clarification may be discussed during detailed engineering stage and subject to customer approvals.
25	Section-2 Vol. II-F2/Section-Xii	5.01.17	4) Where operating mechanism cabinets are mounted on the switchgear, the grounding shall be made by separate conductor. LCCs and marshalling boxes shall be grounded through a separate conductor.	In our offered GIS design, Earthing switches and its mechanism are connected via the enclosure i.e they make a continuous earthing path via enclosure itself and so is the case for all the componets. Further, the complete GIS is earthed / grounded at multiple points utilizing flat GI bars. Hope same shall be acceptable.	Bidder to pl follow TS
26	Section-2 Vol. II-F2/Section-Xii	6.02.02	c) Following tests shall be performed as routine tests in addition to the standard tests: • At least one local control cubicle (LCC) shall be tested together with the GIS during factory acceptance tests • Speed and timing tests for circuit breakers • Partial discharge measurements • Chattering time of the arc contact shall be measured and recorded at no-load operations • Visual inspection of the switchgear, in order to ensure that all components are mechanically assembled and fixed properly and that there are no imperfections.	We wish to clarify that all the routine test at factory shall be in line with IEC 62271-203 only. Below test are not applicable for the offered design. 1. Offered LCC for this project shall be of standalone type and hence LCC cannot be tested together with the GIS at factory, however LCC will be tested at vendor end and same can be witnessed by customer. Further LCC shall be tested toghether with GIS at site. 2. Chattering time of the arc contact test is not applicable as per IEC. 3. All the routine test for bought out items such as VT,CT, LA, LCC, Density monitors, enclosures etc shall be done at respective vendor premises, routine test reports for the same shall be submitted for review to customer during execution stage.	1. & 3. Bidder to pl follow TS 2. Noted subject to customer approval during contract stage
27	Section-2 Vol. II-F2/Section-Xii	5.01.04 - clause 14	i) After tripping of circuit breaker, operation of the respective disconnector control switch to open will first initiate rapid closure of the associated high-speed grounding switch. When this grounding switch is signaled 'closed' by its auxiliary switches, an adjustable time delay relay will start to allow time for any trapped charges to dissipate into the grounding network. After the set time delay, the disconnector motor operating mechanism will be energized to open the disconnector.	adjustable time delay is not applicable for GIS LCC panel. Same is provided in CRP panel. However necessary interlock as per IEC shall be provided in LCC panel. LCC panel in general used for local operation.	Noted, subject to customer approval during contract stage

28	Section-2 Vol. II-F2/Section-Xii	5.01.04 - clause 19	d) Auxiliary Switch - Auxiliary switch of breaker to be positively driven by operating rod.	(1) Auxiliary switch shall be fixed type as per type tested design. (2) qty for Spare Auxiliary switches are fixed as per type tested design of drives. IF additional spare contacts are required same shall be provided with contact multiplication relay.	1. Noted 2. Bidder to follow TS
29	TS Section-1 (Part-A)	8	6. Bidder shall conduct insulation co-ordination studies in line with IEC for establishing surge arrester rating, quantity and any other requirement for successful operation of GIS.	(1) Since here major surge arrestors are of AIS type, it is understood that insulation coordination study shall be in BHEL scop. kindly confirm. (2) Currently there are no items for GIS surge arrestors in price Bid. we understand In case of additional requirement of GIS surge arrester (For GIS busbar only) is envisaged after conducting VFTO studies during execution, the same shall be at additional time and price implication. Kindly confirm.	1. Please follow TS 2. Scope of LA is well defiled in SLD & BPS 1.08400KV SF6 GIS BUS MEASUREMENT ASSEMBLY FOR MAIN BUS INCLUDING LA, VT, DS & ES AS PER SLD & TENCHNICAL SPECTIFCATION
30	TS	Clause 7	Type testing The validity of type test reports shall be as per the latest CEA guidelines (amended time to time) as on the original scheduled date bid submission for BHEL tender.	We wish to clarify that, since we are follwing similar design as of our collaborator, so we request for acceptance of type test reports of collaborator company which are conducted as per IEC in internaltional accrediated laboratory. Type test reports conducted by vendor for bought out items (CT, VT, SA, LCC) shall be submitted for review during execution stage. Any kind of repitition of Type test for bought out items & GIS is not considered.	Bidder to please follow TS
31	TS Section-1 (Part-A)	3. NOTE FOR BILL OF QUANTITIES	8. Supply scope of Testing & Maintenance Equipment – Scope of supply of following Equipments shall be applicable only if covered in BOQ / BPS. d. Portable Partial Discharge(PD) monitoring system e. Online Partial Discharge Monitoring System	(1) We understand that since online PDM is already offered, there is no requirement of Portable PD monitoring system. (2) further we understand that online PD monitoring system is to be provided for 400KV GIS only for the scope defined in 400KV GIS GSLD drawing number 18A03-DWG-E-0002. Kindly confirm. (3) Further integration of online PDM along with requisite cables and assecories shall be in BHEL scope. Kindly confirm.	1. Pl ref. Technical Corrigendum-1 2. Scope is limited to 400kV System 3. For Scope of cable- relevant section for cable scope shall be applicable
32	Layout		400kV Layout	Request to share autocad copy of 400kV Layout	Attached
33	Section-2 Vol. II-F2/Section-Xii				
34	Price Bid	4.06	SERVICES- GIS : STUDIES INSULATION CO- ORDINATION VFTO REPORT e.t.c. complete	As this item will be executed even before drawing approval, request to relase the payment against this item against the relavant document approval. This should not be linked with supply of material or supervision services.	Tender condition shall prevails

TECHNICAL CLARIFICATION FOR 400KV GIS

S.No.	Specification No./Clauses	Description	Bidder's Observation	BHEL Reply
	Vol. II-F2/Section-XII 765kV,400kV & 33 kV GIS	**4.48.00 GIS HALL LAYOUT CRITERIA**		
1	Page 19 of 116	Clear space of 5 meters shall be provided on three sides of the GIS (765 kV, 400kV) equipment for easy movement along with equipment / trolley. Clearance on maintenance bay side shall be at least 10 meter wide (clear space from edge of GIS (765 kV, 400kV) to inner edge of wall). Building width shall be decided considering the requirement of turning radius to rotate the largest removable component for assembly/disassembly.	We wish to inform you that largest removable component is the GCB which is vertically oriented, removing of interrupter can be facilitated from top side without disturbing the GCB position and repacing total GCB is easily possible considering minimum turning radius in vertical orientation and doesn't require 5 metres of clear space, As per OM standards, 2 metres clear width is sufficient on both sides from GIS bays (GCB to LCC front or GCB to outer wall) Our bays are dispatched as sub-divided units and not as a complete assembled bay. Maintenance/Overhaul activities wherever applicable done at siteare carried out on respective modules/sub-assemblies and doesn't require 10 metres space	Bidder to please follow technical specification.
	Vol. II-F2/Section-XII 765kV,400kV & 33 kV GIS	**5.01.04 Disconnecting Switch**		
2	14) Page 29 of 116	When the lines are taken out of service for maintenance, etc., the disconnectors and high-speed grounding switches located on the transmission line feeder modules of the GIS switchgear are required to operate as follows: i) After tripping of circuit breaker, operation of the respective disconnector control switch to open will first initiate rapid closure of the associated high-speed grounding switch. When this grounding switch is signaled 'closed' by its auxiliary switches, an adjustable time delay relay will start to allow time for any trapped charges to dissipate into the grounding network. After the set time delay, the disconnector motor operating mechanism will be energized to open the disconnector. ii) Operation of the disconnector control switch to close will close the disconnector, which-when proved 'closed', will signal the high-speed ground switch 'to open'.	We wish to inform you that as per OEM recommended practise during line side maintenance GCB shall be opened /isolated by opening the disconnector switches first and then Line side high speed earth switch shall be closed after taking disconnector open feedback as well as line disenergized feedback from AIS VT/CVT.	Noted, subject to customer approval during contract stage.

TECHNICAL CLARIFICATION FOR 400KV GIS

S.No.	Specification No./Clauses	Description	Bidder's Observation	BHEL Reply
	Vol. II-F2/Section-XII 765kV,400kV & 33 kV GIS	**5.01.11 Insulating Gas**		
3	3) Gas System Page 35 of 116	Gas barriers shall be provided in line with Gas single line diagram (DWG No. 18A03-DWG-E-0002) as a minimum requirement, and to meet service continuity requirements	We wish to inform you that CT secondary is externally mounted as per OEM standrads and separate CT gas compartment is applicable as shown in the Gas SLD The number of gas barriers provided on each dia and on bus-bar shall be as per OEM standards only and we will ensure the service continuity requirement as mentioned in clause 4.45.00 of Vol. II-F2/Section-XII 765kV,400kV & 33 kV GIS	Bidder to please follow technical specification.
4	4) Gas monitoring device Page 35 of 116	Temperature-compensated two (2) independent gas density monitoring devices shall be provided for each gas compartment to improve the reliability. The devices shall provide continuous and automatic monitoring of the density of the gas. Hybrid / Mechanical & Electronic type density monitor shall also be provided per gas compartment to improve the reliability.	We will provide single gas density monitor mounted on each and every GIS compartment which will provide the continuous and automatic gas density monitoring and display of the pressure locally on the GIS compartment itself. Further the density monitor shall be norma dial type without any electronic output and shall be hard wired from the GIS compartment to LCC for two staged alarm indication.	Bidder to please follow technical specification.
	Vol. II-F2/Section-XII 765kV,400kV & 33 kV GIS	**5.16.13 Earthing**		
5	Page 77 of 116	For GIS equipment, high frequency earth grid shall be provided. Dedicated copper earth mat of adequate size embedded in the concrete i.e below F.F.L of GIS building shall be provided. Same shall be connected to below ground earth mat of GIS building. In the proposed HF earthing grid, welding of copper bars shall be made to ensure the proper continuity. The connection between below ground mat & HF earthing grid shall be made in such a way that connection of earth grid conductors shall be intact for 30 years	We wish to inform that as per OEM standards enclosure is earthed continuously without any separate individual connections to main earth grid. Final earthing terminal is provided on the structure near to the ground and high frequency transients are efficiently grounded without any significant reflection keeping the Transient enclosure voltage rise within the limits due to switching. Hence HF earthing grid is not envisaged	Bidder to please follow technical specification.
	Vol. II-F2/Section-XII 765kV,400kV & 33 kV GIS	**5.18.20 On Line Partial Discharge (PD) Monitoring system**		
6	Page 100 of 116	For 765KV & 400kV GIS Partial Discharge Measurement is mandatory. As such on line partial discharge (PD) monitoring system as per IEC60270 shall be envisaged for continuous monitoring.	Only UHF sensors on GIS equipment shall be in GIS manufacturer scope Continuous online PD monitoring system, junction box, accessories, cabling, cable trays required between UHF sensor to PD junction box/PD monitoring system shall be in BHEL scope	Bidder to please follow technical specification.
	Vol. II-F2/Section-XII 765kV,400kV & 33 kV GIS	**High Voltage Outdoor bushing (Porcelain Type)**		
7			We GIS OEM recommends polymer type composite SF6 to air bushing which is much better compared to porcelain. Polymer bushings are lightweight, easy to handle during installation/maintenance, not fragile to shocks and vibration, high resistance to flashovers and doesn't require hot line washing due to self cleaning quality.	Noted. Subject to customer approval during contract stage
	General			
8			Control cables, control cable supporting arrangement on the GIS equipment from GIS to LCC inside the building (indoor) shall be in GIS Manufacturer scope. Other cables, associated cable trays from LCC to CRP and from Outdoor GDM to LCC shall be in BHEL scope	Please follow Section-1 Part-A clause 7. SCOPE FOR CABLES

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Item Wise BoQ

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Enquiry/NIT No: NIT No.77865_ Enquiry No. 61Q2400199 Dated 30-10-2023

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1	2	3	4	5	12	13	14	15	16	20	21	51	53	54	55
1.01	400 KV, SF6 GIS LINE FEEDER BAY	item1	3	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.02	400 KV, SF6 GIS BUS REACTOR BAY	item2	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.03	400 KV, SF6 GIS IBT BAY	item3	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.04	400 KV, SF6 GIS ST BAY	item4	3	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.05	400 KV, SF6 GIS ICT BAY	item5	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.06	400KV SF6 GIS TIE BAY	item6	6	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.07	400KV GIS BUS BAR MODULE	item7	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.08	400KV SF6 GIS BUS MEASUREMENT ASSEMBLY FOR MAIN BUS INCLUDING LA, VT, DS & ES AS PER SLD & TENCHNICAL SPECTIFCATION	item8	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.09	400KV SINGLE PHASE, SF6 GAS INSULATED BUS DUCT (GIB) OUTSIDE GIS HALL ALONGWITH ASSOCIATED SUPPORT STRUCTURE & EARTHING	item9	4200	Meter	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.1	400KV SF6 GIS ADAPTER BOX FOR EXTENSION OF GIS, SET OF 3 PHASE	item10	4	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.11	400KV SF6 TO AIR BUSHING (1 PHASE)	item11	36	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.12	SF6 GAS REQUIRED FOR PLACING GIS INTO SUCCESSFUL OPERATION	item12	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.13	CONTROLLED SWITCHING DEVICE FOR 400 KV, 3-PH CIRCUIT BREAKER	item13	15	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.14	LOCAL CONTROL CUBICLES (LCC)	item14	18	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.15	STRUCTURE MATERIAL INCLUDING FOUNDATION BOLTS, EMBEDDED ITEMS, RAILS AND/ OR OTHER MATERIALS ETC.	item15	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only

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1	2	3	4	5	12	13	14	15	16	20	21	51	53	54	55
1.16	EARTHING MATERIALS INCLUDING HIGH FREQUENCY EARTHING	item16	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.17	ONLINE PARTIAL DISCHARGE MONITORING SYSTEM FOR 400KV GIS.	item17	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.18	SF6 GAS PROCESSING UNIT FOR 400KV GIS STATION	item18	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
1.19	SF6 GAS LEAKAGE DETECTOR	item19	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.01	SPARE - O-RING AND GASKETS (ONE OF EACH TYPE & SIZE)	item20	3	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.02	SPARE - SF6 GAS PRESSURE RELIEF DEVICES (ONE OF EACH TYPE & RATING ALONG WITH Ó'RINGS)	item21	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.03	SPARE - SF6 GAS CYLINDER (20% OF TOTAL QUANTITY)	item22	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.04	SPARE - MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS (5% OF TOTAL QUANTITY)	item23	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.05	SPARE - ALL TYPES OF CONTROL VALVES FOR SF6 (ONE OF EACH TYPE & RATING)	item24	3	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.06	SPARE - LOCKING DEVICE TO KEEP THE DISCONNECTORS /ISOLATORS AND EARTHING SWITCHES IN CLOSE OR OPEN POSITION IN CASE OF REMOVAL OF DRIVING MECHANISM	item25	3	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.07	SPARE - SPARES FOR LOCAL CONTROL CABINET INCLUDING MCB, FUSES, TIMER, AUXILIARY RELAYS, CONTACTORS, PUSH BUTTONS, SWITCHES, LAMPS & ANNUNCIATION WINDOWS, TERMINAL BLOCKS (ONE OF EACH TYPE & RATING, SIZE, RATING & MAKE)	item26	2	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.08	SPARE - SF6 TO AIR BUSHING COMPLETE WITH CONNECTORS (ONE OF EACH TYPE & RATING & RATING)	item27	1	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.09	SPARE - SINGLE PHASE POTENTIAL TRANSFORMER (ONE OF EACH TYPE & RATING, ACCURACY CLASS, BURDEN)	item28	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only

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2.1	SPARE - SINGLE PHASE CURRENT TRANSFORMER (ONE OF EACH TYPE & RATING, RATIO, ACCURACY CLASS, BURDEN) WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR COMPLETE IN ALLRESPECT	item29	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.11	SPARE - EXPLOSION VENT DIAPHRAGMS (5% OF TOTAL POPULATION)	item30	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.12	SPARE - BUS SUPPORT INSULATOR (5% OF TOTAL POPULATION)	item31	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.13	SPARE - SURGE ARRESTOR (ONE OF EACH TYPE & RATING & RATING AND DISCHARGE CLASS)	item32	1	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.14	SPARE - SURGE COUNTER WITH LEAKAGE CURRENT MONITOR	item33	1	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.151	CB SPARE - COMPLETE POLE ASSEMBLY (1 PHASE) OF CIRCUIT BREAKER OF EACH TYPE AND RATING COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE, MARSHALLING BOX WITH OPERATING MECHANISM (APPLICABLE FOR CB WITHOUT PIR)	item34	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.152	CB SPARE - COMPLETE POLE ASSEMBLY (1 PHASE) OF CIRCUIT BREAKER OF EACH TYPE AND RATING COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE, MARSHALLING BOX WITH OPERATING MECHANISM (APPLICABLE FOR CB WITH PIR)	item35	0	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.153	CB SPARE - CIRCUIT BREAKER CLOSING AND OPENING COIL ASSEMBLY (ONE OF EACH TYPE & RATING)	item36	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.154	CB SPARE - CIRCUIT BREAKER OPERATING MECHANISM (ONE OF EACH TYPE & RATING)	item37	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.155	CB SPARE - CIRCUIT BREAKER OPERATION COUNTER (ONE OF EACH TYPE & RATING)	item38	3	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.156	CB SPARE - AUXILIARY SWITCH ASSEMBLY (ONE OF EACH TYPE & RATING)	item39	3	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only

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2.1601	SPARE - COMPLETE SET OF 3 NOS. OF SINGLE PHASE / ONE 3 PHASE ISOLATOR OF EACH TYPE , DIMENSION, CURRENT, & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM	item40	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1602	SPARE - 3 NOS OF SINGLE PHASE / ONE 3 PHASE MAINTENANCE EARTH SWITCH OF EACH TYPE , DIMENSION, CURRENT, & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM	item41	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1603	SPARE - 3 NOS OF SINGLE PHASE / ONE 3 PHASE FAST ACTING EARTH SWITCH OF EACH TYPE , DIMENSION, CURRENT, & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM	item42	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1604	SPARE - OPEN & CLOSE CONTACTOR ASSEMBLY INCLUDING TIMER, INTERLOCKING COILS, KEY INTERLOCK, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTER, FUSES, MCB FOR ONE COMPLETE DISCONNECTOR (3 PHASE) (ONE OF EACH TYPE & RATING)	item43	1	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1605	SPARE - OPEN & CLOSE CONTACTOR ASSEMBLY INCLUDING TIMER, INTERLOCKING COILS, KEY INTERLOCK, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTER, FUSES, MCB FOR ONE COMPLETE MAINTENANCE EARTH SWITCH (3 PHASE) (ONE OF EACH TYPE & RATING)	item44	1	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1606	SPARE - OPEN & CLOSE CONTACTOR ASSEMBLY INCLUDING TIMER, INTERLOCKING COILS, KEY INTERLOCK, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTER, FUSES, MCB FOR ONE COMPLETE FAST ACTING EARTH SWITCH (3 PHASE) (ONE OF EACH TYPE & RATING)	item45	1	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1607	SPARE - ISOLATOR CONTACTS (ONE OF EACH TYPE & RATING & CURRENT RATING)	item46	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1608	SPARE - MAINTENANCE EARTH SWITCH CONTACTS (ONE OF EACH TYPE & RATING & CURRENT RATING)	item47	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1609	SPARE - FAST ACTING EARTH SWITCH CONTACTS (ONE OF EACH TYPE & RATING & CURRENT RATING)	item48	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.161	SPARE - ISOLATOR OPERATING MECHANISM (ONE OF EACH TYPE & RATING)	item49	3	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only

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Sl. No.	Item Description	Item Code / Make	Quantity	Units	Quoted Currency in INR / Other Currency	Unit RATE In Figures To be entered by the Bidder in Rs. P	GST (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL Ex-Works + F & I AMOUNT excluding GST in Rs. P	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P	TOTAL AMOUNT In Words
1	2	3	4	5	12	13	14	15	16	20	21	51	53	54	55
2.1611	SPARE - MAINTENANCE EARTH SWITCH OPERATING MECHANISM (ONE OF EACH TYPE & RATING)	item50	3	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1612	SPARE - FAST ACTING EARTH SWITCH OPERATING MECHANISM (ONE OF EACH TYPE & RATING)	item51	3	Nos.	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1613	SPARE - LIMIT SWITCH ASSEMBLY FOR DISCONNECTOR (ONE OF EACH TYPE & RATING)	item52	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1614	SPARE - LIMIT SWITCH ASSEMBLY FOR MAINTENANCE EARTH SWITCH (ONE OF EACH TYPE & RATING)	item53	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.1615	SPARE - LIMIT SWITCH ASSEMBLY FOR FAST ACTING EARTH SWITCH(ONE OF EACH TYPE & RATING)	item54	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.17	SPARE - STATIC FILTER(ADSORBENT) (5% OF TOTAL POPULATION)	item55	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.18	SPARE - GAS BARRIER & RUPTURE DISK (ONE OF EACH TYPE & RATING) (5% OF TOTAL POPULATION)	item56	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.19	SPARE - GAS DENSITY MONITOR (PRESSURE SWITCH WITH GAUGE) (5% OF TOTAL POPULATION)	item57	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
2.2	SPARE - COUPLING DEVICES ONE OF EACH TYPE & RATING OF PRESSURE GAUGE CUM SWITCH FOR CONNECTING GAS HANDLING PLANT	item58	2	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
3.1	SPARES- GIS : REFERENCE UNIT PRICE FOR ADDITION / DELETION OF SUPPLY ITEMS: AUGMENTATION OF 1 PHASE GIS CTA / CTB FOR ADDITION OF 1 CORE (IF REQUIRED IN DETAILED ENGINEERING)	item59	18	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
3.2	SPARES- GIS : REFERENCE UNIT PRICE FOR ADDITION / DELETION OF SUPPLY ITEMS: AUGMENTATION OF 1 PHASE GIS VOLTAGE TRANSFORMER FOR ADDITION OF 1 NO. SECONDARY WINDING (IF REQUIRED IN DETAILED ENGINEERING	item60	18	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only

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Item Wise BoQ

Tender Inviting Authority: BHEL TBG NOIDA

Name of Work: 400kV GIS for NLC Talabira TPS

Enquiry/NIT No: NIT No.77865_ Enquiry No. 61Q2400199 Dated 30-10-2023

Name of the Bidder/ Bidding Firm / Company :	

PRICE SCHEDULE

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NUMBER #	TEXT #	TEXT #	NUMBER #	TEXT #	TEXT #	NUMBER #	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER #	NUMBER #	NUMBER #	TEXT #
Sl. No.	Item Description	Item Code / Make	Quantity	Units	Quoted Currency in INR / Other Currency	Unit RATE In Figures To be entered by the Bidder in Rs. P	GST (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL Ex-Works + F & I AMOUNT excluding GST in Rs. P	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P	TOTAL AMOUNT In Words
1	2	3	4	5	12	13	14	15	16	20	21	51	53	54	55
4.01	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS	item61	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
4.02	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GAS INSULATED BUS DUCT	item62	1	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
4.03	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF SF6 TO AIR BUSHING	item63	36	Set	INR			0.00			0.00		0.000	0.000	INR Zero Only
4.04	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS	item64	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
4.05	SERVICES- GIS : 400KV, FINAL SUCCESSFUL HV/ POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	item65	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
4.06	SERVICES- GIS : STUDIES INSULATION CO-ORDINATION VFTO REPORT e.t.c. complete	item66	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
4.07	SERVICES- GIS : TRAINING AT GIS FACTORY	item67	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
4.08	SERVICES- GIS : TRAINING AT SITE	item68	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
5.1	SERVICES- GIS : REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR SUPERVISION OF ERECTION OF GIS	item69	10	MANDAY	INR			0.00			0.00		0.000	0.000	INR Zero Only
5.2	SERVICES- GIS : REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR TESTING & COMMISSIONING OF GIS	item70	10	MANDAY	INR			0.00			0.00		0.000	0.000	INR Zero Only
5.3	SERVICES- GIS : 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - CHARGES OF HV TEST KIT WITH OPERATOR	item71	1	Lot	INR			0.00			0.00		0.000	0.000	INR Zero Only
Total in Figures													0.000	0.000	Zero Only
oted Rate in Words		**INR Zero Only**													