Bharat Heavy Electricals Limited

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CORRIGENDUM - 12 TO NIT NO - 60513

Subject: Corrigendum - 12 for uploading of revised technical specification and BOQ for supply & services of 400kV & 132kV GIS for POWERGRID KISHTWAR PROJECT.

Project : POWERGRID KISHTWAR PROJECT
Equipment / Item : SUPPLY & SERVICES OF 400KV GIS
Enquiry No/Date : 61Q2200078, DATED 20-09-2021, **ORIGINAL DUE ON: 28-09-2021 at 11 HRS**
BHEL NIT NO : 60513.

TENDER NO: 60513;

The corrigendum-12 is being issued by BHEL TBG against above mentioned NIT/ enquiry for Pre-Bid Tie-Up for supply & services of 400kV & 132kV GIS for POWERGRID KHISTWAR PROJECT and uploading revised technical specification and BOQ in NIC / CPP Portal. The same has also been uploaded in BHEL/NIC Portal.

Tender due date for above tender enquiry is 19-01-2022 in line with POWERGRID. Bidder(s) to ensure for submission of their offer on or before due date through NIC / Hard bid in tender box / Email in tender box.

Note: Tender ID in CPP/NIC Portal has also be changed due to server error while uploading corrigendum-10 for above NIT/Enquiry. **Now, new tender ID is generated instead of 2021_BHEL_5355_1. Bidder to ensure to follow new tender ID in NIC Portal.**

Thanking you

Rajeev Kumar Roy
BHEL TBG, NOIDA

Enclosed

- Revised technical specification and BOQ
- Un-priced Copy based on revised BOQ

PRE-BID TIE-UP FOR 400/132kV GIS OF 400KV KISHTWAR SUBSTATION

SUBSTATION PACKAGE SS-01 UNDER TRANSMISSION SCHEME FOR EVACUATION OF POWER FROM PAKALDUL HEP IN CHENAB VALLEY HEPS-CONNECTIVITY SYSTEM

Document Number TB-PBT-316-102, REV 00 — **CORRIGENDUM-1**

Date: 14.01.22

S.No.	PARTICULARS	CORRIGENDUM
1	SECTION-1 OF TECHNICAL SPECIFICATION	SECTION-1, REV.01 OF TECHNICAL SPECIFICATION ISSUED.
2	ANNEXURE-BOQ_400/132KV GIS (REV 00)	ANNEXURE-BOQ_400/132KV GIS (REV 01) ISSUED.
3	ANNEXURE-BOQ_MANDATORY SPARES FOR GIS (REV 00)	ANNEXURE-BOQ_MANDATORY SPARES FOR GIS (REV 01) ISSUED.
4	GIS-ANNEXURE-1 OF TECHNICAL SPECIFICATION	GIS-ANNEXURE-1, REV 01 ISSUED.
5	GIS-ANNEXURE-2 OF TECHNICAL SPECIFICATION	GIS-ANNEXURE-2, REV 01 ISSUED.

14/01/22

14/01/2022

14/1/22

Section 1: Scope, Technical Requirements and Quantities

[1] SCOPE

This technical specification covers the requirements of design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to project site and supervision of unloading & Erection, and testing & commissioning of **400/132kV Gas Insulated Switchgear (GIS) with Local Control Cabinet (LCC), CSD and other accessories as per BOQ and Technical specification,** complete in all respect for efficient & trouble-free operation.

The electrical scope of work under this requisition shall also include but not be limited to basic and detailed engineering as required, Insulation coordination studies, supply of all mandatory spares, commissioning spares, special tools & tackles and Documentation as defined in the technical specification.

The offered **Gas Insulated Switchgear (GIS)** shall also comply with the Section-3 (Project Details and General technical requirements for all equipment under the Project) of this specification.

The specification comprises of following sections,

Section-1	:	Scope, Project specific technical requirements & Bill of Quantities.
Section-2	:	Specific technical requirements for the equipment under scope of supplies.
Section-3	:	Project/ Tender Details and General technical requirements for all equipment under the Project.
Section-4	:	Annexures

Annexure- A (Compliance Certificate)
Annexure-B (Schedule of Technical Deviations)
Annexure-C (Technical Checklist)

Applicable Statutory Regulations in India shall supersede the technical specification.

In case of any discrepancies between the requirements mentioned under different Sections of technical specifications, order of precedence shall be as follows:
Section-1 shall precede Section-2, Section-2 shall precede Section-3.

BHEL/POWERGRID concurrence shall, however, be obtained before taking a final decision in such matters.

In general, no deviation from the requirements specified in various clauses of this specification shall be allowed and hence, a Technical Compliance certificate to this effect shall have to be furnished along with the offer (Annexure-A), however bidder shall furnish list of conflicts/ ambiguities/ deviations (if any) in Schedule of Technical Deviations (Annexure-B).

Any clarification(s) for GIS published by M/s Powergrid with reference to TBCB/PAKALDUL HEP/400KV GIS/G5, Pre Bid Tie up for Substation Package SS01 at Kishtwar (GIS) (Tender ID: 21125) will also valid for this specification.

Any conflicts/ ambiguities/ deviations mentioned elsewhere in technical offer shall not be reviewed. In case the deviations mentioned in the Schedule of Technical Deviations are not technically acceptable, the offer of the bidder will be liable to rejection.

The scope of supplies shall be as per commercial terms and conditions enclosed separately with the notice inviting tender/ enquiry.

This technical specification is required for Pre-bid tie-up before participation in the following tender:

Name of the Customer	**Power Grid Corporation of India Ltd.**
Name of Main Contractor	**Bharat Heavy Electricals Limited**
Name of the Project/ Tender	**SUBSTATION PACKAGE SS-01 UNDER TRANSMISSION SCHEME FOR EVACUATION OF POWER FROM PAKALDUL HEP IN CHENAB VALLEY HEPS-CONNECTIVITY SYSTEM**
Location	**400KV KISHTWAR GIS, UDHAMPUR, JAMMU, INDIA**

[2] SPECIFIC TECHNICAL REQUIREMENTS

Sl.	Technical Parameter	Unit	400KV GIS	132KV GIS
1	Type of GIS		Indoor	Indoor
2	Nominal voltage class, rms	kV	400	132
3	Maximum System voltage, rms	kV	420	145
4	Current Rating			
4.1	Bus Bar	A	**5000A**	**3000A**
4.2	Line bay	A	3150A	**1000A**
4.3	ICT bay	A	3150A	**1000A**
4.4	Bus Reactor Bay	A	3150A	-
4.5	Tie bay	A	3150A	-

4.5	Bus Coupler bay	A	-	3000A
4.6	Bus Duct	A	3000A	**1000A**
5	Rated frequency,	Hz	50	50
6	Number of phases	Nos	03	03
7	Symmetrical Short time withstand current	kA/Sec	**50 kA for 1 sec.**	40 kA for 1 sec.
8	Creepage distance			
8.1	Creepage distance for insulator string/ long rod insulators/ outdoor bushings	mm/kV	31	31
8.2	Creepage distance of other outdoor equipment	mm/kV	25	25
9	LT Auxiliary Supply			
9.1	AC		415 V (± 10 %),3 phase, 4 wire solidly earthed	
9.2	DC		220 V (+10 %,-15%),DC, 2 wire, unearthed	
10	**Meteorological data**			
10.1	Design ambient temperature	^{0}C	Min. - 10 °C / Max. 50 °C	
10.2	Altitude **		**1600 meter above mean sea level (MSL)**	
10.3	Snow fall		**Snow Bound, IS 875 (Part 4)**	
10.4	Seismic Zone		As per IS 1893 (Part 1)	
10.5	Wind Zone		Latest wind map as per National Building Code shall be used for wind load calculation.	

** Necessary **Altitude Correction Factor** for relevant parameters shall be taken care by bidder.

[3] SPECIFIC TECHNICAL REQUIREMENTS for 400KV GIS & OTHER ASSOCIATED EQUIPMENTS:

3.1 The scope covers following bays:

1. 400KV GIS:

i) Line bay: 3 nos.

ii) Bus Reactor: 3 X 41.67 MVAR, 420kV & 1 no. spare reactor unit.

iii) Bus Reactor bay: 1 no.

iv) ICT: 2 Sets. (3 X 66.67) MVA, 400/132kV & 1 no. spare transformer unit.

v) ICT bay: 2 nos.

vi) Space for future 420kV line bay: 8 nos.

vii) Space for future 400/132kV ICT along with associated bay: 2 no.

viii) Space for future Bus Reactor along with bay: 1 no.

ix) Space for future 400/220 KV ICT along with associated bays: 2 NOS.

2. 145KV GIS:

i) ICT bays: 2 nos.

ii) Line bays: 4 nos.

iii) Bus Coupler bay: 1 no.

iv) Space for future 420/132kV ICT bay: 2 nos.

v) Space for future 132kV Line bay: 2 nos.

3.2 Bay module description are as GIS-Annexure-1

3.3 All technical details of GIS are as per Section-2.

3.4 Please refer GAS SLD as per Bus- bar configuration of respective voltage class as per Annexure-A of section -2.

3.5 For 400kV & above voltage class GIS bay module, CT cores shall be duly distributed on both side of circuit breaker.

3.6 CT parameters of 400/132KV GIS are as per GIS- Annexure-2.

3.7 Please refer **service continuity requirement** as per Cl. No. 5.7 of Section-2. No deviation from the same shall be acceptable.

3.8 Gas Insulated Bus (GIB) Duct:

Bus duct shall be three/single phase as per table below:

S.No	Voltage class	Duct type
i)	400 kV GIS	Single phase enclosed
ii)	132 KV GIS	Three Phase enclosed

GIB from outside the GIS Hall wall including support structure to SF6/Air Bushing for interconnection to substation equipment of Line/ ICT/ Reactor Bays shall be considered for mode of measurement. Inner side GIB is to be considered as part of respective Feeder Bay.

The 400/132kV SF6 gas insulated bus (GIB) ducts shall be complete with all necessary SF6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring devices, barriers, pressure switches, UHF PD sensors, provision for UHF PD sensors, piping etc complete in all respect.

3.9 Thermal calculations shall be based on the climatic conditions and design parameters.

3.10 400kV and 132KV GIS shall be housed in separate building.

3.11 GIS should be suitable for future extension for 400/132kV GIS. Please refer (Section-2) clause number 5.43 and Annexure-9 (Standard Interface Module Drawing). Bidder to ensure necessary provision for the same. Bidder to consider interface module for future extension and same to be incorporated in building/ Layout drawing.

3.12 Bidder shall conduct insulation coordination study for establishing Surge

Arrester's rating for 400/132kV GIS system. The study report shall be submitted for Approval. Please refer clause 11.2. of Section-2 of technical specification for scope involved for Insulation co-ordination details.

3.13 Bidder to submit Study report of VFTO generated for 400kV GIS installation.

[4] OTHER TECHNICAL REQUIREMENTS for GIS & OTHER ASSOCIATED EQUIPMENTS:

4.1 Each circuit of a double circuit transmission line shall be terminated in different diameters.

4.2 Transformers of same HV rating shall be placed in different diameters.

4.3 Bus reactors of same HV rating shall be placed in different diameters.

4.4 The Surge Arresters shall be provided with a common Junction box suitably for a set of three (3) Surge Arresters of each bay for extending the contact information of surge counter to SAS/RTU (as applicable).

4.5 145kV Circuit Breakers for 132kV Transformer bays and 132kV Bus Coupler bay shall be provided with 3-Ph auto-reclosing. Whereas, 145kV Circuit Breakers for 132kV line bays shall be suitable for 1-Ph as well as 3-Ph auto-reclosing.

4.6 The technical parameters for system and equipment given in Technical Specification are applicable for installations up to an altitude of 1000m above mean sea level. As, the altitude for Kishtwar GIS S/S is considered as 1600m, necessary altitude correction factor shall be applied as per relevant IEC.

4.7 Terminal connector (for SF6 to Air Bushing) is not envisaged in bidder's scope.

4.8 Bidder to submit following drawings/ documents at tender stage:

i) Preliminary GAS SLD for the GIS.

ii) Preliminary Layout/ section for the GIS.

iii) Tentative building size including Colum placement and GIB exit requirement.

iv) EOT Crane Details/ sizing. However, requirement of EOT crane shall be in line with cl. No. 17 of EOT crane.

v) Heat Load calculation for all the three type GIS (Indoor part) for AHU load calculation.

vi) AC-DC Load cycle, Continuous and Momentary load.

vii) Bidder to note, **overall plan** for this project includes present and future bays are as follows. Submission of GIS Hall Size (with building column's proposed position), Layouts etc. are to be provided meeting future requirement as well. Master drawing list/ drawings / documents is to be submitted in line with specification requirements during on contract stage.

4.4 Successful bidder shall submit 3D OGA drawing for complete GIS and section drawing of each equipment. OGA drawings shall also be furnished in AutoCAD file format which is compatible to primtech.

4.5 **CONSUMABLES:** Bidder to submit list of consumables during contract stage. Cost of the same is deemed inclusive of bidder's scope. Consumables with limited self-life shall be supplied on time before erection after clearance from BHEL site.

4.6 Bidder shall check and ensure adequacy of the system protection for successful operation of GIS. After checking of system/site by bidder, GIS shall be installed and if any failure, malfunction of any part occurs after commissioning bidder shall replace the part unconditionally within a month.

4.7 Bidder to submit all supporting document in English. If document submitted by bidder is other than English language, self-attested English translated document should also be submitted.

4.8 Factor of safety for design of equipment structures and foundations shall be as below:

(i) Factor of safety for design of equipment structures shall be 1.5 under normal condition and 1.2 under short-circuit condition.

(ii) Factor of safety for design of equipment foundation shall be 1.5 in both normal and short circuit condition as per IS 456.

(iii) Factor of safety for stability of equipment foundation like

overturning shall be 2 (without wind or seismic), 1.5 (with wind or seismic) for normal and short circuit condition as per IS 1904."

[5] SPECIFIC TECHNICAL REQUIREMENTS FOR CSD (FOR 400kV GIS ONLY)

5.1 CSD shall be deployed for optimization of switching behavior of bidder supplied GIS Breaker.

5.2 CSD shall be deployed for optimization of switching behavior of bidder supplied GIS Breaker.

5.3 The limit for inrush current for switching of Transformer by CSD shall be 1.0 p.u. of rated current of transformer after fine tuning of CSD settings during pre-commissioning checks. For site acceptance of CSD, during online CSD test after fine tuning inrush current should be less than 1.0 P.U. of rated current in five consecutive operations.

5.4 All 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD by using a suitable selector switch irrespective of whether circuit breakers to be supplied are envisaged along with CSD or not as per bid price schedules.

5.5 Complete interfacing with GIS and CSD shall be in bidder's scope. Any additional item like transducer, contact multiplication relay, switches, special/screened cables, modification hardwired, modification in schematics (if any) required for interfacing and for complying to the technical specification requirement shall be in bidder's scope and shall be included in quoted price. No price implication for the same shall be entertained during detailed engineering.

5.6 All wiring necessary for interface of GIS/ CRP with bidder supplied CSD is also deemed to be included in the scope of bidder. Cables, lugs, ties etc required for connection of CSD in existing relay panel is deemed to be included in bidder's scope.

5.7 Supervision of Erection only and testing & Commissioning of CSD shall be in bidder's scope.

5.8 The CSD should have display facility at the front for the display of settings and measured values. In case where CSD does not have complete display

facility for settings and measured values, bidder to supply one number laptop PC with pre-installed, licensed software for each site. Cost of the same shall be deemed included in offer.

5.9 Special cables (i.e., screened/ FO cable) other than 1100V LT Power & Control Cables required for CB / CSD / Relay Panel interfacing shall be in bidder's scope. Mode of measurement for special cable shall be cable-trench running length from GIS to CSD/ Relay panel. **Total requirement of special cable qty. is to be estimated & supplied by bidder based on no. of runs etc.**

[6] POWER, CONTROL & INSTRUMENTATION CABLE

6.1 POWER, CONTROL & INSTRUMENTATION CABLE: All cables within GIS, GIS to LCC, LCC to LCC shall be in bidder's scope of supply. Bidder to provide detailed "Bill of Quantity" during detailed engineering stage. Cabling & termination schedule for the same shall be provided by successful bidder along with AS BUILT drawing during contract stage. Power Cable TB's (for both AC & DC incomer cables) shall be suitable for termination of two wire of 16Sqmm Aluminum (for each phase / polarity).

6.2 The cables between LCC to CRP/ Bus Bar Panel shall be supplied and laid by BHEL under the supervision and input of the bidder.

[7] STRUCTURAL STEEL

Structural Steel required for complete installation of GIS equipments are in the scope of bidder, as listed below (not limited to):

7.1 All necessary supports, ladders, walkways, lift etc. for operation & maintenance work.

7.2 Base Plate / Channel / Metallic / Structural Member for seating of GIS system LCC shall be placed near the respective GIS bay.

7.3 Lattice / Pipe structure required for installation of GIS, GIB, SF6 to Air Bushing complete in all respect.

7.4 Structure member for Embedment, Foundation bolt / Anchor Fastening bolts for GIS system.

7.5 Equipment fixing hardware.

[8] EARTHING OF GIS

8.1 Supply of 40mm MS ROD, 75X12mm GI Flat, 50X06mm GI Flat is not envisaged in bidder's scope of supply.

8.2 Bidder to inform the material required for GIS floor Earth mat as per their approved Earthing philosophy with Powergrid.

8.3 Supply of all other Earthing material and supervision of Erection for all Earthing connection for GIS-to-GIS system and GIS to Earth Mesh on Floor shall be in bidder's scope. The quantity shall be estimated by the bidder, based on technical specification, design philosophy, IS/IEC requirement as applicable.

8.4 Bidder to submit detailed calculations and layout drawings for Earthing system during contract stage.

8.5 ANY OTHER EQUIPMENT/MATERIAL required to complete the specified GIS scope of work are inclusive of bidder's scope of supply.

[9] BILL OF QUANTITIES:

9.1 Please refer following Annexures for Bill of quantities:

a. **ANNEXURE-BOQ_400/132KV GIS**

b. **ANNEXURE-BOQ_ MANDATORY SPARES FOR GIS**

9.2 During tender stage No of bays of 400/132kV GIS may vary. No of bays of 400/132kV GIS shall be finalized after receipt of Notification of award (NOA) from Powergrid.

9.3 Total contract value after receipt of NOA from Powergrid/ scope finalization may vary up to ±30% at contract stage.

9.4 SF6 gas, gas wastage for successful commissioning and testing, structure, Earthing and any other item required for completeness of bay/ module shall be deemed included in the Bay and module.

9.5 Bidder **to submit price break-up of spares as per ANNEXURE-BOQ_ MANDATORY SPARES FOR GIS during tender stage.** It shall not be binding on the BHEL to procure all of these mandatory spares.

9.6 Length of GIB is purely indicative and same shall be finalized during detailed engineering stage in line with final approval of drawings from Powergrid.

9.7 The price of Bus-duct inside the GIS hall shall be integral part of the respective bay module and it will not be paid separately. However, the payment of bus-duct for outside the GIS hall along with support structure shall be paid as per running meters in line with provision of Price schedule.

9.8 Prices for all applicable accessories of GIS shall be included in the equipment prices. All items required for completeness of bay/ module such as SF6 gas, sensors, structure, earthing etc. shall be the part of respective bay/ module price. However, in the case of award of contract, Bidder will submit the price break-up for those items.

9.9 Any Item Not Applicable/ Not quoted by bidder in bid price schedule and found applicable as per system requirement shall be supplied free of cost.

9.10 ANY OTHER EQUIPMENT/MATERIAL required to complete the specified GIS scope of work are inclusive of bidder's scope of supply.

[10] MANDATORY SPARES

10.1 Spares corresponding to 400/132kV main GIS equipments as per Price schedule and Annexure BOQ are to be considered for supply.

10.2 The requirement/ applicability of spare shall be reviewed during detailed engineering based on manufacturer's design meeting the TS. If applicable/ required, same shall deemed to be included.

10.3 The bidder is clarified that no mandatory spares shall generally be used during the commissioning of the equipment. Any spares required for commissioning purpose shall be arranged by the Contractor. The unutilized spares if any brought for commissioning purpose shall be taken back by the contractor.

10.4 Wherever spares in BPS/Technical Specification have been specified as "each

type/each rating/each type & rating": If the offered spare/spares is sufficient to replace the respective main equipment of all types/ratings, then such offered spare/spares shall be acceptable. It implies that common spare/spare set fulfilling the spare requirement of all types/ratings shall also be acceptable, provided it is configurable at site itself without special assistance of OEM.

[11] TOOLS AND TACKLES

11.1 All Instruments & Special Tools-tackles, including gas handling plant required for successful installation of GIS are in the scope of bidder on returnable basis.

11.2 All Instruments / Test kit and Tools-tackles required for successful Testing and Commissioning of GIS are in the scope of bidder on returnable basis.

11.3 However general Tools and Tackles shall be provided by BHEL, list of the requirement i.e. general tools-tackle, spanners, gauges, slings and other lifting devices, crane, welding machines, drills, general instruments and appliances necessary for the installation of GIS is to be submit by bidder along the technical bid.

11.4 Bidder to furnish detailed BOQ for non-returnable special Tools and Tackles, if applicable along with unit prices to be handed over to ultimate customer. The prices for the same shall be considered during evaluation.

[12] TECHNICAL QUALIFYING REQUIREMENTS:

Please refer **Annexure_TQR for** Qualifying Requirements.

Bidder to submit complete supporting documents required for technical qualifying requirement.

[13] GUARANTEED TECHNICAL PARTICULARS

Bidder to submit detailed GTP in line with technical specification during contract stage for review and approval, it will be the bidder's responsibility to get the same approved from the ultimate customer M/s Powergrid Corporation of India Limited.

[14] QUALITY PLAN

Bidder to follow valid Powergrid approved Quality Plan as per Powergrid procedure. In case the bidder doesn't have Powergrid approved Quality Plan, it will be the bidder's responsibility to get its Quality Plan approved directly from the ultimate customer M/s Powergrid Corporation of India Limited within 30 days from the date of issue of after award of contract from Powergrid.

All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan. The supplier shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and comply with the requirements of the specification.

[15] PACKING, DISPATCH AND STORAGE:

Please refer clause 22 and 23 of Section-2 of for Packing, Transportation and storage details of GIS.

15.2 Each individual piece to be shipped, whether crate, container or large unit, shall be marked special notations such as 'Fragile', 'This side up', 'Centre of gravity', 'Weight', 'Powergrid particulars', 'PO no.' etc., and other details as per purchase order.

15.3 The equipment may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage.

15.4 Storage area at site shall be provided by BHEL. However, bidder shall provide data for type of storage (Indoor/ Outdoor).

[16] SUPERVISION OF ERECTION, EXECUTION OF "TESTING & COMMISSIONING":

16.1 The complete GIS Switchgear assembly shall be subjected to the site tests as per IEC-62271-203 and POWERGRID Asset Management Controlled Document No: D-3-01-09-01-01.

16.2 Bidder shall also submit site acceptance testing (SAT) procedures and get them approved from BHEL/Powergrid before carrying out the site testing at site.

16.3 Bidder shall carry out the supervision of installation of GIS.

16.4 Execution of field testing and execution of commissioning of GIS and CSD, including associated system shall be in Bidder's scope.

16.5 Further appropriate testing & commissioning reports and as-built documentation submission is in bidder's scope.

16.6 All the testing kits including HV Test Kit required for successful testing / commissioning of offered GIS are to be arranged by bidder on returnable basis. Cost of the same shall be deemed inclusive in the offer.

16.7 SF6 Gas handling equipment required during erection, testing & commissioning in bidder' It is the responsibility of the contractor to supply all necessary commissioning spares as required unless/ until the equipment/ systems are handed over to the Purchaser (POWERGRID). scope.

16.8 An adequate stock of start-up/ commissioning spares shall be made available at the site such that the start-up and commissioning of the equipment /systems, performance testing and handing over the equipment/ systems to the Purchaser can be carried out without any hindrance or delays.

16.9 ETC work schedule for all the GIS may vary according to readiness of site. Respective dates for the commencement of erection, testing and commissioning activities of GIS shall be communicated to manufacturers from time to time as per the readiness of site.

[17] TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

Please refer Section-2 and Section-3 of technical specification for the details of type test requirement.

All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

The reports for all type tests as per technical specification shall be furnished by the bidder along with equipment / material drawings. However, type test reports of similar equipments/ material already accepted in POWERGRID (in the projects similar to present project) shall be applicable for all projects with similar requirement. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by POWERGRID or representative authorized by POWERGRID or Utility or representative of accredited test lab.

Unless otherwise specified elsewhere, the type test reports submitted shall be of the **tests conducted within last 10 (ten) years from the originally scheduled date of bid opening of tender of Powergrid i.e. 29th January 2021.** In case the test reports are of the test conducted earlier than 10 (ten) years from the original date of technical bid opening of tender (Tender of Powergrid), the contractor shall repeat these test(s) at no extra cost to BHEL / Powergrid.

Further, in the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to non-compliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost and delivery implication to BHEL/Powergrid.

The Bidder shall intimate BHEL with the detailed program about the type tests at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

Note – Type test report shall be reviewed for approval in detailed engineering stage only. However, for evaluation purpose, the test reports are to be submitted along with the technical bid.

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ANNEXURE-BOQ_400/132KV GIS (REV 01)

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)

SL	DESCRIPTION	UNIT	QTY	REMARKS
1	**GAS INSULATED SWITCHGEAR (INDOOR TYPE)- MAIN QUANTITY**			
	400KV GIS			
1.01	SUPPLY- GIS : 400KV, **50KA FOR 1S,** ONE & HALF CIRCUIT BREAKER SCHEME -GIS BUS BAR MODULE	SET	2	Current rating - 5000A, Details as per **Cl. No.3.1.1.1 (a)** of GIS-Annexure-1 of technical specification excluding End Piece (Interface) module.
1.02	SUPPLY- GIS : 400KV, **50KA FOR 1S,** 3150A, GIS TRANSFORMER FEEDER BAY	SET	2	Details as per **Cl. No.3.1.1.1 (b)** of GIS-Annexure-1 of technical specification excluding GIS SF6/ Oil Interface, GIS Surge arrester and LCC.
1.03	SUPPLY- GIS : 400KV, **50KA FOR 1S,** 3150A, GIS BUS REACTOR FEEDER BAY	SET	1	Details as per **Cl. No.3.1.1.1 (c)** of GIS-Annexure-1 of technical specification excluding GIS SF6/ Oil Interface, GIS Surge arrester and LCC.
1.04	SUPPLY- GIS : 400KV, **50KA FOR 1S,** 3150A, GIS TIE BAY WITHOUT PIR	SET	3	Details as per **Cl. No. 3.1.1.1 (d)** of GIS-Annexure-1 of technical specification excluding LCC.
1.05	SUPPLY- GIS : 400KV, **50KA FOR 1S,** 3150A, GIS LINE FEEDER BAY WITHOUT PIR	SET	3	Details as per **Cl. No. 3.1.1.1 (e)** of GIS-Annexure-1 of technical specification excluding LCC.
1.06	**SUPPLY- GIS : 420KV, 50KA FOR 1S, 3150A, SF6 GIS AUXILIARY BUS MODULE FOR SPARE TRANSFORMER**	**SET**	**1**	Details as per **Cl. No. 3.1.1.1 (f)** of GIS-Annexure-1 of technical specification excluding GIS SF6/ Oil Interface and GIS Surge arrester.
1.07	**SUPPLY- GIS : 420KV, 50KA FOR 1S, 3150A, SF6 GIS AUXILIARY BUS MODULE FOR SPARE REACTOR**	**SET**	**1**	Details as per **Cl. No. 3.1.1.1 (g)** of GIS-Annexure-1 of technical specification excluding GIS SF6/ Oil Interface and GIS Surge arrester.
1.08	SUPPLY- GIS : 400KV, **50KA FOR 1S,** 3000A, SINGLE PHASE GAS INSULATED BUS DUCT	**MTR**	**1900**	GIB outside the GIS Hall wall shall be considered for mode of measurement. Inner side GIB is to be considered as part of respective Feeder Bay and cost of the same shall be deemed inclusive.
1.09	SUPPLY- GIS : 400KV, **50KA FOR 1S,** 3150A, SINGLE PHASE SF6 TO AIR BUSHING	**SET**	**9**	Polymer Type with 31mm/ kV creepage complete in all respect except terminal connectors.
1.10	SUPPLY- GIS : 400KV,**50KA FOR 1S,** 3150A, SINGLE PHASE SF6 TO OIL BUSHING/ CONNECTION SUITABLE FOR TRANSFORMER	SET	**7**	
1.11	SUPPLY- GIS : 400KV,**50KA FOR 1S,** 3150A, SINGLE PHASE SF6 TO OIL BUSHING/ CONNECTION SUITABLE FOR REACTOR	SET	**4**	
1.12	SUPPLY- GIS : 336KV, 20KA GIS SURGE ARRESTER INCLUDING SURGE COUNTER	SET	**11**	
1.13	SUPPLY- GIS : 400KV, LOCAL CONTROL CUBICLE	NO	9	Including power, control & instrumentation cable as applicable.
1.14	SUPPLY- GIS : 400KV, INTERFACE MODULE FOR FUTURE EXTENSION OF GIS	SET	2	As per cl no. 5.42 of section-2 of Technical specification. (1 Set = Arrangement for Extension of one set of 3-phase of bus-bar)

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)

SL	DESCRIPTION	UNIT	QTY	REMARKS
1.15	SUPPLY- GIS : 400KV, CONTROLLED SWITCHING DEVICE (CSD) FOR GIS CB	SET	2	The CSD should have display facility at the front for the display of settings and measured values. In case where CSD does not have complete display facility for settings and measured values, bidder to supply one number laptop PC with pre-installed, licensed software for each site.
1.16	SUPPLY- GIS : 400KV, SPECIAL CABLES OTHER THAN POWER & CONTROL CABLES REQUIRED FOR CSD FOR INTERFACING WITH CB AND RELAY PANEL	MTR	100	Mode of measurement for cable shall be route length between CSD and CRP/ LCC.
1.17	SUPPLY- GIS : TOOLS AND TACKLES	SET	1	Non returnable Tools and Tackles for 400kV & 132kV GIS. Bidder to provide detail list along with the bid.
	132KV GIS			
1.18	SUPPLY- GIS : 132KV, 40KA FOR 1S, 3000A, TWO MAIN BUS BAR SCHEME- GIS BUS BAR MODULE	SET	2	Details as per **Cl. No.3.1.1.2 (a)** of GIS-Annexure-1 of technical specification excluding End Piece (Interface) module.
1.19	SUPPLY- GIS : 132KV, 40KA FOR 1S, 3000A, GIS BUS COUPLER BAY	SET	1	Details as per **Cl. No.3.1.1.2 (b)** of GIS--Annexure-1 of technical specification excluding LCC.
1.20	SUPPLY- GIS : 132KV, 40KA FOR 1S, **1000A,** GIS TRANSFORMER FEEDER BAY	SET	2	Details as per **Cl. No.3.1.1.2 (c)** of GIS--Annexure-1 of technical specification excluding LCC.
1.21	SUPPLY- GIS : 132KV, 40KA FOR 1S, **1000A,** GIS LINE FEEDER BAY	SET	4	Details as per **Cl. No.3.1.1.2 (d)** of GIS--Annexure-1 of technical specification excluding LCC.
1.22	SUPPLY- GIS : 132KV, 40KA FOR 1S, **1000A**, SF6 GIS AUXILIARY BUS MODULE FOR SPARE TRANSFORMER	SET	1	Details as per **Cl. No.3.1.1.2 (e)** of GIS--Annexure-1 of technical specification.
1.23	SUPPLY- GIS : 132KV, 40KA FOR 1S, **1000A**, THREE PHASE GAS INSULATED BUS DUCT	MTR	105	GIB outside the GIS Hall wall shall be considered for mode of measurement. Inner side GIB is to be considered as part of respective Feeder Bay and cost of the same shall be deemed inclusive.
1.24	SUPPLY- GIS : 132KV, 40KA FOR 1S, **1000A**, THREE PHASE SF6 TO AIR BUSHING	SET	4	1 Set = 03 Phase. Polymer Type with 31mm/ kV creepage complete in all respect except terminal connectors.
1.25	SUPPLY- GIS : 132KV, LOCAL CONTROL CUBICLE	NO	7	Including power, control & instrumentation cable as applicable.
1.26	SUPPLY- GIS : 132KV, INTERFACE MODULE FOR FUTURE EXTENSION OF GIS	SET	2	As per cl no. 5.42 of section-2 of Technical specification. (1 Set = Arrangement for Extension of one set of 3-phase of bus-bar)
2	**MANDATORY MAINTENANCE EQUIPMENT**			
2.01	SUPPLY- GIS : MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS ANALYZER	NO	1	As per cl no. 27.3 of Section-2 of Technical specification
2.02	SUPPLY- GIS : MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS LEAKAGE DETECTOR	NO	1	As per cl no. 27.1 of Section-2 of Technical specification

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)

SL	DESCRIPTION	UNIT	QTY	REMARKS
2.03	SUPPLY- GIS : MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - OFFLINE PARTIAL DISCHARGE MONITORING SYSTEM	SET	1	Portable Partial Discharge measurement test kit with all necessary accessories, Industrial Grade Laptop and licensed software as per cl no. 27.4 Section-2 of Technical specification.
2.04	SUPPLY- GIS : 400KV, MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS FILLING, EVACUATING, FILTERING, DRYING, PUMPING & STORAGE PLANT	SET	1	As per cl no. 27.2 of Section-2 of Technical specification
2.05	SUPPLY- GIS : 132KV, MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS FILLING, EVACUATING, FILTERING, DRYING, PUMPING & STORAGE PLANT	SET	1	As per cl no. 27.2 of Section-2 of Technical specification
3	**MANDATORY SPARES FOR GIS**			
	400KV GIS			
3.01	SPARES- GIS : 400KV, MANDATORY SPARES AS PER TECHNICAL SPECIFICATION	LOT	1	Mandatory spares for 400kV GIS as per ANNEXURE-BOQ_MANDATORY SPARES. Bidder to submit price break-up of spares as per BOQ during tender stage.
	132KV GIS			
3.02	SPARES- GIS : 132KV, MANDATORY SPARES AS PER TECHNICAL SPECIFICATION	LOT	1	Mandatory spares for 132kV GIS as per ANNEXURE-BOQ_MANDATORY SPARES. Bidder to submit price break-up of spares as per BOQ during tender stage.
4	**SERVICES**			
	400KV GIS			
4.01	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS	LOT	1	Supervision of erection of 400kV GIS, complete in all respect including LCC, Surge Arrester, SF6/Oil Bushing/ connection . It also includes supervision of unloading & verification of materials for proper storage at site.
4.02	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GAS INSULATED BUS DUCT	MTR	**1900**	400kV, 3000A Single-phase Busduct.
4.03	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF SF6 TO AIR BUSHING	SET	**9**	Single phase SF6 Bushing.
4.04	**SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF SF6 TO OIL BUSHING/ CONNECTION SUITABLE FOR TRANSFORMER/ REACTOR**	**SET**	**11**	
4.05	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF CSD COMPLETE IN ALL RESPECT	SET	2	

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)

SL	DESCRIPTION	UNIT	QTY	REMARKS
4.06	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS	LOT	1	Testing and commissioning of complete 400kV GIS system including LCC, Surge Arrester, SF6/Oil Bushing/ connection is to be executed by contractor. 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. (Testing & commissioning of GIB, SAB & CSD are break-up separately in following BOQ Line items)
4.07	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GAS INSULATED BUS DUCT	MTR	**1900**	400kV, 3000A Single-phase Busduct.
4.08	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF SF6 TO AIR BUSHING	SET	**9**	Single phase SF6 Bushing.
4.09	**SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF SF6 TO OIL BUSHING/ CONNECTION SUITABLE FOR TRANSFORMER/ REACTOR**	**SET**	**11**	
4.10	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF CSD	SET	2	
4.11	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.
	132KV GIS			
4.10	SERVICES- GIS : 132KV, SUPERVISION OF ERECTION OF GIS	LOT	1	Supervision of erection of 132kV GIS, complete in all respect including LCC and cable connection module. It also includes supervision of unloading & verification of materials for proper storage at site.
4.11	SERVICES- GIS : 132KV, SUPERVISION OF ERECTION OF GAS INSULATED BUS DUCT	MTR	105	132kV, 1600A Three phase Busduct.
4.12	SERVICES- GIS : 132KV, SUPERVISION OF ERECTION OF SF6 TO AIR BUSHING	SET	4	1 Set = 132kV Three phase Bushing.
4.13	SERVICES- GIS : 132KV, TESTING & COMMISSIONING OF GIS	LOT	1	Testing and commissioning of complete 132kV GIS system including LCC and cable connection module is to be executed by contractor. 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. (Testing & commissioning of GIB, SAB & CSD are break-up separately in following BOQ Line items)
4.14	SERVICES- GIS : 132KV, TESTING & COMMISSIONING OF GAS INSULATED BUS DUCT	MTR	105	132kV, 1600A Three phase Busduct.
4.15	SERVICES- GIS : 132KV, TESTING & COMMISSIONING OF SF6 TO AIR BUSHING	SET	4	1 Set = 132kV Three phase Bushing.

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)

SL	DESCRIPTION	UNIT	QTY	REMARKS
4.16	SERVICES- GIS : 132KV, 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.
	GENERAL			
4.17	SERVICES- GIS : INSULATION CO-ORDINATION STUDIES FOR GIS SYSTEM	LOT	1	For 400kV & 132kV GIS including VFTO report.
4.18	SERVICES- GIS : TRAINING FOR GIS AT SITE	DAYS	3	For 400kV & 132kV GIS.
4.19	SERVICES- GIS : TRAINING FOR GIS AT MANUFACTURER'S WORKS	DAYS	3	For 400kV & 132kV GIS.
5	**SPARES- UNIT PRICES OF INDIVIDUAL ITEM/EQUIPMENT (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)**			
	400KV GIS			
5.01	**SPARES- GIS : 400KV, 50KA FOR 1S, SINGLE PHASE BUS BAR**	MTR	1	Current rating - 5000A, Complete in all respect.
5.02	SPARES- GIS : 400KV, GIS METALLIC ENCLOSURE	KG	50	
5.03	SPARES- GIS : 400KV, EXPANSION BELLOWS/ JOINTS	Set	1	For Single Phase of any type and any rating.
5.04	SPARES- GIS : 400KV, TEE BEND	Set	1	For Single Phase of any type and any rating.
5.05	SPARES- GIS : 400KV, ANGLE BEND (135°)	Set	1	For Single Phase of any type and any rating.
5.06	SPARES- GIS : 400KV, L-BEND	Set	1	For Single Phase of any type and any rating.
	132KV GIS			
5.07	SPARES- GIS : 132KV, 40KA FOR 1S, 3000A, THREE PHASE BUS BAR	MTR	1	Complete in all respect.
5.08	SPARES- GIS : 132KV, GIS METALLIC ENCLOSURE	KG	50	
5.09	SPARES- GIS : 132KV, EXPANSION BELLOWS/ JOINTS	Set	1	For Three Phase of each type & rating.
5.10	SPARES- GIS : 132KV, TEE BEND	Set	1	Including 90° Bend as applicable for Three Phase of each type & rating.
5.11	SPARES- GIS : 132KV, ANGLE BEND (135°)	Set	1	For Three Phase of each type & rating.
5.12	SPARES- GIS : 132KV, L-BEND	Set	1	For Three Phase of each type & rating.

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)

SL	DESCRIPTION	UNIT	QTY	REMARKS
6	**SERVICES (UNIT PRICES)** **(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)**			
	400KV GIS			
6.01	SERVICES- GIS : 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR SUPERVISION OF ERECTION OF GIS	MANDAY	1	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.
6.02	SERVICES- GIS : 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR TESTING & COMMISSIONING OF GIS	MANDAY	1	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.
6.03	SERVICES- GIS : 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - HIRING 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)
	132KV GIS			
6.04	SERVICES- GIS : 132KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR SUPERVISION OF ERECTION OF GIS	MANDAY	1	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.
6.05	SERVICES- GIS : 132KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR TESTING & COMMISSIONING OF GIS	MANDAY	1	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.
6.06	SERVICES- GIS : 132KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - HIRING 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)

ANNEXURE-BOQ_MANDATORY SPARES FOR GIS (REV 01)						
400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)						
SL	DESCRIPTION	UNIT	QTY	Unit Rate	Total	REMARKS
A	400KV GIS-MANDATORY SPARES					
A.1	400kV GIS- GENERAL SPARES					
A.1.01	SF6 GAS PRESSURE RELIEF DEVICES OF EACH TYPE ALONG WITH O - RINGS	SET	2			1 SET= 1 number of each make, type and rating
A.1.02	SF6 PRESSURE GAUGE CUM SWITCH OR DENSITY MONITORS AND PRESSURE SWITCH AS APPLICABLE EACH TYPE	SET	3			1 SET= 1 number of each make, type and rating
A.1.03	COUPLING DEVICE OF EACH TYPE FOR PRESSURE GAUGE CUM SWITCH FOR CONNECTING GAS HANDLING PLANT	SET	2			1 SET= 1 number of each make, type and rating
A.1.04	RUBBER GASKETS, "O" RINGS AND SEALS FOR SF6 GAS OF EACH TYPE	SET	3			1 SET= Rubber Gaskets, "O" Rings and Seals for SF6 gas for GIS enclosure of each type
A.1.05	MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS	SET	1			1 SET= 3% (In weight) of total molecular filter quantity.
A.1.06	CONTROL VALVES FOR SF6 GAS OF EACH TYPE	NO.	3			1 SET= Control Valves for SF6 gas of each type
A.1.07	SF6 GAS (5 % OF TOTAL GAS QUANTITY) IN NON-RETURNABLE CYLINDERS	LOT	1			
A.1.08	LOCKING DEVICE TO KEEP THE DIS-CONNECTORS (ISOLATORS) AND EARTHING SWITCHES IN CLOSE OR OPEN POSITION IN CASE OF REMOVAL OF THE DRIVING MECHANISM	NOS.	3			1 SET= 1 number of each make, type and rating
A.1.09	SPARES FOR LOCAL CONTROL CABINET INCLUDING MCB, FUSES, TIMERS, AUX. RELAYS, CONTACTOR, PUSH BUTTONS, SWITCHES, LAMPS, ANNUNCIATION WINDOWS ETC OF EACH TYPE & RATING AND TERMINAL OF EACH TYPE	SET	2			1 SET= 1 number of each make, type and rating
A.1.10	UHF PD SENSORS OF EACH TYPE	NO.	5			1 SET= 1 number of each make, type and rating
A.1.11	SUPPORT INSULATOR/GAS BARRIER OF EACH TYPE ALONG WITH ASSOCIATED CONTACTS & SHIELDS	SET	5			1 SET= 1 number of each make, type and rating
A.1.12	SF6 TO AIR BUSHING OF EACH TYPE & RATING ALONG WITH CONDUCTOR & ENCLOSURE	NO.	1			1 SET= 1 number of each make, type and rating
A.2	400kV SF6 CIRCUIT BREAKER:					
A.2.01	COMPLETE CIRCUIT BREAKER (1 PHASE UNIT) OF EACH TYPE & RATING COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND MARSHALLING BOX WITH OPERATING MECHANISM (**WITHOUT PIR**) TO ENABLE REPLACEMENT OF ANY TYPE/RATING OF CB BY SPARE (AS APPLICABLE)	SET	1			1 SET= complete material to enable replacement of all applicable type/rating of CB by spare
A.2.02	TRIP COIL ASSEMBLY WITH RESISTOR, AS APPLICABLE, 3 NOS. OF EACH TYPE AND RATING	SET	1			
A.2.03	CLOSING COIL ASSEMBLY WITH RESISTOR, AS APPLICABLE, 3 NOS. OF EACH TYPE AND RATING	SET	1			each make, type and rating
A.2.04	RELAYS, POWER CONTACTORS, PUSH BUTTONS, TIMERS & MCBS ETC.	SET	1			1 SET= 1 number of each make, type and rating
A.2.05	AUXILIARY SWITCH ASSEMBLY, 3 NOS. OF EACH TYPE AND RATING	SET	1			each make, type and rating
A.2.06	OPERATION COUNTER, 3 NOS. OF EACH TYPE AND RATING	SET	1			
	For Hydraulic Operated Mechanism, if applicable					
A.2.07	HYDRAULIC OPERATING MECHANISM WITH DRIVE MOTOR	SET	1			1 SET= 1 number of each make, type and rating
A.2.08	FERRULES, JOINTS AND COUPLINGS	SET	1			1 SET= 1 number of each make, type and rating
A.2.09	HYDRAULIC FILTER	SET	1			1 SET= 1 number of each make, type and rating
A.2.10	HOSE PIPE	SET	1			1 SET= 1 number of each make, type and rating
A.2.11	NITROGEN ACCUMULATOR	SET	1			1 SET= 1 number of each make, type and rating

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)

SL	DESCRIPTION	UNIT	QTY	Unit Rate	Total	REMARKS
A.2.12	VALVES	SET	1			1 SET= 1 number of each make, type and rating
A.2.13	PRESSURE SWITCHES	SET	1			1 SET= 1 number of each make, type and rating
A.2.14	PRESSURE GAUGE WITH COUPLING DEVICE	SET	1			1 SET= 1 number of each make, type and rating
A.2.15	HYDRAULIC OIL	SET	1			1 SET= 5% of total Oil quantity
A.2.16	PRESSURE RELIEF DEVICE	SET	1			1 SET= 1 number of each make, type and rating
	For Spring Operated Mechanism, if applicable					
A.2.17	SPRING OPERATING MECHANISM INCLUDING CHARGING MECHANISM ETC.	SET	1			1 SET= 1 number of each type and rating
A.3	**400kV ISOLATORS :**					
A.3.01	**# FOR ISOLATOR (3150A) :** COMPLETE SET OF SINGLE PHASE DIS-CONNECTOR OF EACH TYPE, DIMENSION, CURRENT & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC TO ENABLE REPLACEMENT OF ANY TYPE/RATING OF ISOLATOR BY SPARE	SET	2			1 SET= 1 number of each make, type and rating
A.3.02	# FOR MAINTENANCE EARTH SWITCH: 1 NO. OF SINGLE PHASE MAINTENANCE EARTHING SWITCH OF EACH TYPE, DIMENSION, CURRENT & VOLTAGE INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC TO ENABLE REPLACEMENT OF ANY TYPE/RATING OF EARTH SWITCH BY SPARE	SET	2			1 SET= 1 number of each make, type and rating
A.3.03	# FOR FAST EARTHING SWITCH: 1 NO. OF SINGLE PHASE FAST EARTHING SWITCH OF EACH TYPE, DIMENSION, CURRENT & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC TO ENABLE REPLACEMENT OF ANY TYPE/RATING OF EARTH SWITCH BY SPARE (IF APPLICABLE)	SET	2			1 SET= 1 number of each make, type and rating
A.3.04	FOR ISOLATOR: OPEN / CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS POWER CONTACTORS, RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX (3 – PHASE GANG OPERATED OR 1 – PHASE UNIT).	SET	1			1 SET= 1 number of each make, type and rating
A.3.05	FOR MAINTENANCE EARTH SWITCH : OPEN / CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS POWER CONTACTORS, RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX (3 – PHASE GANG OPERATED OR 1 – PHASE UNIT).	SET	1			1 SET= 1 number of each make, type and rating
A.3.06	FOR FAST EARTHING SWITCH: OPEN / CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS POWER CONTACTORS, RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX (3 – PHASE GANG OPERATED OR 1 – PHASE UNIT).	SET	1			1 SET= 1 number of each make, type and rating
A.3.07	FOR ISOLATOR: LIMIT SWITCH AND AUX. SWITCHES FOR COMPLETE 3 -PHASE EQUIPMENT	SET	2			1 SET= 1 number of each make, type and rating
A.3.08	FOR MAINTENANCE EARTH SWITCH : LIMIT SWITCH AND AUX. SWITCHES FOR COMPLETE 3- PHASE EQUIPMENT	SET	2			1 SET= 1 number of each make, type and rating
A.3.09	FOR FAST EARTHING SWITCH: LIMIT SWITCH AND AUX. SWITCHES FOR COMPLETE 3- PHASE EQUIPMENT	SET	2			1 SET= 1 number of each make, type and rating
A.3.10	FOR ISOLATOR: DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each type and rating
A.3.11	FOR MAINTENANCE EARTH SWITCH : DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
A.3.12	FOR FAST EARTHING SWITCH: DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
A.3.13	FOR ISOLATOR: MOTOR FOR DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
A.3.14	FOR MAINTENANCE EARTH SWITCH : MOTOR FOR DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
A.3.15	FOR FAST EARTHING SWITCH: MOTOR FOR DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating

ANNEXURE-BOQ_MANDATORY SPARES FOR GIS (REV 01)						
400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)						
SL	DESCRIPTION	UNIT	QTY	Unit Rate	Total	REMARKS
A.4	400kV CURRENT TRANSFORMER					
A.4.1	COMPLETE (3 CORES) CURRENT TRANSFORMER (CTA) WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR TO ENABLE REPLACEMENT OF CT BY SPARE	NO	1			
A.4.2	COMPLETE (2 CORES) CURRENT TRANSFORMER (CTB) WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR TO ENABLE REPLACEMENT OF CT BY SPARE	NO	2			
A.5	400kV VOLTAGE TRANSFORMER					
A.5.1	COMPLETE 400KV PT OF EACH TYPE AND RATING WITH ENCLOSURE TO ENABLE REPLACEMENT OF ANY TYPE/RATING OF VT BY SPARE (IF APPLICABLE)	NO	1			
A.6	400kV GIS SURGE ARRESTER					
A.6.1	GAS INSULATED LA FOR OF EACH TYPE AND RATINGS ENCLOSURE & SURGE MONITOR COUNTER TO ENABLE REPLACEMENT OF ANY TYPE/ RATING OF GAS INSULATED LA BY SPARE (IF APPLICABLE)	NO	1			
A.6.2	SURGE COUNTER/ MONITOR OF EACH TYPE AND RATING	NO	1			
B	132KV GIS-MANDATORY SPARES					
B.1	132KV GIS- GENERAL SPARES					
B.1.01	CABLE CONNECTION ENCLOSURE WITH THE MAIN CIRCUIT (IF APPLICABLE)	NO.	1			For Single phase and of each type and rating
B.1.02	SF6 GAS PRESSURE RELIEF DEVICES OF EACH TYPE ALONG WITH O - RINGS	SET	2			1 SET= 1 number of each make, type and rating
B.1.03	SF6 PRESSURE GAUGE CUM SWITCH OR DENSITY MONITORS AND PRESSURE SWITCH AS APPLICABLE EACH TYPE	SET	3			1 SET= 1 number of each make, type and rating
B.1.04	COUPLING DEVICE OF EACH TYPE FOR PRESSURE GAUGE CUM SWITCH FOR CONNECTING GAS HANDLING PLANT	SET	2			1 SET= 1 number of each make, type and rating
B.1.05	RUBBER GASKETS, "O" RINGS AND SEALS FOR SF6 GAS OF EACH TYPE	SET	3			1 SET= Rubber Gaskets, "O" Rings and Seals for SF6 gas for GIS enclosure of each type
B.1.06	MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS	SET	1			1 SET= 3% (In weight) of total molecular filter quantity.
B.1.07	CONTROL VALVES FOR SF6 GAS OF EACH TYPE	NO.	3			1 SET= Control Valves for SF6 gas of each type
B.1.08	SF6 GAS (5 % OF TOTAL GAS QUANTITY) IN NON-RETURNABLE CYLINDERS	LOT	1			
B.1.09	LOCKING DEVICE TO KEEP THE DIS-CONNECTORS (ISOLATORS) AND EARTHING SWITCHES IN CLOSE OR OPEN POSITION IN CASE OF REMOVAL OF THE DRIVING MECHANISM	NOS.	1			1 SET= 1 number of each make, type and rating
B.1.10	SPARES FOR LOCAL CONTROL CABINET INCLUDING MCB, FUSES, TIMERS, AUX. RELAYS, CONTACTOR, PUSH BUTTONS, SWITCHES, LAMPS, ANNUNCIATION WINDOWS ETC OF EACH TYPE & RATING AND TERMINAL OF EACH TYPE	SET	2			1 SET= 1 number of each make, type and rating
B.1.11	UHF PD SENSORS OF EACH TYPE	NO.	5			1 SET= 1 number of each make, type and rating
B.1.12	SUPPORT INSULATOR/GAS BARRIER OF EACH TYPE ALONG WITH ASSOCIATED CONTACTS & SHIELDS	SET	5			1 SET= 1 number of each make, type and rating
B.1.13	SF6 TO AIR BUSHING OF EACH TYPE & RATING ALONG WITH CONDUCTOR & ENCLOSURE	NO.	1			1 SET= 1 number of each make, type and rating
B.2	132KV SF6 CIRCUIT BREAKER:					
B.2.01	COMPLETE CIRCUIT BREAKER (3 PHASE UNIT) OF 3000A COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND MARSHALLING BOX WITH OPERATING MECHANISM	SET	1			1 SET= complete material to enable replacement of all applicable CB by spare

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)

SL	DESCRIPTION	UNIT	QTY	Unit Rate	Total	REMARKS
B.2.01	COMPLETE CIRCUIT BREAKER (3 PHASE UNIT) OF 1000A COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND MARSHALLING BOX WITH OPERATING MECHANISM	SET	1			1 SET= complete material to enable replacement of all applicable CB by spare
B.2.02	TRIP COIL ASSEMBLY WITH RESISTOR, AS APPLICABLE, 3 NOS. OF EACH TYPE AND RATING	SET	1			
B.2.03	CLOSING COIL ASSEMBLY WITH RESISTOR, AS APPLICABLE, 3 NOS. OF EACH TYPE AND RATING	SET	1			each make, type and rating
B.2.04	RELAYS, POWER CONTACTORS, PUSH BUTTONS, TIMERS & MCBS ETC.	SET	1			1 SET= 1 number of each make, type and rating
B.2.05	AUXILIARY SWITCH ASSEMBLY, 3 NOS. OF EACH TYPE AND RATING	SET	1			each make, type and rating
B.2.06	OPERATION COUNTER, 3 NOS. OF EACH TYPE AND RATING	SET	1			
	For Hydraulic Operated Mechanism, if applicable					
B.2.07	HYDRAULIC OPERATING MECHANISM WITH DRIVE MOTOR	SET	1			1 SET= 1 number of each make, type and rating
B.2.08	FERRULES, JOINTS AND COUPLINGS	SET	1			1 SET= 1 number of each make, type and rating
B.2.10	HYDRAULIC FILTER	SET	1			1 SET= 1 number of each make, type and rating
B.2.11	HOSE PIPE	SET	1			1 SET= 1 number of each make, type and rating
B.2.12	NITROGEN ACCUMULATOR	SET	1			1 SET= 1 number of each make, type and rating
B.2.13	VALVES	SET	1			1 SET= 1 number of each make, type and rating
B.2.15	PRESSURE SWITCHES	SET	1			1 SET= 1 number of each make, type and rating
B.2.16	PRESSURE GAUGE WITH COUPLING DEVICE	SET	1			1 SET= 1 number of each make, type and rating
B.2.17	HYDRAULIC OIL	SET	1			1 SET= 5% of total Oil quantity
B.2.18	PRESSURE RELIEF DEVICE	SET	1			1 SET= 1 number of each make, type and rating
	For Spring Operated Mechanism, if applicable					
B.2.19	SPRING OPERATING MECHANISM INCLUDING CHARGING MECHANISM ETC.	SET	1			1 SET= 1 number of each type and rating
B.3	**132KV ISOLATORS :**					
B.3.01	# COMPLETE SET OF ONE NO. OF 3-PHASE DISCONNECTOR (3000A) OF EACH TYPE, DIMENSION, CURRENT & VOLTAGE RATING INCLUDING MAIN CIRCUIT , ENCLOSURE, DRIVING MECHANISM AN SUPPORT INSULATOR ETC TO ENABLE REPLACEMENT OF ISOLATOR BY SPARE	SET	1			1 SET= 1 number of each make, type and rating
B.3.01	# COMPLETE SET OF ONE NO. OF 3-PHASE DISCONNECTOR (1000A) OF EACH TYPE, DIMENSION, CURRENT & VOLTAGE RATING INCLUDING MAIN CIRCUIT , ENCLOSURE, DRIVING MECHANISM AN SUPPORT INSULATOR ETC TO ENABLE REPLACEMENT OF ISOLATOR BY SPARE	SET	1			1 SET= 1 number of each make, type and rating
B.3.02	ONE NO OF 3-PHASE MAINTENANCE EARTHING SWITCH OF EACH TYPE, DIMENSION, CURRENT & VOLTAGE INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC TO ENABLE REPLACEMENT OF ANY TYPE/RATING OF EARTH SWITCH BY SPARE	SET	1			1 SET= 1 number of each make, type and rating
B.3.03	ONE NO OF 3-PHASE FAST EARTHING SWITCH OF EACH TYPE, DIMENSION, CURRENT & VOLTAGE RATING INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC TO ENABLE REPLACEMENT OF ANY TYPE/RATING OF EARTH SWITCH BY SPARE (IF APPLICABLE)	SET	1			1 SET= 1 number of each make, type and rating
B.3.04	FOR ISOLATOR: OPEN / CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS POWER CONTACTORS, RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX (3 – PHASE GANG OPERATED OR 1 – PHASE UNIT) DIS-CONNECTOR AND (3 PHASE) EARTHING SWITCH OF EACH TYPE AND RATING.	SET	1			1 SET= 1 number of each make, type and rating

400/132KV GAS INSULATED SWITCHGEAR (INDOOR TYPE)						
SL	DESCRIPTION	UNIT	QTY	Unit Rate	Total	REMARKS
B.3.05	FOR MAINTENANCE EARTH SWITCH : OPEN / CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS POWER CONTACTORS, RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX (3 – PHASE GANG OPERATED OR 1 – PHASE UNIT) DIS-CONNECTOR AND (3 PHASE) EARTHING SWITCH OF EACH TYPE AND RATING.	SET	1			1 SET= 1 number of each make, type and rating
B.3.06	FOR FAST EARTHING SWITCH: OPEN / CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS POWER CONTACTORS, RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX (3 – PHASE GANG OPERATED OR 1 – PHASE UNIT) DIS-CONNECTOR AND (3 PHASE) EARTHING SWITCH OF EACH TYPE AND RATING.	SET	1			1 SET= 1 number of each make, type and rating
B.3.07	FOR ISOLATOR: LIMIT SWITCH AND AUX. SWITCHES FOR COMPLETE 3 -PHASE EQUIPMENT	SET	2			1 SET= 1 number of each make, type and rating
B.3.08	FOR MAINTENANCE EARTH SWITCH : LIMIT SWITCH AND AUX. SWITCHES FOR COMPLETE 3- PHASE EQUIPMENT	SET	2			1 SET= 1 number of each make, type and rating
B.3.09	FOR FAST EARTHING SWITCH: LIMIT SWITCH AND AUX. SWITCHES FOR COMPLETE 3- PHASE EQUIPMENT	SET	2			1 SET= 1 number of each make, type and rating
B.3.10	FOR ISOLATOR: DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each type and rating
B.3.11	FOR MAINTENANCE EARTH SWITCH : DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
B.3.12	FOR FAST EARTHING SWITCH: DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
B.3.13	FOR ISOLATOR: MOTOR FOR DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
B.3.14	FOR MAINTENANCE EARTH SWITCH : MOTOR FOR DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
B.3.15	FOR FAST EARTHING SWITCH: MOTOR FOR DRIVE MECHANISM OF EACH TYPE	SET	1			1 SET= 1 number of each make, type and rating
B.4	**132KV CURRENT TRANSFORMER**					
B.4.1	COMPLETE (4 CORES) CURRENT TRANSFORMER (CTC) WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR TO ENABLE REPLACEMENT OF CT BY SPARE	NO	1			
B.4.2	COMPLETE (4 CORES) CURRENT TRANSFORMER (CTD) WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR TO ENABLE REPLACEMENT OF CT BY SPARE	NO	1			
B.5	**132KV VOLTAGE TRANSFORMER**					
B.5.1	COMPLETE 132KV PT OF EACH TYPE AND RATING WITH ENCLOSURE TO ENABLE REPLACEMENT OF ANY TYPE/RATING OF VT BY SPARE (IF APPLICABLE)	NO	1			

NOTES:

1. In case, Disconnector Switch (DS) & Earth Switch (ES) is provided in a same enclosure with single operating mechanism, then the module comprising of Disconnector & Earth switch in single enclosure with single operating mechanism is to be provided under the head of spare Disconnector (#) only and in such case, supply of spare Earth Switch is not required separately.

2. In case, Disconnector Switch (DS) & Earth Switch (ES) is provided in a same enclosure with separate operating mechanism, then the module comprising of Disconnector & Earth switch in single enclosure with separate operating mechanism is to be provided under the head of spare Disconnector (#) only and in such case, supply of spare Earth Switch separately is not required.

DESCRIPTION OF GIS BAY/MODULE

3.1.1.1 400kV Gas Insulated Switchgear

400kV SF6 gas insulated switchgear shall have one and a half breaker bus bar arrangement. The Switchgear shall be complete with all necessary terminal boxes, SF6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring equipment & piping and support structures along with necessary base plate & foundation bolts. In addition, all necessary platforms, supports, ladders and catwalks etc. as required for operation & maintenance work shall also be supplied.

The SF6 gas insulated switchgear (50 Hz) shall be of the indoor metal-enclosed type, comprising of following modules:

a) Isolated phase, 420kV, 5000A, 50 kA for 1 second, SF6 gas-insulated metal enclosed bus bars module (for 3 nos. of diameter), each set comprising of:-

i. Three (3) numbers individual bus bars enclosures running across the length of the switch gear to inter-connect each of the circuit breaker bay modules in one and half breaker bus system.

ii. Three numbers 1-phase Potential Transformers complete with manual operated isolating switch/ device.

iii. One (1) number 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

iv. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structures etc. as required.

v. Local Control Cubicle (If required separately).

vi. End Piece (Interface) module with the test link for future extension of Bus bar module. The end piece module shall be designed in such a way so that future GIS module may be tested by removing the test link, without extending voltage to existing bus.

DESCRIPTION OF GIS BAY/MODULE

b) 420kV, 3150A, 50 kA for 1 second, SF6 gas-insulated metal enclosed ICT bay module (For 400kV side of 400/132kV ICT) each set comprising of the following: -

i. One (1) number 3-phase, SF6 insulated circuit breaker without PIR complete with operating mechanism. ii. Three (3) numbers, 1-phase, 3-core (multi ratio) current transformers (CTA) on one side of circuit breaker. iii. Three (3) numbers 1-phase, 2-core (multi ratio) current transformers (CTB) on other side of circuit breaker.

iv. Two (2) numbers 3-phase, single pole, group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Three (3) numbers 1-phase, individual pole operated isolator switches, complete with manual and motor driven operating mechanisms.

vii. Three (3) numbers 1-phase, individual operated safety grounding switches, complete with manual and motor driven operating mechanisms.

viii. Three Nos. 1-phase, individual pole operated isolator switches, complete with manual and motor driven operating mechanisms for switching of Spare Transformer through 420kV Auxiliary bus. The isolator must meet the operational requirement in terms of Phase-phase insulation withstand capability.

ix. Three (3) numbers single phase SF6 ducts inside the GIS hall (up to the outer edge of the wall of GIS Hall)

x. Three (3) number 1-phase, SF6 insulated surge arresters.

xi. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structures etc. as required.

xii. Local Control Cubicle.

xiii. Elsewhere in this document, requirement of GIS SF6/ Oil Interface to connect with 400KV side of 400/132kV Transformer (outdoor), as per IEC-62271-211 is specified. GIS SF6/ Oil Interface as required, shall be included as part of ICT GIS bay module (For 400kV side of 400/132kV ICT) .

DESCRIPTION OF GIS BAY/MODULE

c) 420kV, 3150A, 50 kA for 1 second, SF6 gas insulated metal enclosed Bus reactor module each set comprising of :-

i. One (1) number 3-phase, SF6 gas insulated circuit breaker without PIR complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3-core (multi ratio) current transformers (CTA) on one side of circuit breaker. iii. Three (3) numbers 1-phase, 2-core (multi ratio) current transformers (CTB) on other side of circuit breaker.

iv. Two (2) numbers 3-phase, single pole group operated isolator switches, complete with manual and motor driven operating mechanisms

v. Two (2) numbers 3-phases, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Three (3) numbers 1-phase, individual pole operated isolator switches, complete with manual and motor driven operating mechanisms.

vii. Three (3) numbers 1-phase, individual operated safety grounding switches, complete with manual and motor driven operating mechanisms.

viii. Three Nos. 1-phase, single pole, individual pole operated isolator switches, complete with manual and motor driven operating mechanisms for switching of Spare Reactor through 420kV Auxiliary bus. The isolator must meet the operational requirement in terms of Phase-phase insulation withstand capability.

ix. Three (3) numbers single phase SF6 ducts inside the GIS hall (up to the outer edge of the wall of GIS Hall)

x. Three (3) numbers 1-phase, SF6 insulated surge arresters.

xi. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structures etc. as required.

xii. Local Control cubicle.

xiii. GIS SF6/ Oil interface to connect to Shunt Reactor (outdoor).

Elsewhere in this document, requirement of GIS SF6/ Oil Interface to connect with 400KV side of 400KV BUS REACTOR (outdoor), as per IEC-62271-211 is specified.

DESCRIPTION OF GIS BAY/MODULE

GIS SF6/ Oil Interface as required, shall be included as part of BUS REACTOR GIS bay module.

d) 420kV, 3150A, 50 kA for 1 second, SF6 gas insulated metal enclosed Tie bay module comprising of:-

i. One (1) number 3-phase, SF6 insulated circuit breaker without PIR complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3-core (multi ratio) current transformers (CTA) on one side of breaker and Three (3) numbers 1-phase, 3-core (multi ratio) current transformers (CTA) on other side of breaker.

iii. Two (2) numbers 3-phase, single pole group operated isolator switches, complete with manual and motor driven operating mechanisms.

iv. Two (2) numbers 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

v. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structures etc. as required.

vi. Local Control Cubicle

e) 420kV, 3150A, 50 KA for 1 second, SF6 gas insulated metal enclosed Line feeder bay module each set comprising of:-

i. One (1) number 3-phase, SF6 insulated circuit breaker without PIR complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3-core (multi ratio) current transformers (CTA) on one side of circuit breaker. iii. Three (3) numbers 1-phase, 2-core (multi ratio) current transformers (CTB) on other side of circuit breaker.

iv. Three (3) numbers 3-phase, single pole group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phases, single pole group operated safety grounding switches, complete with manual and motor driven operating **mechanisms. vi. One**

DESCRIPTION OF GIS BAY/MODULE

(1) number 3-phase, single pole, high speed grounding switch, complete with group operated manual and motor driven operating mechanisms.

vii. Three (3) numbers 1-phase, SF6 ducts inside the GIS hall (up to the outer edge of the wall of GIS Hall)

viii. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structure etc., as required.

ix. Local Control Cubicle.

f) Set of isolated phase, 420kV, 3150A, 50kA for 1 second, SF6 gas-insulated metal enclosed, Auxiliary Bus bars Module for ICT Bays, comprising of :

i. One No., 1-Phase, Auxiliary bus bar enclosures running across the length of the switch gear to inter-connect the spare unit of ICT with all ICT Bay Modules through GIS duct.

ii. One No., 1-phase, single pole operated safety grounding switch, complete with manual and motor driven operating mechanisms.

iii. One No., 1-phase, SF6 duct inside the GIS hall (upto the outer edge of the wall of GIS Hall).

iv. GIS SF6/ Oil Interface to connect with 400/132kV spare Transformer unit (outdoor) as per IEC-62271-211.

GIS SF6/ Oil Interface as required, shall be included as part of Auxiliary Bus bars Module for ICT Bays.

v. One number 1-phase, SF6 insulated surge arresters.

vi. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, etc., as required.

vii. End Piece (Interface) module with the test link for future extension.

DESCRIPTION OF GIS BAY/MODULE

g) Set of isolated phase, 420kV, 3150A, 50kA for 1 second, SF6 gas-insulated metal enclosed, Auxiliary Bus Bars Module for BUS REACTOR Bays, comprising of:

i. One No., 1-Phase, Auxiliary bus bar enclosures running across the length of the switch gear to inter-connect the spare unit of Reactor with all Reactor Bay Modules through GIS duct.

ii. One No., 1-phase, single pole operated safety grounding switch, complete with manual and motor driven operating mechanisms.

iii. One No., 1-phase, SF6 duct inside the GIS hall (up-to the outer edge of the wall of GIS Hall).

iv. GIS SF6/ Oil interface to connect to 41.67 MVAR Shunt Reactor spare unit (outdoor).

GIS SF6/ Oil Interface as required, shall be included as part of Auxiliary Bus Bars Module for BUS REACTOR Bays.

v. One number 1-phase, SF6 insulated surge arresters.

vi. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, etc., as required.

vii. End Piece (Interface) module with the test link for future extension.

3.1.1.2 145kV Gas Insulated Switchgear

The 145kV SF6 gas insulated switchgear shall have double main bus bar arrangement. The Switchgear (50 Hz) shall be complete with all necessary terminal boxes, SF6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring equipment & piping and support structures along with base plate & foundation bolts. In addition, all necessary platforms, supports, ladders and catwalks etc. as required for operation & maintenance work shall also be supplied.

DESCRIPTION OF GIS BAY/MODULE

The SF6 gas insulated switchgear (50 Hz) shall be of the indoor metal-enclosed type, comprising of following modules:

a) Sets of three phase, 3000A, 40kA for 1 Second, SF6 gas-insulated metal enclosed Bus Bar modules (for 7 nos. of bays), each comprising of: -

i. Bus bars enclosures running across the length of the switchgear to inter connect each of the circuit breaker bay modules in double main bus system.

ii. One (1) number 3-phase group operated isolator switches, complete with manual and motor driven operating mechanisms.

iii. Three (3) numbers 1-Phase potential transformers, complete with isolator switch/link.

iv. One (1) number 3-phase group operated safety grounding switch, complete with manual and motor driven operating mechanisms.

v. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structures etc. as required.

vi. End Piece (Interface) module with the test link for future extension of Bus bar module. The end piece module may be designed in such a way so that future GIS module may be tested without extending voltage to existing bus by removing the test link. End interface modules for both the buses shall be in one alignment.

vii. Local control cubicle, if required separately.

b) 145kV, 3000A, 40KA for 1 second, SF6 gas-insulated metal enclosed Bus-Coupler bay module comprising of: -

i. One (1) number, 3-Phase, SF6 gas insulated circuit breaker, complete with operating mechanism.

ii. Three (3) numbers 1-phase, 4-core (multi ratio) current transformers (CTC).

iii. Two (2) numbers 3-phase group operated isolator switches, complete with manual and motor driven operating mechanisms.

DESCRIPTION OF GIS BAY/MODULE

iv. Two (2) numbers 3-phase group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

v. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structures etc. as required.

vi. Local Bay Control Cubicle.

c) 145kV, 1000A, 40kA for 1 second, SF6 gas insulated ICT feeder bay module each comprising of: -

i. One (1) number, 3-Phase, SF6 gas insulated circuit breaker complete with operating mechanism.

ii. Three (3) numbers 1-phase, 4-core (multi ratio) current transformers (CTD).

iii. Two (2) numbers 3-phase group operated isolator switches complete with manual and motor driven operating mechanisms.

iv. One (1) numbers 3-phase group operated safety grounding switches complete with manual and motor driven operating mechanisms.

v. Three (3) numbers 1-phase individual pole operated isolator switches complete with manual and motor driven operating mechanisms.

vi. Three (3) numbers 1-phase individual pole operated safety grounding switches complete with manual and motor driven operating mechanisms.

vii. Three Nos. 1-phase, individual pole operated isolator switches, complete with manual and motor driven operating mechanisms for switching of Spare ICT through 132kV Auxiliary bus. The isolator must meet the operational requirement in terms of Phase-phase insulation withstand capability.

viii. 3-phase SF6 ducts inside GIS hall (up to outer edge of wall of GIS Hall).

ix. Cable compartment suitable for EHV cable termination as per IEC-62271-209 to be located at outer side of wall of GIS hall. The necessary GIB required to install cable termination module shall be included in module cost and shall not be paid separately.

DESCRIPTION OF GIS BAY/MODULE

x. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structures etc. as required.

xi. Local Bay control cubicle.

d) 145kV, 1000A, 40kA for 1 second, SF6 gas insulated Line feeder bay module each comprising of: -

i. One (1) number 3-Phase, SF6 gas insulated circuit breaker complete with operating mechanism.

ii. Three (3) numbers 1-phase, 4-core (multi ratio) current transformers (CTD).

iii. Two (2) numbers 3-phase group operated isolator switches complete with manual and motor driven operating mechanisms.

iv. Two (2) numbers 3-phase group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

v. One (1) number 3-phase high speed grounding switch, complete with group operated manual and motor driven operating mechanisms.

vi. 3-phase SF6 ducts inside GIS hall (up to outer edge of wall of GIS Hall).

vii. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structures etc. as required.

viii. Local Bay control cubicle.

e) Set of isolated phase, 145kV, 1000A, 40kA for 1 second, SF6 gas-insulated metal enclosed, Auxiliary Bus bars Module for ICT Bays, comprising of :

i. One No., 1-Phase, Auxiliary bus bar enclosures running across the length of the switch gear to inter-connect the spare unit of ICT with all ICT Bay Modules through GIS duct.

DESCRIPTION OF GIS BAY/MODULE

ii. One No., 1-phase, single pole operated safety grounding switch, complete with manual and motor driven operating mechanisms.

iii. One No., 1-phase, SF6 duct inside the GIS hall (up to the outer edge of the wall of GIS Hall).

iv. Cable compartment suitable for EHV cable termination as per IEC-62271-209 to be located at outer edge of wall of GIS hall.

v. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, etc., as required.

vi. End Piece (Interface) module with the test link for future extension.

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REQUIREMENTS OF CURRENT TRANSFORMER

A. REQUIREMENTS FOR 400 kV CURRENT TRANSFORMER

Type CTA

No. of Cores.	Core no.	Application	Current Ratio	Output Burden (VA)	Accuracy class	Min knee point voltage V_K	Max. CT sec. wdg resistance (ohms)	Max. Excitation current at V_K (in mA)
3	1	Protection	3000/ 2000/ 500/1	-	**PX**	3000/ 2000/ 500	15/10/2.5	20 on 3000/1; 30 on 2000/1; 120 on 500/1
	2	Protection	3000/ 2000/ 500/1	-	**PX**	3000/ 2000/ 500	15/10/2.5	20 on 3000/1; 30 on 2000/1; 120 on 500/1
	3	METERING	3000/ 2000/ 500/1	20 20 20	0.2S 0.2S 0.2S	- - -		- - -

Type CTB

No. of Cores.	Core no.	Application	Current Ratio	Output Burden (VA)	Accuracy class	Min knee point voltage V_K	Max. CT sec. wdg resistance (ohms)	Max. Excitation current at V_K (in mA)
2	1	Protection	3000/ 2000/ 500/1	-	**PX**	3000/ 2000/ 500	15/10/2.5	20 on 3000/1; 30 on 2000/1; 120 on 500/1
	2	Protection	3000- 2000- 500/1	-	**PX**	3000/ 2000 500	15/10/2.5	20 on 3000/1, 30 on 2000/1, 120 on 500/1

REQUIREMENTS OF CURRENT TRANSFORMER

B. REQUIREMENTS FOR 145kV CURRENT TRANSFORMER FOR BUS COUPLER BAY

Type CTC

Core no.	Application	Current Ratio	Output Burden (VA)	Accuracy class	Min knee point voltage V_K	Max. CT sec. wdg resistance (ohms)	Max. Excitation current at V_K (in mA)
1	protection	2500-1600/1	-	PX	2500-1600	12.5/8	16 on 2500/1 25 on 1600/1
2	Metering	2500-1600/1	20	0.2S	-	-	-
3	protection	2500-1600/1	-	PX	2500-1600	12.5/8	16 on 2500/1 25 on 1600/1
4	protection	2500-1600/1	-	PX	2500-1600	12.5/8	16 on 2500/1 25 on 1600/1

C. REQUIREMENTS FOR 145kV CURRENT TRANSFORMER FOR ICT/LINE BAY

Type CTD

Core no.	Application	Current Ratio	Output Burden (VA)	Accuracy class	Min knee point voltage V_K	Max. CT sec. wdg resistance (ohms)	Max. Excitation current at V_K (in mA)
1	protection	800-400/1	-	PX	800-400	8/4	25 on 800/1 50 on 400/1
2	Metering	800-400/1	20	0.2S	-	-	-
3	protection	800-400/1	-	PX	800-400	8/4	25 on 800/1 50 on 400/1
4	protection	800-400/1	-	PX	800-400	8/4	25 on 800/1 50 on 400/1