



Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)

पारेषण व्यापार समूह, नोएडा, ऊ.प्र. / TBG, Noida, U.P.

सामग्री प्रबंधन / Material Management

Tower-A, 5th Floor, Advant Navis IT Business Park, Plot-7,

Sector-142, Expressway Noida, Noida-201305

Phone: 0120-6748484, Fax: 0120-6748550, Email: rajeevroy@bhel.in

Subject: Corrigendum - 04 to update PQR & revised technical specification for supply of 400kV GIS-POWERGRID SS19 ITARSI PROJECT against BHEL NIT No: 48288.

Project : POWERGRID SS19 ITARSI PROJECT.

Equipment / Item : SUPPLY & SUPERVISISON OF 400KV GIS.

Enquiry No. / Date : 61Q2000107, DATED 20-08-2019, DUE ON: 11-10-2019

TENDER SUBMISSION:

The corrigendum-04 has been uploaded in BHEL/CPP Portal incorporating the revised PQR & revised technical specification against the above tender enquiry.

The due date for submission of offers is **11-10-2019 at 14.00 Hrs** & bidder to ensure for submission of their offer on or before extended due date.

Thanking you

21/10/19
Rajeev Kr. Roy/Manager-TBMM



Enclosed;

- Annexure to corrigendum

SPECIAL TERMS & CONDITIONS FOR SUPPLY OF 400KV GIS- POWERGRID SS19 ITARSI PROJECT

Enquiry No: 61Q2000107, DATED 20-08-2019

Clauses of STC	Description
07.	PRE-QUALIFYING REQUIREMENT (Clause No: 07 of STC): The following clause shall be applicable in place of clause no 07 of STC. Bidder must be comply the following else offer is liable for rejection. - Technical PQR, which is mentioned in BHEL's technical specification. - Financial PQR as under; Bidder should have a minimum average audited annual turnover / Sales Value of INR 75 Million for last three financial years (2014-15, 2015-16 & 2016-17 - OR 2015-16, 2016-17 & 2017-18 OR 2016-17, 2017-18 & 2018-19) and should submit audited balance sheet and Profit & Loss Account Sheet of these years and should declare with supporting documents including audited balance sheet and P & L account. In case of foreign bidder: In case audited balance sheets and Profit and loss Accounts for above referred three financial years is not available, Balance Sheets and Profit and Loss Account Accounts for three years ending in Calendar years 2014, 2015, 2016 or Calendar Years 2015, 2016, 2017 or Calendar Years 2016, 2017, 2018 may be considered acceptable. In case audited Balance Sheets & Profit & Loss Accounts, are in language other than English, Certified translated copy in English Language should also be furnished Further in case certified copies of audited Balance sheets and Profit and loss Accounts are not available, Figures of Turnover/Sales value as mentioned in reports from D & B (Dun and Brad Street) or Credit reform may also be considered acceptable by BHEL. In such a case, bidder to furnish copy of Report from (Dun and Brad Street) or Credit reform, as the case may be Note : - Bidder must submit all supporting documents along with their offer. - All documents (including third party documents/supporting documents) in language other than English, certified translated copy in English language should also be furnished. - Offers will be scrutinised based on the qualifying requirements and only those who are technically and financially capable to execute the job and who fulfil the prequalifying requirements (PQR) are eligible to quote against above NIT. However, final acceptance of the bidder/offer shall be subject to acceptance of our customer.
-----	UPDATED TECHNICAL SPECIFICATION, REVISED BOQ & CLARIFICATION OF PRE-BID QUERIES: Enclosed herewith. Bidder to ensure to comply the same else offer is liable for rejection.

ALL OTHER TERMS AND CONDITIONS SHALL BE AS PER NIT

(Sign and seal of Bidder)

2/4
30/9/19



निविदा / Enquiry



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 400 KV ITARSI

Enquiry No	Enquiry Dt	Rev No	Rev Dt	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
61Q2000107	20-Aug-19	1	30-Sep-19	61I2000183	Package		11-Oct-19	BHEL NIT TERMS AND CONDITION ARE APPLICABLE	BHEL TECHNICAL SPECIFICATION IS APPLICABLE	RAJEEV KUMAR ROY

Document Enclosed

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - GAS BARRIERS	0	SET	10.0000		
2	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - SF6 TO AIR BUSHING	0	NO	2.0000		
3	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CURRENT TRANSFORMER - COMPLETE CT WITH ENCLOSURE	0	NO	2.0000		
4	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - SPRING CHARGING MOTOR	0	NO	2.0000		
5	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - LOCAL CONTROL CUBICLES (LCC)	0	NO	2.0000		
6	SUPPLY- GIS : MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS LEAKAGE DETECTOR	0	NO	1.0000		
7	SUPPLY- GIS : MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS ANALYZER	0	NO	1.0000		
8	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - UHF PD SENSORS WITH BNC CONNECTOR	0	SET	5.0000		
9	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - BUS SUPPORT INSULATOR	0	SET	10.0000		
10	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - LOCKING DEVICE TO KEEP DISCONNECTORS (ISOLATORS) AND EARTHING SWITCHES/ FAST EARTHING SWITCHES IN CLOSE OR OPEN POSITION IN CASE OF REMOVAL OF THE DRIVING MECHANISM	0	SET	2.0000		
11	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - BUS BAR SECTIONS INCLUDING BUS BAR INTERCONNECTION MODULES, BUS DUCTS SECTIONS, COMPENSATORS/ EXPANSION JOINTS/BELLOWS, BENDS, END COVERS ALONG WITH ENCLOSURE OF EACH TYPE. FOR EACH OF THE ABOVE MODULE/ENCLOSURE ALL ACTIVE PARTS SUCH AS CONDUCTOR, CONDUCTOR JOINTS, CORONA SHIELD ETC.	0	SET	1.0000		
12	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - SF6 GAS PRESSURE RELIEF DEVICE	0	SET	1.0000		

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SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
13	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - SF6 PRESSURE GAUGE CUM SWITCH / DENSITY MONITORS AND PRESSURE SWITCH AS APPLICABLE	0	SET	5.0000		
14	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - COUPLING DEVICE FOR PRESSURE GAUGE CUM SWITCH FOR CONNECTING GAS HANDLING PLANT	0	SET	2.0000		
15	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - RUBBER GASKETS, "O" RINGS AND SEALS FOR SF6 GAS FOR GIS ENCLOSURE	0	SET	5.0000		
16	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS	0	SET	1.0000		
17	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - CONTROL VALVES FOR SF6 GAS	0	SET	3.0000		
18	SUPPLY- GIS : 400KV, 40KA FOR 1S, 3150A, ONE & HALF CIRCUIT BREAKER SCHEME - SF6 TO AIR BUSHING	0	SET	9.0000		
19	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - CONTROLLED SWITCHING DEVICE FOR CIRCUIT BREAKER	0	SET	2.0000		
20	SUPPLY- GIS : MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS FILLING, EVACUATING, FILTERING, DRYING, PUMPING & STORAGE PLANT	0	SET	1.0000		
21	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - OPERATION COUNTER	0	SET	3.0000		
22	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - WINDSCOPE/ OBSERVING WINDOW	0	SET	2.0000		
23	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS- FOR SF6 TO AIR BUSHING	0	SET	9.0000		
24	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR LOCAL CONTROL CUBICLE - AUX. RELAYS, CONTACTOR, PUSH BUTTONS, SWITCHES, LAMPS, ANNUNCIATION WINDOWS, MCB, FUSES, TIMERS ETC.	0	SET	5.0000		
25	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DRIVE MECHANISM- FOR FAST EARTHING SWITCH	0	SET	2.0000		
26	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS- FOR SF6 TO AIR BUSHING	0	SET	9.0000		
27	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - PIPE LENGTH FOR SF6 CIRCUIT	0	SET	2.0000		
28	SUPPLY- GIS : 400KV, 40KA FOR 1S, 3150A, ONE & HALF CIRCUIT BREAKER SCHEME - TRANSFORMER GIS BAY	0	SET	1.0000		
29	SUPPLY- GIS : 400KV, 40KA FOR 1S, 3150A, ONE & HALF CIRCUIT BREAKER SCHEME - TIE GIS BAY	0	SET	1.0000		
30	SUPPLY- GIS : 400KV, 40KA FOR 1S, 4000A, ONE & HALF CIRCUIT BREAKER SCHEME - BUS BARS	0	SET	2.0000		
31	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - CIRCUIT BREAKER POLE WITHOUT PIR COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND MARSHALLING BOX WITH OPERATING MECHANISM	0	SET	2.0000		
32	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - FIXED, MOVING AND ARCING CONTACTS INCLUDING INSULATING NOZZLES	0	SET	1.0000		
33	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - CLOSING COIL ASSEMBLY WITH RESISTOR, AS APPLICABLE	0	SET	3.0000		
34	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER- RELAYS, POWER CONTACTORS, PUSH BUTTONS, TIMERS & MCBS ETC.	0	SET	1.0000		

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SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
35	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - AUXILIARY SWITCH ASSEMBLY	0	SET	3.0000		
36	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - HYDRAULIC OPERATING MECHANISM WITH DRIVE MOTOR	0	SET	3.0000		
37	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - FERRULES, JOINTS AND COUPLINGS	0	SET	3.0000		
38	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - HYDRAULIC FILTER	0	SET	3.0000		
39	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - HOSE PIPE	0	SET	3.0000		
40	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER- NITROGEN ACCUMULATOR	0	SET	3.0000		
41	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - VALVES	0	SET	3.0000		
42	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - PIPE LENGTH	0	SET	3.0000		
43	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - PRESSURE SWITCHES	0	SET	3.0000		
44	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - PRESSURE GAUGE WITH COUPLING DEVICE	0	SET	3.0000		
45	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - HYDRAULIC OIL	0	SET	1.0000		
46	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - PRESSURE RELIEF DEVICE	0	SET	3.0000		
47	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - SPRING OPERATING MECHANISM INCLUDING CHARGING MECHANISM ETC.	0	SET	3.0000		
48	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DISCONNECTOR INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR	0	SET	1.0000		
49	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MAINTENANCE EARTHING SWITCH, INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC.	0	SET	1.0000		
50	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - FAST EARTHING SWITCH, INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC.	0	SET	1.0000		
51	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - COPPER CONTACT FINGERS & CORONA SHIELD FOR MALE & FEMALE CONTACT – FOR DIS-CONNECTOR	0	SET	1.0000		
52	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - COPPER CONTACT FINGERS & CORONA SHIELD FOR MALE & FEMALE CONTACT – FOR MAINTENANCE EARTHING SWITCH	0	SET	1.0000		
53	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - COPPER CONTACT FINGERS & CORONA SHIELD FOR MALE & FEMALE CONTACT – FOR FAST EARTHING SWITCH	0	SET	1.0000		
54	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - 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 - FOR DIS-CONNECTOR	0	SET	2.0000		

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SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
55	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - 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 - FOR MAINTENANCE EARTHING SWITCH	0	SET	2.0000		
56	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - 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 - FOR FAST EARTHING SWITCH	0	SET	2.0000		
57	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - LIMIT SWITCHES AND AUXILIARY SWITCH - FOR DIS-CONNECTOR	0	SET	2.0000		
58	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - LIMIT SWITCHES AND AUXILIARY SWITCH - FOR MAINTENANCE EARTHING SWITCH	0	SET	2.0000		
59	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - LIMIT SWITCHES AND AUXILIARY SWITCH - FOR FAST EARTHING SWITCH	0	SET	2.0000		
60	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DRIVE MECHANISM- FOR DIS-CONNECTOR	0	SET	2.0000		
61	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DRIVE MECHANISM- FOR MAINTENANCE EARTHING SWITCH	0	SET	2.0000		
62	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM- FOR DIS-CONNECTOR	0	SET	3.0000		
63	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM- FOR MAINTENANCE EARTHING SWITCH	0	SET	3.0000		
64	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM- FOR FAST EARTHING SWITCH	0	SET	3.0000		
65	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS- FOR GAS INSULATED BUS DUCT	0	LOT	1.0000		
66	SERVICES- GIS : 400KV, INSULATION CO-ORDINATION STUDIES FOR GIS SYSTEM	0	LOT	1.0000		
67	SERVICES- GIS : 400KV, SITE VISIT FOR SUPERVISION OF UNLOADING & VERIFICATION OF MATERIALS FOR PROPER STORAGE & UP-KEEPING AT SITE	0	LOT	1.0000		
68	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS INCLUDING EARTHING	0	LOT	1.0000		
69	SERVICES- GIS : 400KV, FINAL SUCCESSFUL HV/ POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	0	LOT	1.0000		
70	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - STRUCTURE MATERIAL INCLUDING WALKWAY, PLATFORM, RAILING, FOUNDATION BOLTS, EMBEDDED ITEMS, RAILS AND/ OR OTHER MATERIALS ETC.	0	LOT	1.0000		
71	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - SF6 GAS REQUIRED FOR PLACING GIS INTO SUCCESSFUL OPERATION	0	LOT	1.0000		
72	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - EARTHING MATERIALS INCLUDING HIGH FREQUENCY EARTHING, IF APPLICABLE	0	LOT	1.0000		
73	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - CONSUMABLES FOR GIS	0	LOT	1.0000	21/7	30/9

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SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
74	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - SF6 GAS	0	LOT	1.0000		
75	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS- FOR GAS INSULATED BUS DUCT	0	LOT	1.0000		
76	SUPPLY- GIS : 400KV, 40KA FOR 1S, 3150A, ONE & HALF CIRCUIT BREAKER SCHEME - GAS INSULATED BUS DUCT	0	MTR	200.0000		
77	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF CSD COMPLETE IN ALL RESPECT	0	SET	2.0000		
78	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF CSD	0	SET	2.0000		
79	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - TRIP COIL ASSEMBLY WITH RESISTOR, AS APPLICABLE	0	SET	3.0000		
80	SUPPLY- GIS : 400KV, 40KA FOR 1S, ONE & HALF CIRCUIT BREAKER SCHEME - FAST EARTHING SWITCH	0	SET	1.0000		
81	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS	0	LOT	1.0000		
82	SERVICES- GIS : 400KV, FINAL DOCUMENTATION	0	LOT	1.0000		
83	SUPPLY- GIS : 400KV, SPECIAL CABLES OTHER THAN POWER & CONTROL CABLES REQUIRED FOR CSD FOR INTERFACING WITH CB AND RELAY PANEL	0	MTR	100.0000		

You are requested to submit your most competitive offer so as to reach us positively by the tender opening date & time. THE TENDERS NOT RECEIVED WITHIN SCHEDULED DATE AND TIME ARE LIKELY TO BE IGNORED. BHEL shall not be responsible for any postal delay.

In your own interest, you are advised to carefully read "the instructions to bidders". Incomplete bids and/or bids not complying with tender conditions shall be treated as non-responsive and are likely to be ignored.

In case Tender Documents are not received within 7 days of this E-mail message, intimate BHEL accordingly. If no intimation is received, it will be considered that you have received tender enquiry and delay in submission offer due to late receipt of tender documents will not be entertained.

You are requested to submit your most competitive offer as stated in Terms & conditions.

BHEL reserves the right to opt for reverse auction for obtaining best prices.

Offers Through E-MAIL / FAX / E-Procurement Portal:

WHOSOEVER DESIRES TO SEND OFFERS ON THEIR OWN RISK (COMPLETE IN ALL RESPECTS) VIA E-MAIL or FAX HAVE TO SEND THE OFFERS TO THE COMMON E-MAIL ADDRESS tenderbox@bhel.in or 0120-6748581 FAX or bhel.abc.procure.com as instructed.

THE RECEIVED EMAIL OFFERS WILL BE PRINTED BY PURCHASE COORDINATOR AND PUT THEM INTO COVERS AS PER CONVENTIONAL METHOD FOR TENDER OPENING I.E., TECHNO COMMERCIAL & PRICE OFFER SHALL BE PUT INTO TWO SEPARATE COVERS AND BOTH THE COVERS ARE KEPT IN THIRD COVER DULY SUPER SCRIBING ENQY. NO. AND DUE DATE.

OFFERS SENT TO ANY OTHER E-MAIL ID or FAX NO AND INCOMPLETE OFFERS SHALL NOT BE CONSIDERED FOR EVALUATION PURPOSE.

It is suggested that the bidders are advised to send the files with 'password protection'.

The vendors who has sent offers with password, the passwords are to be forwarded to another email id: tenderbox@bhel.in

Please acknowledge the receipt of tender enquiry and fax back this letter by ticking the appropriate item below.

भारत हेवी इलेक्ट्रिकल्स लिमिटेड के लिए / for BHARAT HEAVY ELECTRICALS LTD

We acknowledge the receipt of tender.

(a) The offer against subject enquiry shall be submitted by the scheduled date and time.

(5/6)

21-7
30/9

(b) We regret to quote. The item in reference is out of our manufacturing range.

(c) We regret because of our prior commitments.

(d) Any other reason.

To

A K Chowdhary

Sr Dy General Manager

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS GROUP

TOWER-A, 5th Floor,

Advant Navis IT Business Park,

Plot No-7, Sector-142, Expressway Noida

Noida-201305

Distt. Gautam BudhNagar, U.P

हस्ताक्षर और निविदाकार की सील / Signature and
Seal of Tenderer

Ph: 0120-6748129

Fax: 0120-6748581

Enquiry No : 61Q2000107

Enquiry Dt : 20-Aug-19

21/8/19
30/8/19

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(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

BHEL tender enquiry No:51Q2000107, DATED 20-08-2019

Project: POWERGRID SS19 - ITARSI PROJECT

S.N	Description of Item	Unit	QTY	REMARKS	HSN / SAC Code	Unit Ex-works /prices	Total Ex-Works/ prices	% of GST on Ex-works (vendor to mention % of GST applicable in respect of each line item)	GST on total Ex-works /prices	Unit Freight & Insurance	Total Freight & Insurance	% of GST on F&I (vendor to mention % of GST applicable in respect of each line item)	GST on Total Freight & Insurance	TOTAL (FOR Destination) PRICE (Rs.)
	INSTRUCTION TO BIDDER ->>>>							Note: Bidder to quote % of GST for supervision charges (Item no-12 to 67)			NOT APPLICABLE FOR SUPERVISION CHARGES			
1	2	3	4	5	6	7	8 = 7 X 4	9	10	11	12 = 11 X 4	13	14	15 (15=8+10+12+14)
A	400kV Gas Insulated Switchgear (Outdoor Type)- Main Quantity													
A 01	SUPPLY GIS 400KV 40KA FOR 1S 3*50A ONE & HALF CIRCUIT BREAKER SCHEME - TRANSFORMER GIS BAY	SET	1	Fully equipped Bay module for CT Bay										
A 02	SUPPLY GIS 400KV 40KA FOR 1S 3*50A ONE & HALF CIRCUIT BREAKER SCHEME - TIE GIS BAY	SET	1	Fully equipped Bay module for Tie Bay										
A 03	SUPPLY GIS 400KV 40KA FOR 1S 4000A ONE & HALF CIRCUIT BREAKER SCHEME - BUS BARS	SET	2	Single phase isolated SF6 gas-insulated metal enclosed Main Bus Bars (1 SLT = 3-Phase). GIS should be suitable for future extension. Ref: clause 5.43 (Section 2)										
A 04	SUPPLY GIS 400KV 40KA FOR 1S 3*50A ONE & HALF CIRCUIT BREAKER SCHEME - GAS INSULATED BUS DUCT	MTR	200	420kV, 3000A rating. Single phase. SF6 Gas Insulated Bus Duct (GIB) from Main bus-1, Main Bus-2 and CT bay to SF6 gas Bushing										
A 05	SUPPLY GIS 400KV 40KA FOR 1S 3*50A ONE & HALF CIRCUIT BREAKER SCHEME - SF6 TO AIR BUSHING	SET	9	Polymer type complete material except connectors										
A 06	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - STRUCTURE MATERIAL INCLUDING WALKWAY, PLATFORM, RAILING, FOUNDATION BOLTS, EMBEDDED ITEMS, RAILS AND/ OR OTHER MATERIALS ETC.	LOT	2	For GIS, GIB and SF6 to Air Bushing complete material respect										
A 07	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - LOCAL CONTROL CUBICLES (LCC)	NO	2	Including power control & instrumentation cable as applicable										
A 08	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - SF6 GAS REQUIRED FOR PLACING GIS INTO SUCCESSFUL OPERATION	LOT	1	Including gas wastage during installation, testing & commissioning										
A 09	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - EARTHING MATERIALS INCLUDING HIGH FREQUENCY EARTHING, IF APPLICABLE	LOT	1	Excluding 40mm VS ROD 75X12 & 50X6 GIP at										
A 10	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - CONSUMABLES FOR GIS	LOT	1	As per cl no. 14.13 of section 1 of Technical specification										
A 11	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - CONTROLLED SWITCHING DEVICE FOR CIRCUIT BREAKER	SET	2	Complete with all items										
A 12	SUPPLY GIS 400KV SPECIAL CABLES OTHER THAN POWER & CONTROL CABLES REQUIRED FOR GSP FOR INTERFACING WITH CB AND RELAY PANEL	MTR	100											
B	Mandatory Maintenance Equipment													
B 01	SUPPLY GIS MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS LEAKAGE DETECTOR	Nos	1	As per cl no. 27.1 of Section-2 of Technical specification										
B 02	SUPPLY GIS 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										
B 03	SUPPLY GIS MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS ANALYZER	Nos	1	As per cl no. 27.3 of Section-2 of Technical specification										
B 04	SUPPLY GIS MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS FILLING, EVACUATING, FILTERING, DRYING, PUMPING & STORAGE PLANT SPARE PARTS FOR FIVE YEAR SUCCESSFUL OF EQUIPMENT	SET	1	For equipment mentioned at s. no. B.02										
C	Mandatory Spares for GIS													
C.1	General (For 400kV Voltage Class)													

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

BHEL tender enquiry No:61Q2000107, DATED 20-08-2019

Project: POWERGRID SS19 - ITARSI PROJECT

S.N	Description of Item	Unit	QTY	REMARKS	HSN / SAC Code	Unit Ex-works /prices	Total Ex-Works/ prices	% of GST on Ex-works (vendor to mention % of GST applicable in respect of each line item)	GST on total Ex-works /prices	Unit Freight & Insurance	Total Freight & Insurance	% of GST on F&I (vendor to mention % of GST applicable in respect of each line item)	GST on Total Freight & Insurance	TOTAL (FOR Destination) PRICE (Rs.)
INSTRUCTION TO BIDDER - >>>>									NOT APPLICABLE FOR SUPERVISION CHARGES					
1	2	3	4	5	6	7	8 = 7 X 4	9	10	11	12 = 11 X 4	13	14	15 (15=8+10+12+14)
C.1	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. BUS BAR SECTIONS INCLUDING BUS BAR INTERCONNECTION MODULES, BUS DUCTS SECTIONS, COMPENSATORS/ EXPANSION JOINTS/BELLOWS, BENDS, END COVERS ALONG WITH ENCLOSURE OF EACH TYPE FOR EACH OF THE ABOVE MODULES/ENCLOSURE ALL ACTIVE PARTS SUCH AS CONDUCTOR, CONDUCTOR JOINTS, CORONA SHIELD ETC.	SF	1	1 SET= 1 number of each type and rating										
C.2	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. SF6 GAS PRESSURE RELIEF DEVICES	SET	1	1 SET= 1 number of each type and rating										
C.3	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. SF6 PRESSURE GAUGE CUM SWITCH / DENSITY MONITORS AND PRESSURE SWITCH AS APPLICABLE	SF	3	1 SET= SF6 Pressure gauge cum switch / Density monitors of each type										
C.4	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR GIS COUPLING DEVICES FOR PRESSURE GAUGE CUM SWITCH FOR CONNECTING GAS HANDLING PLANT	SF	2	1 SET= 1 number of each type and rating										
C.5	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR GIS RUBBER GASKETS, O-RINGS AND SEALS FOR SF6 GAS OR G.S. ENCLOSURE	SF	3	1 SET= Rubber Gaskets, O-Rings and Seals for SF6 gas for GIS enclosure of each type										
C.6	SPARES, GIS 400KV MANDATORY SPARES SUITABLE FOR G.S. MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS	SET	1	1 SET= 10% (in weight) of total molecular filter quantity.										
C.7	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. CONTROL VALVES FOR SF6 GAS	SET	1	1 SET= Control Valves for SF6 gas of each type										
C.8	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR GIS, SF6 GAS (20% OF TOTAL GAS QUANTITY) NON-RETURNABLE CYLINDERS	LOT	1	In addition with SF6 gas mentioned at S. no. A.08.										
C.9	SPARES, GIS 400KV MANDATORY SPARES SUITABLE FOR G.S. PIPE LENGTH FOR SF6 CIRCUIT	SF	4	1 SET = Pipe length (Copper or Steel as applicable) for SF6 Circuit of each type (if applicable)										
C.10	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. LOCKING DEVICES TO KEEP DISCONNECTORS, ISOLATORS AND EARTHING SWITCHES/FAST EARTHING SWITCHES IN CLOSED OR OPEN POSITION IN CASE OF REMOVAL OF THE DRIVING MECHANISM	SET	1	1 SET= 1 number of each type and rating										
C.11	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR GIS CURRENT SENSORS WITH BNC CONNECTOR	SET	2	1 SET= 1 number of each type and rating										
C.12	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR GIS BUS SUPPORT INSULATOR	SET	4	1 SET= 1 number of each type and rating										
C.13	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. GAS BARRIERS	SET	4	1 SET= 1 number of each type and rating										
C.14	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. SF6 TO AIR BUSHING	NO	1	of each type and rating. Complete in all respect										
C.2 400KV SF6 CIRCUIT BREAKER:														
C.2.1	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. CIRCUIT BREAKER CIRCUIT BREAKER POLE WITH CHAMBER COMPLETE WITH INTERRUPTER MAIN CIRCUIT, ENCLOSURE AND MANIPULATING BOX WITH OPERATING MECHANISM	SF	1	1 SET= complete material to enable replacement of all applicable type/rating of CB by spare										
C.2.2	SPARES, GIS 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER FIXED MOVING AND ARCING CONTACTS INCLUDING INSULATING NOZZLES	SET	1	1 SET= 1 number of each type and rating (for Main Chamber)										
C.2.3	SPARES, G.S. 400KV MANDATORY SPARES SUITABLE FOR G.S. CIRCUIT BREAKER TRIP COIL ASSEMBLY WITH RESISTOR AS APPLICABLE	SET	3	1 SET= 1 number of each type and rating										
C.2.4	SPARES, GIS 400KV MANDATORY SPARES SUITABLE FOR G.S. CIRCUIT BREAKER COILSING COIL ASSEMBLY WITH RESISTOR AS APPLICABLE	SET	3	1 SET= 1 number of each type and rating										

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

BHEL tender enquiry No:61Q2000107, DATED 20-08-2019

Project: POWERGRID SS19 - ITARSI PROJECT

S.N	Description of Item	Unit	QTY	REMARKS	HSN / SAC Code	Unit Ex-works /prices	Total Ex-Works/ prices	% of GST on Ex-works (vendor to mention % of GST applicable in respect of each line item)	GST on total Ex-works /prices	Unit Freight & Insurance	Total Freight & Insurance	% of GST on F&I (vendor to mention % of GST applicable in respect of each line item)	GST on Total Freight & Insurance	TOTAL (FOR Destination) PRICE (Rs.)
INSTRUCTION TO BIDDER ->>>>									Note: Bidder to quote % of GST for supervision charges (Item no-72 to 83)	NOT APPLICABLE FOR SUPERVISION CHARGES				
1	2	3	4	5	6	7	8 = 7 X 4	9	10	11	12 = 11 X 4	13	14	15 (15=8+10+12+14)
C.2.5	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: RELEAYS POWER CONTACTORS PUSH BUTTONS, THERMISTERS & MCCBS ETC	SET	1	1 SET= 1 number of each type and rating										
C.2.6	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: AUXILIARY SWITCH-ASSEMBLY	SET	3	1 SET= 1 number of each type and rating										
C.2.7	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: OPERATION COUNTER	SET	3	1 SET= 1 number of each type and rating										
C.2.8	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: WINDSCOPE/OBSERVING WINDOW For Hydraulic Operating Mechanism if applicable	SET	2	1 SET= 1 number of each type and rating (if applicable)										
C.2.9	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: HYDRAULIC OPERATING MECHANISM WITH DRIVE MOTOR	SET	3	1 SET= 1 number of each type and rating										
C.2.10	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: FERRULES, JOINTS AND COUPLINGS	SET	3	1 SET= 1 number of each type and rating										
C.2.11	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: HYDRAULIC FILTER	SET	3	1 SET= 1 number of each type and rating										
C.2.12	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: HOSE, PORT	SET	3	1 SET= 1 number of each type and rating										
C.2.13	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: NITROGEN ADJUSTOR	SET	2	1 SET= 1 number of each type and rating										
C.2.14	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: VALVES	SET	3	1 SET= 1 number of each type and rating										
C.2.15	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: PIPE, LENGTH	SET	3	1 SET= Pipe length (copper & steel) of each size & type, if applicable										
C.2.16	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: PRESSURE SWITCHES	SET	3	1 SET= 1 number of each type and rating										
C.2.17	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: PRESSURE GAUGE WITH COUPLING DEVICE	SET	3	1 SET= 1 number of each type and rating										
C.2.18	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: HYDRAULIC OIL	SET	2	1 SET= 20% of total Oil quantity										
C.2.19	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: PRESSURE RELIEF DEVICE For Spring Operated Mechanism if applicable	SET	3	1 SET= 1 number of each type and rating										
C.2.20	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: SPRING OPERATING MECHANISM INCLUDING CHARGING MECHANISM ETC	SET	3	1 SET= 1 number of each type and rating										
C.2.21	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER: SPRING CHARGING MOTOR	NO	2	1 SET= 1 number of each type and rating										
C.3 400kV ISOLATORS :														
C.3.1	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DISCONNECTOR INCLUDING MAIN CIRCUIT ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR	SET	2	Complete SET of 3-phase dis-connector of each type including main circuit, enclosure, driving mechanism and support insulator etc. to enable complete replacement of all applicable type/rating of Isolator by spare										
C.3.2	SPARES: GIS: 400KV MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MAINTENANCE EARTHING SWITCH INCLUDING MAIN CIRCUIT ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC	SET	2	Complete SET of 3-phase Maintenance Earthing switch of each type, including main circuit, enclosure, driving mechanism and support insulator etc. to enable complete replacement of all applicable type/rating of Earth										

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

BHEL tender enquiry No:61Q2000107, DATED 20-08-2019

Project: POWERGRID SS19 - ITARSI PROJECT

S.N	Description of Item	Unit	QTY	REMARKS	HSN / SAC Code	Unit Ex-works /prices	Total Ex-Works/ prices	% of GST on Ex-works (vendor to mention % of GST applicable in respect of each line item)	GST on total Ex-works /prices	Unit Freight & Insurance	Total Freight & Insurance	% of GST on F&I (vendor to mention % of GST applicable in respect of each line item)	GST on Total Freight & Insurance	TOTAL (FOR Destination) PRICE (Rs.)
	INSTRUCTION TO BIDDER ->>>>							Note: Bidder to quote % of GST for supervision charges (Item no-72 to 84)				NOT APPLICABLE FOR SUPERVISION CHARGES		
1	2	3	4	5	6	7	8 = 7 X 4	9	10	11	12 = 11 X 4	13	14	15 (15=8+10+12+14)
C.3.3	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - COPPER CONTACT FINGERS & CORONA SHIELD FOR MALE & FEMALE CONTACT - FOR DIS CONNECTOR	SET	1	for one complete (3-phase) dis-connector of each type and rating										
C.3.4	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR DIS DISCONNECTOR - COPPER CONTACT FINGERS & CORONA SHIELD FOR MALE & FEMALE CONTACT - FOR MAINTENANCE EARTHING SWITCH	SET	1	for one complete (3- phase) earthing switch of each type and rating										
C.3.5	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - OPEN / CLOSE CONTACTOR ASSEMBLY, TITERS KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTORS, FUSES, PCBs & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX - FOR DIS-CONNECTOR	SF	1	for one complete MOM box (3 – phase gang operated or 1 – phase unit)- For isolator										
C.3.6	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - OPEN / CLOSE CONTACTOR ASSEMBLY, TITERS KEY, INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTORS, FUSES, PCBs & DRIVE CONTROL CARDS ETC FOR ONE COMPLE. ETC MOM BOX - FOR MAINTENANCE EARTHING SWITCH	SET	1	for one complete MOM box (3 – phase gang operated or 1 – phase unit)- For Maintenance Earth switch										
C.3.7	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - LIMIT SWITCHES AND AUXILIARY SWITCH - FOR DIS-CONNECTOR	SET	1	for complete 3 phase equipment										
C.3.8	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - LIMIT SWITCHES AND AUXILIARY SWITCH - FOR MAINTENANCE EARTHING SWITCH	SF	1	for complete 3 phase equipment (if applicable)										
C.3.9	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DRIVE MECHANISM- FOR DIS CONNECTOR	SET	1	1 SET= 1 number of each type and rating										
C.3.10	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DRIVE MECHANISM- FOR MAINTENANCE EARTHING SWITCH	SF	1	1 SET= 1 number of each type and rating										
C.3.11	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM - FOR DIS-CONNECTOR	SET	1	1 SET= 1 number of each type and rating										
C.3.12	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM- FOR MAINTENANCE EARTHING SWITCH	SF	1	1 SET= 1 number of each type and rating										
C.4	400KV CURRENT TRANSFORMER													
C.4.1	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR GIS CURRENT TRANSFORMER - COMPLETE CT WITH ENCLOSURE	NO	1	Complete CT of a pole with enclosure to enable replacement of all applicable type/rating of CT by spare										
C.5	LOCAL CONTROL CUBICLE													
C.5.1	SPARES-GIS 400KV, MANDATORY SPARES SUITABLE FOR LOCAL CONTROL CUBICLE - AUX RELAYS, CONTACTOR, PUSH BUTTONS, SWITCHES, LAMPS, ANNUNCIATOR, WINDOWS, MCB, FUSES, TITERS ETC	SET	2	1 SET= 1 number of each type and rating										
E	SPARES- UNIT PRICES OF INDIVIDUAL ITEM/EQUIPMENT			(Unit Prices of individual Equipment included here or in mandatory 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)										
E.1	SPARES-GIS 400KV, 40KA FOR 1'S 3150A, CIRCUIT BREAKER ONE COMPLETE POLE WITH-OUT P.R. ENCLOSURE AND OPERATING MECHANISM	SF	1											

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BHEL tender enquiry No:61Q2000107, DATED 20-08-2019

Project: POWERGRID SS19 - ITARSI PROJECT

S.N	Description of Item	Unit	QTY	REMARKS	HSN / SAC Code	Unit Ex-works /prices	Total Ex-Works/ prices	% of GST on Ex-works (vendor to mention % of GST applicable in respect of each line item)	GST on total Ex-works /prices	Unit Freight & Insurance	Total Freight & Insurance	% of GST on F&I (vendor to mention % of GST applicable in respect of each line item)	GST on Total Freight & Insurance	TOTAL (FOR Destination) PRICE (Rs.)
	INSTRUCTION TO BIDDER - >>>>							Note: Bidder to quote % of GST for supervision charges (item no-72 to 82)		NOT APPLICABLE FOR SUPERVISION CHARGES				
1	2	3	4	5	6	7	8 = 7 X 4	9	10	11	12 = 11 X 4	13	14	15 (15=8+10+12+14)
E.2	SPARE'S GIS 400KV 40KA FOR 1S, 3*55A DISCONNECTOR INCLUDING MAIN CIRCUIT ENCLOSURE SUPPORT INSULATOR AND WITH-OUT DRIVING MECHANISM	SF												
E.3	SPARE'S GIS 400KV MAINTENANCE LARHING SWITCH INCLUDING MAIN CIRCUIT ENCLOSURE SUPPORT INSULATOR AND WITH-OUT DRIVING MECHANISM	SF												
E.4	SPARE'S GIS 400KV 40KA FOR 1S, 3*55A SAG, F-PHASE BUS BAR	MTR												
E.5	SPARE'S GIS 400KV GIS METALLIC ENCLOSURE	MTR												
E.6	SPARE'S GIS 400KV EXPANSION JOINTS FOR BELLOW'S	SF		For Single Phase										
D SERVICES														
D.1	SERVICES GIS 400KV INSULATION CO-ORDINATION STUDIES FOR G.S SYSTEM	LOT		including VFTO report										
D.2	SERVICES GIS 400KV SITE VISIT FOR SUPERVISION OF UNLOADING & VERIFICATION OF MATERIALS FOR PROPER STORAGE & UNLOADING AT SITE	LOT												
D.3	SERVICES GIS 400KV SUPERVISION OF ERECTION OF GIS INCLUDING EARTHING	LOT												
D.4	SERVICES GIS 400KV SUPERVISION OF ERECTION OF GIS FOR GAS INSULATED BUS DUCT	LOT												
D.5	SERVICES GIS 400KV SUPERVISION OF ERECTION OF GIS FOR SF6 AIR BUS-ING	SF	9											
D.6	SERVICES GIS 400KV SUPERVISION OF ERECTION OF GSD COMPLETE V.A.L. RESPECT	SF	2											
D.7	SERVICES GIS 400KV TESTING & COMMISSIONING OF GIS	LOT												
D.8	SERVICES GIS 400KV TESTING & COMMISSIONING OF GIS FOR GAS INSULATED BUS DUCT	LOT												
D.9	SERVICES GIS 400KV TESTING & COMMISSIONING OF GIS FOR SF6 AIR BUS-ING	SF	6											
D.10	SERVICES GIS 400KV TESTING & COMMISSIONING OF GSD	SF	2											
D.11	SERVICES GIS 400KV FINAL SUCCESSFUL HV POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	LOT												
D.12	SERVICES GIS 400KV FINAL DOCUMENTATION	LOT												
F SERVICES														
F.1	G.S SERVICES GIS 400KV RE-UNLAPPING OF GIS INDIVIDUAL ITEM/EQUIPMENT - SERVICES FOR SUPERVISION OF ERECTION OF GIS	MANDAY		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.										

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

BHEL tender enquiry No:61Q2000107, DATED 20-08-2019

Project: PDWGRID SS19 - ITARSI PROJECT

S.N	Description of Item	Unit	QTY	REMARKS	HSN / SAC Code	Unit Ex-works /prices	Total Ex-Works/ prices	% of GST on Ex-works (vendor to mention % of GST applicable in respect of each line item)	GST on total Ex-works /prices	Unit Freight & Insurance	Total Freight & Insurance	% of GST on F&I (vendor to mention % of GST applicable in respect of each line item)	GST on Total Freight & Insurance	TOTAL (FOR Destination) PRICE (Rs.)
INSTRUCTION TO BIDDER - >>>>								Note: Bidder to quote % of GST for supervision charges (Item no-72 to 85)	NOT APPLICABLE FOR SUPERVISION CHARGES					
1	2	3	4	5	6	7	8 = 7 X 4	9	10	11	12 = 11 X 4	13	14	15 (15=8+10+12+14)
F-2	G/S SERVICES: GIS - 400KV, REF. UNIT PRICE OF G/S AND VIOUAL TIME FOR "PVENT" SERVICES FOR TESTING & COMMISSIONING OF G/S	MANDAY	1											
F-3	SERVICES: GIS - 400KV, REF. UNIT PRICE OF G/S AND VIOUAL TIME FOR EQUIPMENT LIFTING CHARGES OF HV TEST KIT WITH OPERATOR	LOT	1											
F-4	SERVICES: GIS - 400KV, TRAINING FOR G/S AT SITE	DAY	1											
A	Total cost (in figures),													
B	Total cost (in words)													
C	Input credit available to BHEL on account of GST (on Ex-works, F & I)													
D=A-C	Total cost to BHEL (after input credit of GST) = Total cost less GST on Ex-works less GST on F&I													

NOTE:

1. Bidder has to mention "quoted" (in each applicable cell) in unpriced bid. In case that cell is Not Applicable, "NA" must be mentioned in that particular cell. Prices shall be mentioned in Price bid schedule only.
2. Bidder strictly to quote as per BHEL format only. Other format of price bid will be liable for rejection.
3. Bidder to quote strictly as per BoQ. Rates/prices shall not be combined. In case, the charges/prices are combined, BHEL reserves the right to reject the offer. Decision of BHEL shall be final.
4. It is certified that, We (M/s _____) have quoted as per the specified price format of the tender, otherwise our offer shall be liable for rejection.

NAME AND SEAL OF TENDERER

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

BHEL tender enquiry No:61Q2000107, DATED 20-08-2019

Project: POWERGRID SS19 -ITARSI PROJECT

S.N	Description of Item	Unit	QTY	REMARKS	HSN / SAC Code	Currency	Unit-CIF [Indian Sea port]	Total-CIF [Indian Sea port]
INSTRUCTION TO BIDDER ->>>>								
1	2	3	4	5	6	7	8	9
A	400kV Gas Insulated Switchgear (Outdoor Type)- Main Quantity							
A01	SUPPLY GIS 400KV 40KA FOR 1S 3150A ONE & HALF CIRCUIT BREAKER SCHEME - TRANSFORMER GIS BAY	SET	1	Fully equipped Bay module for ICT Bay				
A02	SUPPLY GIS 400KV 40KA FOR 1S 3150A ONE & HALF CIRCUIT BREAKER SCHEME - TIE GIS BAY	SET	1	Fully equipped Bay module for Tie Bay				
A03	SUPPLY GIS 400KV 40KA FOR 1S 4000A ONE & HALF CIRCUIT BREAKER SCHEME - BUS BARS	SET	2	Single phase isolated, SF6 gas insulated metal enclosed Main Bus bars for SF6 3 Phase. GIS should be suitable for future extension. Ref: clause 5.43 (Section-2)				
A04	SUPPLY GIS 400KV 40KA FOR 1S 3150A ONE & HALF CIRCUIT BREAKER SCHEME - GAS INSULATED BUS DUCT	MTR	230	420KV, 3000A rating , Single phase, SF6 Gas Insulated Bus Duct (GIB) from Main bus-1, Main Bus-2 and ICT bay to SF6 gas Bushing				
A05	SUPPLY GIS 400KV 40KA FOR 1S 3150A ONE & HALF CIRCUIT BREAKER SCHEME - SF6 TO AIR BUSHING	SET	9	Paymer Type complete in all respect except connectors				
A06	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - STRUCTURE MATERIAL INCLUDING WALKWAY, PLATFORM, RAILING, FOUNDATION BOLTS, EMBEDDED ITEMS, RAILS AND/ OR OTHER MATERIALS ETC.	LOT	1	For GIS GIB and SF6 to Air Bushing complete in all respect				
A07	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - LOCAL CONTROL CUBICLES (LCC)	NO	2	including power, control & instrumentation cable as applicable				
A08	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - SF6 GAS REQUIRED FOR PLACING GIS INTO SUCCESSFUL OPERATION	LOT	1	including gas wastage during installation, testing & commissioning				
A09	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - EARTHING MATERIALS INCLUDING HIGH FREQUENCY EARTHING, IF APPLICABLE	LOT	1	including 40mm MS ROD, 75X12 & 50X6 GI flat				
A10	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - CONSUMABLES FOR GIS	LOT	1	As per clause 14.13 of section 1 of Technical specification				
A11	SUPPLY GIS ONE & HALF CIRCUIT BREAKER SCHEME - CONTROLLED SWITCHING DEVICE FOR CIRCUIT BREAKER	SET	2	Complete with all items				
A12	SUPPLY GIS 400KV SPECIAL CABLES OTHER THAN POWER & CONTROL CABLES REQUIRED FOR CSU FOR INTERACING WITH CB AND RELAY PANEL	MTR	100					
B	Mandatory Maintenance Equipment							
B01	SUPPLY GIS MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS LEAKAGE DETECTOR	Nos	1	As per clause 27.1 of Section 2 of Technical specification				
B02	SUPPLY GIS MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS FILLING, EVACUATING, FILTERING, DRYING, PUMPING & STORAGE PLANT	SET	1	As per clause 27.2 of Section 2 of Technical specification				
B03	SUPPLY GIS MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS ANALYZER	Nos	1	As per clause 27.3 of Section 2 of Technical specification				
B04	SUPPLY GIS MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS FILLING, EVACUATING, FILTERING, DRYING, PUMPING & STORAGE PLANT SPARES FOR FIVE YEAR SUCCESSFUL OPERATION	SET	1	For equipment mentioned at S no. B 02				
C	Mandatory Spares for GIS							
C.1	General (For 400kV Voltage Class)							
C.1.1	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - BUS BAR SECTIONS INCLUDING BUS BAR INTERCONNECT ON MODULES, BUS DUCTS, SLIDING COMPENSATORS/EXPANSION JOINTS, BELLWIS, BENDS AND COVERS ALONG WITH ENCLOSURE OF EACH TYPE FOR EACH OF THE ABOVE MODULES INCLUDING ALL ACTIVE PARTS SUCH AS CONDUCTOR, CONDUCTOR JOINTS, CORONA SHEATH ETC.	SET	1	1 SET= 1 number of each type and rating				
C.1.2	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - SF6 GAS PRESSURE RELIEF DEVICE	SET	1	1 SET= 1 number of each type and rating				
C.1.3	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - SF6 GAS PRESSURE GAUGE, CUM SWITCH / DENSITY MONITORS AND PRESSURE SWITCH AS APP. CABLE	SET	3	1 SET= SF6 Pressure gauge cum switch / Density monitors of each type				
C.1.4	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - COMPENSATING DEVICE FOR PRESSURE GAUGE CUM SWITCH OR COMPENSATING GAS HANDLING PLANT	SET	2	1 SET= 1 number of each type and rating				
C.1.5	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - RUBBER GASKETS, O-RINGS AND SEALS FOR SF6 GAS FOR GIS ENCLOSURE	SET	3	1 SET= Rubber Gaskets, O-Rings and Seals for SF6 gas for GIS enclosure of each type				
C.1.6	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - MOLLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS	SET	1	1 SET= 10% (in weight) of total molecular filter quantity.				
C.1.7	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - CONTROL VALVES FOR SF6 GAS	SET	1	1 SET= Control Valves for SF6 gas of each type				
C.1.8	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - SF6 GAS (25% OF TOTAL GAS QUANTITY) IN NON RETURNABLE CYLINDERS	LOT	1	In addition with SF6 gas mentioned at S no. A 08				
C.1.9	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - PIPE LINGHT OR SF6 CIRCUIT	SET	1	1 SET= Pipe length (Copper or Steel as applicable) for SF6 Circuit of each type (if applicable)				
C.1.10	SPARE S-GIS 400KV MANDATORY SPARE SUITABLE FOR GIS - LOCKING DEVICE TO PREVENT DISCONNECTORS (ISOLATORS) AND EARTHING SWITCHES AS EARTHING SWITCHES IN CLOSED OR OPEN POSITION, IN CASE OF REMOVAL OF THE DRIVING MECHANISM	SET	1	1 SET= 1 number of each type and rating				

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

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C.1.11	Spare S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS LINE PD SENSORS WITH BNC CONNECTOR	SET	2	1 SET= 1 number of each type and rating		
C.1.12	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS BUS SUPPORT INSULATOR	SET	4	1 SET= 1 number of each type and rating		
C.1.13	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS GAS BARRIERS	SET	4	1 SET= 1 number of each type and rating		
C.1.14	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS SF6 TO AIR BUSHING	NO	1	of each type and rating. Complete in all respect		
C.2 400kV SF6 CIRCUIT BREAKER:						
C.2.1	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER CIRCUIT BREAKER POLE WITHOUT PIR COMPLETE WITH INTERRUPTER, MAIN CIRCUIT ENCLOSURE AND MARKING BOX WITH OPERATING MECHANISM	SET	4	1 SET= complete material to enable replacement of all applicable type/rating of CB by spare		
C.2.2	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER EXCITING MOVING AND ARKING CONTACTS INCLUDING INSULATING NOZZLES	SET	4	1 SET= 1 number of each type and rating (for Main Chamber)		
C.2.3	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER TRIP COIL ASSEMBLY WITH RESISTOR AS APPL. CABLE	SET	3	1 SET= 1 number of each type and rating		
C.2.4	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER CLOSING COIL ASSEMBLY WITH RESISTOR AS APPL. CABLE	SET	3	1 SET= 1 number of each type and rating		
C.2.5	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER RELAYS POWER CONTACTORS PUSH BUTTONS, TIMERS & MOBS ETC	SET	4	1 SET= 1 number of each type and rating		
C.2.6	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER AUXILIARY SWITCH ASSEMBLY	SET	3	1 SET= 1 number of each type and rating		
C.2.7	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER OPERATION COUNTER	SET	3	1 SET= 1 number of each type and rating		
C.2.8	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER WINDOW SCOPES OBSERVING WINDOW For Hydraulic Operated Mechanism, if applicable	SET	2	1 SET= 1 number of each type and rating (if applicable)		
C.2.9	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER HYDRAULIC OPERATING MECHANISM WITH DRIVE MOTOR	SET	3	1 SET= 1 number of each type and rating		
C.2.10	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER FITTINGS JOINTS AND COUPLINGS	SET	3	1 SET= 1 number of each type and rating		
C.2.11	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER HYDRAULIC FILTER	SET	3	1 SET= 1 number of each type and rating		
C.2.12	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER HOSE PIPE	SET	3	1 SET= 1 number of each type and rating		
C.2.13	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER NITROGEN ACCUMULATOR	SET	3	1 SET= 1 number of each type and rating		
C.2.14	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER VALVES	SET	3	1 SET= 1 number of each type and rating		
C.2.15	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER PIPE FITTING	SET	3	1 SET= Pipe length (copper & steel) of each size & type, if applicable		
C.2.16	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER PRESSURE SWITCHES	SET	3	1 SET= 1 number of each type and rating		
C.2.17	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER PRESSURE GAUGE WITH COUPLING DEVICE	SET	3	1 SET= 1 number of each type and rating		
C.2.18	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER HYDRAULIC OIL	SET	4	1 SET= 20% of total Oil quantity		
C.2.19	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER PRESSURE RELIEF DEVICE For Spring Operated Mechanism, if applicable	SET	3	1 SET= 1 number of each type and rating		
C.2.20	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER SPRING OPERATING MECHANISM INCLUDING CHARGING MECHANISM ETC	SET	3	1 SET= 1 number of each type and rating		
C.2.21	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER SPRING CHARGING MOTOR	NO	2	1 SET= 1 number of each type and rating		
C.3 400kV ISOLATORS :						
C.3.1	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR DISCONNECTOR INCLUDING MAIN CIRCUIT ENCLOSURE DRIVING MECHANISM AND SUPPORT INSULATOR	SET	4	Complete SET of 3 phase disconnector of each type including main circuit, enclosure, driving mechanism and support Insulator etc. to enable complete replacement of all applicable type/rating of Isolator by spare		
C.3.2	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR MAINTENANCE EARTHING SWITCH INCLUDING MAIN CIRCUIT ENCLOSURE DRIVING MECHANISM AND SUPPORT INSULATOR ETC	SET	4	Complete SET of 3 phase Maintenance Earthing switch of each type, including main circuit, enclosure, driving mechanism and support Insulator etc. to enable complete replacement of all applicable type/rating of Earth Switch by spare		
C.3.3	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR COMPLETE CONTACT FINGERS & CONTACT SHEET FOR VOLT & EARTH CONTACT FOR DISCONNECTOR	SET	4	for one complete (3 phase) disconnector of each type and rating		
C.3.4	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR COMPLETE CONTACT FINGERS & CONTACT SHEET FOR VOLT & EARTH CONTACT FOR MAINTENANCE EARTHING SWITCH	SET	4	for one complete (3 phase) earthing switch of each type and rating		
C.3.5	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR COMPLETE CONTACTOR ASSEMBLY, TIMERS KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSHBUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTORS, FUSES, MOBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX FOR DISCONNECTOR	SET	4	for one complete MOM box (3 phase gang operated or 1 phase unit) For Isolator		
C.3.6	SPARE S.G.S. 400kV MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR COMPLETE CONTACTOR ASSEMBLY, TIMERS KEY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSHBUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTORS, FUSES, MOBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM	SET	4	for one complete MOM box (3 phase gang operated or 1 phase unit) For Maintenance Earth switch		

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

BHEL tender enquiry No.61Q2000107, DATED 20-08-2019

Project: POWERGRID SS19 - ITARSI PROJECT

C.3.7	SPARE S: GIS: 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - LIMIT SWITCHES AND AUXILIARY SWITCH - FOR DIS CONNECTOR	SFT	1	for complete 3 phase equipment				
C.3.8	SPARE S: GIS: 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - LIMIT SWITCHES AND AUXILIARY SWITCH - FOR MAINTENANCE EARTHING SWITCH	SET	1	for complete 3 phase equipment (if applicable)				
C.3.9	SPARE S: GIS: 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DRIVE MECHANISM - FOR DIS-CONNECTOR	SFT	1	1 SET= 1 number of each type and rating				
C.3.10	SPARE S: GIS: 400KV, MANDATORY SPARE S SUITABLE FOR GIS DISCONNECTOR - DRIVE MECHANISM - FOR MAINTENANCE EARTHING SWITCH	SFT	1	1 SET= 1 number of each type and rating				
C.3.11	SPARE S: GIS: 400KV, MANDATORY SPARE S SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM - FOR DIS CONNECTOR	SET	1	1 SET= 1 number of each type and rating				
C.3.12	SPARE S: GIS: 400KV, MANDATORY SPARE S SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM - FOR MAINTENANCE EARTHING SWITCH	SET	1	1 SET= 1 number of each type and rating				
C.4 400KV CURRENT TRANSFORMER								
C.4.1	SPARE S: GIS: 400KV, MANDATORY SPARE S SUITABLE FOR GIS CURRENT TRANSFORMER - COMPLETE CT WITH ENCLOSURE	NO	1	Complete CT of one pole with enclosure to enable replacement of all applicable type/rating of CT by spare				
C.5 LOCAL CONTROL CUBICLE								
C.5.1	SPARE S: GIS: 400KV, MANDATORY SPARE S SUITABLE FOR LOCAL CONTROL CUBICLE - AUX. RELAYS, CONTACTOR, PUSH BUTTONS, SWITCHES, LAMPS, ANNUNCIATION WINDOWS, MCB, FUSES, TIMERS ETC.	SFT	2	1 SET= 1 number of each type and rating				
E SPARE S- UNIT PRICES OF INDIVIDUAL ITEM/EQUIPMENT				(Unit Prices of Individual Equipment included here or in mandatory 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)				
E.1	SPARE S: GIS: 400KV, 40KA FOR 1S, 3150A, CIRCUIT BREAKER ONE COMPLETE POLE WITH-OUT PROTECTIVE ENCLOSURE AND OPERATING MECHANISM	SET	1					
E.2	SPARE S: GIS: 400KV, 40KA FOR 1S, 3150A, DISCONNECTOR INCLUDING MAIN CIRCUIT ENCLOSURE, SUPPORT INSULATOR AND WITHOUT DRIVING MECHANISM	SET	1					
E.3	SPARE S: GIS: 400KV, MAINTENANCE EARTHING SWITCH INCLUDING MAIN CIRCUIT ENCLOSURE, SUPPORT INSULATOR AND WITHOUT DRIVING MECHANISM	SET	1					
E.4	SPARE S: GIS: 400KV, 40KA FOR 1S, 3150A, SINGLE PHASE BUS BAR	MTR	1					
E.5	SPARE S: GIS: 400KV, GSE METALLIC ENCLOSURE	MTR	1					
E.6	SPARE S: GIS: 400KV, EXPANSION JOINTS FOR BELLOWS	SFT	1	For Single Phase				
					TOTAL COST FOR SUPPLY PORTION =			
D SERVICES								
D.1	SERVICES: GIS: 400KV, INSULATION CO-ORDINATION STUDIES FOR GIS SYSTEM	LOT	1					
D.2	SERVICES: GIS: 400KV, SITE VISIT FOR SUPERVISION OF UNLOADING & VERIFICATION OF MATERIALS FOR PROPER STORAGE & KEEPING AT SITE	LOT	1					
D.3	SERVICES: GIS: 400KV, SUPERVISION OF ERECTION OF GIS INCLUDING EARTHING	LOT	1					
D.4	SERVICES: GIS: 400KV, SUPERVISION OF ERECTION OF GIS FOR GAS INSULATED BUS DUCT	LOT	1					
D.5	SERVICES: GIS: 400KV, SUPERVISION OF ERECTION OF GIS FOR SF6 TO AR BUSHING	SET	9					
D.6	SERVICES: GIS: 400KV, SUPERVISION OF ERECTION OF CSD COMPLETE INSTALLATION	SET	2					
D.7	SERVICES: GIS: 400KV, TESTING & COMMISSIONING OF GIS	LOT	1					
D.8	SERVICES: GIS: 400KV, TESTING & COMMISSIONING OF GIS FOR GAS INSULATED BUS DUCT	LOT	1					
D.9	SERVICES: GIS: 400KV, TESTING & COMMISSIONING OF GIS FOR SF6 TO AR BUSHING	SET	9					
D.10	SERVICES: GIS: 400KV, TESTING & COMMISSIONING OF CSD	SET	2					
D.11	SERVICES: GIS: 400KV, FINAL SUCCESSFUL HV POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	LOT	1					
D.12	SERVICES: GIS: 400KV, FINAL DOCUMENTATION	LOT	1					
F 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)				
F.1	GIS SERVICES: GIS: 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/EQUIPMENT - SERVICES FOR SUPERVISION OF ERECTION OF GIS	MANDAY	1					
F.2	GIS SERVICES: GIS: 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/EQUIPMENT - SERVICES FOR TESTING & COMMISSIONING OF GIS	MANDAY	1					

UN-PRICED BID SCHEDULE (for Foreign vendors only)

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

BHEL tender enquiry No:61Q2000107, DATED 20-08-2019

Project: POWERGRID SS19 -ITARI PROJECT

3	SERVICES: G.S. 400kV REF. UNIT PRICE OF G.S. INDIVIDUAL ITEM/ EQUIPMENT: HIRING CHARGES OF HV TEST KIT WITH OPERATOR	LOF							
4	SERVICES: G.S. 400kV TRAINING FOR G.S. AT SITE	DAY							
									TOTAL COST FOR SERVICE PORTION =
									TOTAL COST FOR (SUPPLY + SERVICE) PORTION =

NOTE:

1. Discharge Port: MUMBAI PORT
2. TOTAL (supply+ Service) is excluding Custom duty, handling charges at discharge port, inland F&I charges, taxes applicable in India and other loading charges .
3. Nos of package with DIMENSIONS AND TYPES OF CARGO (Break Bulk/LCL/FCL) and no. of container (with type of container) required-Is also to be mentioned by bidder.
4. Bidder has to mention "quoted" (in each applicable cell) in unpriced bid. In case that cell is Not Applicable, "NA" must be mentioned in that particular cell. Prices shall be mentioned in Price bid schedule only.
5. Bidder strictly to quote as per BHEL format only. Other format of price bid will be liable for rejection.
6. Bidder to quote strictly as per BoQ. Rates/prices shall not be combined. In case, the charges/prices are combined. BHEL reserves the right to reject the offer. Decision of BHEL shall be final.
7. Taxes outside India shall be in scope of bidder and deemed to be included in their quoted price.
8. It is certified that, We (M/s _____) have quoted as per the specified price format of the tender, otherwise our offer shall be liable for rejection.

NAME AND SEAL OF TENDERER

PRE-BID CLARIFICATIONS ON 420KV GIS TECHNICAL SPECIFICATION FOR 400KV ITRASI SS

Date: 24 September 2019

S.No	Tender Specification clause	Description	Query	BHEL REPLIES
Section 1				
1	Section-1, 3.1.9	Bidder to submit study report of VFTO generated for 400kV GIS installation...	Relevant TTR shall be submitted.	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
2	Section 1, 5.5	CSD	We will provide a CSD without display. We will provide laptop for viewing the parameters.	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
Price Schedule				
3	BOQ, B.01, B.02, B.03	Items no 27.4, 27.5 PD monitoring system & Online Partial Discharge Monitoring System.	Not considered as not mentioned in the BOM	CLARIFIED THAT TESTING & MAINTENANCE EQUIPMENT ARE TO BE OFFERED, AS PER BID PRICE SCHEDULE.
4	BOQ, C.2.8	SPARES- GIS: 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - WINDSCOPE/ OBSERVING WINDOW	In CB, no observing Window is provided in design. Hence not applicable.	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
5	BOQ, C.1.11	UHF PD SENSORS WITH BNC CONNECTOR	BNC connector are not applicable in design.	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
6	BOQ, C.2.1	400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - CIRCUIT BREAKER POLE WITHOUT PIR COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND MARSHALLING BOX WITH OPERATING MECHANISM	Marshalling box is not applicable for GIS design.	MARSHALLING BOX OF CB, ISOLATOR & EARTH SWITCH ETC IS TO BE READ IT'S DRIVE MECHANISM BOX, RELEVANT CONTROL / OPERATION CIRCUIT BOX.
7	BOQ- C.2.5, C.2.6, C.2.7	RELAYS, POWER CONTACTORS, PUSH BUTTONS, TIMERS & MCBs ETC.	In offered CB design. Relay, power contactors, push buttons, timer & MCBs are not applicable. However this item are provided in LCC. Also C.2.6, C.2.7 are part of LCC	BIDDER TO COMPLY TECHNICAL SPECIFICATION. RELEVANT DRIVE BOX, CONTROL & OPERATION CIRCUIT IN LCC / RESPECTIVE DRIVE BOX IS TO BE CONSIDERED.
Section 2				
8	Section 2, 6.7.2, c	Provisions shall be made for local electrical control. For this purpose a local/remote selector switch and close and trip control switch/push buttons shall be provided in the breaker control cabinet.	We understand that, breaker control cabinet means local control cubicle(LCC). So the local remote selector switch shall be placed in LCC. Please confirm.	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
9	Section 2, 6.6.5	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)	With reference to the mentioned clause we understand that the circuit breaker must be capable of withstanding all dielectric stresses imposed on it in open condition at lock out pressure continuously (i.e. shall be designed for 2 p.u. across the breaker continuously. To validate this a power frequency withstand test conducted for a duration of at least 15 minutes is acceptable). We request customer to kindly confirm the same.	PLEASE REFER CL. 6.4.6 OF TECH SPEC. THIS SUPERSEDES CL. 6.6.5

PRE-BID CLARIFICATIONS ON 420KV GIS TECHNICAL SPECIFICATION FOR 400KV ITRASI SS

Date: 24 September 2019

S.No	Tender Specification clause	Description	Query	BHEL REPLIES
10	Section 2, 6.6.8	Circuit Breaker shall be supplied with auxiliary switch having additional 8 NO (normally open) and 8 NC (normally closed) contacts for future use over and above those required for switchgear interlocking and other control and protection function. These spare NO and NC contacts shall be wired upto the local control cubicle	Auxiliary switches are of standard design/size suitably designed for the available space. Hence the required additional 8 NO (Normally open) and 8 NC (normally closed) contacts shall be provided to customer through contact multiplication relays at LCC	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
11	Section 2, 9.9	Each high speed ground switch shall be fitted with auxiliary switches having 4 NO (Normally Open) and 4 NC (Normally Closed) contacts for use by others	Auxiliary switches are of standard design/size suitably designed for the available space. Hence the required additional 4 NO (Normally open) and 4 NC (normally closed) contacts shall be provided to customer through contact multiplication relays at LCC.	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
12	Section 2, 7.2.10	Each disconnecter shall be supplied with auxiliary switch having additional 8 NO (Normally Open) and 8 NC (Normally Closed) contacts for future use over and above those required for switchgear interlocking and automation purposes. These spare NO and NC contacts shall be wired up to the local control cabinet.	This requirement shall be met by effective use of CMR relay in the offered system	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
13	Section 2, 7.2.13	The disconnectors and safety grounding switches shall have a mechanical and electrical inter locks to prevent closing of the grounding switches when isolator switches are in the closed position and to prevent closing of the disconnectors when the grounding switch is in the closed position. Integrally mounted lock when provided shall be equipped with a unique key for such three phase group. Master key is not permitted.	The disconnectors and the safety grounding switches are separate modules in GIS design and shall have only electrical inter locks between them. However the required padlocking facility shall be provided for the manual interlocking for additional protection.	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE
14	Section 2, 8.3	Each safety grounding switch shall be electrically interlocked with its associated disconnectors and circuit breaker such that it can only be closed if both the circuit breaker and disconnectors are in open position. Safety grounding switch shall also be mechanically key interlocked with its associated disconnectors	The disconnectors and the safety grounding switches are separate modules in GIS design and shall have only electrical inter locks between them. However the required padlocking facility shall be provided for the manual interlocking for additional protection.	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE

PRE-BID CLARIFICATIONS ON 420KV GIS TECHNICAL SPECIFICATION FOR 400KV ITRASI SS

Date: 24 September 2019

S.No	Tender Specification clause	Description	Query	BHEL REPLIES
15	Section 2, 8.6	Each ground switch shall be fitted with auxiliary switches having 4 NO (Normally Open), and 4 NC (Normally Closed) contacts for use by others over and above those required for local interlocking and position indication purposes	This requirement shall be met by effective use of CMR relay in the offered system	SUBJECT TO POWERGRID APPROVAL DURING DETAILED ENGINEERING STAGE

deepali

From: JAI SONI <jaik@bhel.in>
Sent: 27 September 2019 12:37
To: 'RAJEEV KUMAR ROY'
Cc: 'Sanjay Kumar Shukla'; 'deepali'; 'aruna'; 'rakesh singh'; amitk@bhel.in; 'Meena Kesri GM TBEM'; akchowdhary@bhel.in
Subject: Corrigendum-1 for 400kV GIS of Itarsi Substation: SS-19_ PI no. 61I2000183
Attachments: 1. Section-1 GIS R1_26-09-19.pdf; 2. Annexure_BOQ -REV 01_26-09-19.pdf; 2. Annexure_BOQ -REV 01_26-09-19.xlsx; 3. D-3-01-09-01-02 PRE COMMISSIONING FOR GIS.pdf; 4. Section2 Annex-10 Rev.1.pdf; 5. Section-4 Annexure C.pdf; 6. PRE BID CLARIFICATIONS.pdf; ITARSI GA.dwg; 0. Corrigendum-1 400kV GIS Itarsi.PDF

Dear Rajeev,

In continuation to trailing mail, please find attached corrigendum-1 with the supporting documents. Please do the needful for onward action. Copy of revised indent being sent separately.

-
Regards,
JAI K SONI, Manager
BHEL | Transmission Business Group | Engineering Management

From: JAI SONI [mailto:jaik@bhel.in]
Sent: Wednesday, September 25, 2019 10:05 AM
To: 'amitk@bhel.in' <amitk@bhel.in>
Cc: 'Sanjay Kumar Shukla' <skshukla@bhel.in>; 'deepali' <deepali@bhel.in>; 'aruna' <arunag@bhel.in>; 'rakesh singh' <rakesh.singh@bhel.in>; 'RAJEEV KUMAR ROY' <rajeevroy@bhel.in>
Subject: RE: Release Indent of 400kV GIS of Itarsi Substation: SS-19_ PI no. 61I2000183

Dear Amit,

In view of the discussion held with various GIS bidders during pre-bid meeting and subsequent meeting with Powergrid for clarification on the reported issues, we have updated technical specification & Estimate for the same. The same is under finalization and being issued shortly. Meanwhile please do the needful for extension of bid submission date.

-
Regards,
JAI K SONI, Manager
BHEL | Transmission Business Group | Engineering Management

Item No	PETICULARS	CORRIGENDUM
1	SECTION-1 OF TECHNICAL SPECIFICATION	SECTION-1, REV.01 ISSUED
2	ANNEXURE BOQ	ANNEXURE_BOQ, REV.01 ISSUED
3	PRE COMMISSIONING FORMAT FOR GIS	D-3-01-09-01-02 ATTACHED
4	STANDARD MANDATORY SPARES FOR GAS INSULATED SWITCHGEAR	SECTION-2, ANNEXURE-10 (REV.01)
5	SECTION-4, ANNEXURE- C (REV.01)	REV.01 ISSUED

REMARK -

PRE- BID CLARIFICATION IS ATTACHED

[Signature]
24/09-19.

[Signature]
24/09/19.

3125011
26/09/19

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES.

[1] SCOPE

This technical specification covers the requirements of design, engineering, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to project sites, supervision of unloading, erection and complete testing & commissioning of 400kV Gas Insulated Switchgear & CSD complete in all respects for efficient & trouble free operation mentioned under this specification.

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 and tackles as defined in the equipment datasheet / drawings / standard specifications / standards, etc. attached or referred with technical specification

The specification comprises of following sections

- Section-1 Scope, project specific technical requirements & bill of quantities.
- Section-2 Standard Technical Specification for GIS
- Section-3 Project details & general technical Specifications for all the equipments 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.

In general, no deviation from the requirements specified in various clauses of this specification shall be allowed and hence, a 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 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 GIS & CSD are required for the following Project

Customer: Power Grid Corporation of India Ltd.

Project: Extension of **400kV /220kV Itarsi Substation** under Western Region System Strengthening Scheme (WRSS)-20.

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

[2] SPECIFIC TECHNICAL REQUIREMENTS

Sl.	Technical Parameter	Unit	Value
1	Type of GIS	Outdoor Type	
2	Design ambient temperature	^o C	50
3	Design relative humidity	%	100
4	Nominal voltage class, rms	kV	400
5	Maximum System voltage, rms	kV	420
6	Rated frequency,	Hz	50
7	Number of phases	Nos	3
8	Symmetrical Short time withstand current	kA/Sec	40 kA for 1 sec.
9	Bus bar rating, rms	A	4000
10	Breaker & Isolator Rating (Bay) , rms	A	3150
11	Creepage distance for outdoor	mm/kV	25
12	LT Auxilliary Supply		
12.1	AC	415 V (± 10 %),3 phase, 4 wire solidly earthed	
12.2	DC	220 V (+10 %, -15%),DC, 2 wire, unearthed	

Remark - Provision for Extension of GIS is not required, so interface module is not envisaged.

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

The existing 400kV switchyard at Itarsi S/S is AIS type with one and a half breaker Switching Scheme, D-type layout. The proposed bays are to be extended from existing 400kV AIS system to GIS system as per the tender GA & SLD drawings enclosed at ***Annexure_Drawing***.

420 KV SF6 Gas Insulated Switch Gear Shall Be Of Outdoor Type having arrangement and switching scheme as indicated in the tender drawings. The outdoor type 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 necessary base plate & foundation bolts.

3.1 The SF6 gas insulated switch gear (50 Hz) shall be of the **outdoor metal-enclosed type**, comprising of following modules: -

3.1.1 420kV, **40kA for 1 second**, SF6 gas-insulated metal enclosed Outdoor ICT bay module (Main/Tie), each set comprising of the following: -

- a** One (1) number 3-phase, **3150A**, SF6 insulated GIS without PIR complete with operating mechanism.
- b** Three (3) numbers 1-phase, **3000A**, 6-core, multi ratio, current transformers duly **distributed on both side of GIS**.
- c** Two (2) numbers 3-phase, **3150A**, group operated isolator switches, complete with manual and motor driven operating mechanisms.
- d** Two (2) numbers 3-phase, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.
- e** **4000A**, single phase SF6 ducts for interconnection of above mentioned elements.

- f** Gas monitoring devices, barriers, pressure switches, UHF PD sensors etc. as required.
- g** Local Control Cubicle.

One end of this module should be capable of connecting with 420kV, **3150A** GIB (Main Bus) and other end to the Tie/Main Bay module mentioned above as applicable (Refer Tender GA drawing).

In addition, all necessary **supports, ladders** etc. for operation & maintenance work shall also be supplied.

3.1.2 420KV GAS INSULATED BUS (GIB) DUCT: -

420 kV, 3150A, single phase enclosure SF6 gas ducts including support structure from GIS module to center line of SF6/Air Bushing shall be three single phase (isolated) for interconnection for extension of 400kV AIS Main Bus-I & II and for interconnection to switchyard equipment (AIS) associated with ICT bay as shown in GA/ SLD drawing.

The 420kV 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, piping & support structures.

SF6 gas ducts used outside the GIS modules are covered under this item. The GIB duct length shall be optimized further without affecting the switchyard arrangement and bay orientation and also any of the functional requirements specified.

3.1.3 420KV GAS INSULATED SF6 TO AIR TERMINATION: -

420 kV 3150A, 1-Ph SF6/air bushings along with support structure for outdoor connections to connect GIS bay with ICT and for outdoor connections to extend 400kV AIS Main Bus I & II to GIS as per SLD and GA drawing.

3.1.4 Testing and Maintenance Equipments as per *Annexure_BOQ*.

- (i) List of mandatory spares are to be considered as per Annexure –BOQ, detailed description of the same is to be referred as Annexure -10 of section-2.
- (ii) **Spares for Sf6 Gas Filling, Evacuating, Filtering, Drying, Pumping & Storage Plant** - Spares for 5 years' operation are to be supplied. Detailed list of spares is to be submitted during detailed engineering for approval.

3.1.5 Mandatory Spares for GIS as per Technical Specification

- (i) **Only spares corresponding to 400kV main GIS equipments (in the present scope of work at Itarsi S/S) are to be considered for supply.** Bidder to submit detailed list of applicable spares along with technical specification.
- (ii) The requirement/ applicability of spare shall be reviewed during detailed engineering based on manufacturer's design meeting the TS. If applicable/ required, same shall be deemed to be included.
- (iii) Refer Annexure_BOQ for Mandatory Spares List.

3.1.6 ONLINE PD MONITORING SYSTEM is not envisaged in bidder's scope of supply. However integral part of PD monitoring system i.e. UHF PD sensors are to be provided with GIS.

3.1.7 TERMINAL CONNECTOR (for SF6 to Air Bushing) is not envisaged in bidder's scope.

3.1.8 Gas insulated Surge Arrestor

(1.) Outdoor Surge Arrestor is being provided by BHEL as per tender SLD. Bidder shall conduct **Insulation Coordination Study** for establishing Surge Arrestor's rating and any other requirement for successful operation of GIS and cost of same shall be deemed included in scope of supply. Any additional item/ Surge arrester if required as per result of insulation coordination study within GIS shall be in GIS supplier scope. 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.

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

- 3.1.10 LCC shall be outdoor type** and placed near the GIS bay. Proper protection under outdoor conditions shall be ensured by bidder, LCC shall be of **IP55** class protection or higher as required for successful operation in outdoor condition. LCC to be provided with rain shed / canopy.
- 3.1.11 control cabinets for CB, Isolator & earth switch** shall have **IP55** class protection or higher as required for successful operation in outdoor condition. Rain shed / canopy to be provided as per requirement.
- 3.1.12** Bidder to ensure necessary provision for protection including ingress protection for all the sensors / devices etc (such as pressure relief devices, density monitors, cable entry, UHF sensors etc complete in all respect) from rain, moisture, dust and other outdoor atmospheric conditions for trouble-free operation. Necessary enclosures for all the sensors, devices are to be provided as per requirement and trouble free operation.
- 3.1.13 PORTABLE SCISSOR** lift is not envisaged in bidder's scope of supply.
- 3.1.14 FAST ACTING EARTH SWITCH** at Tee Point of GIS is not envisaged in bidder's scope of supply.
- 3.1.15 Typical Gas Schematic Diagram** of One & Half Breaker Scheme, Drawing Number C/ENG/GIS/GSD/01 Rev.1 is to be followed.
- 3.1.16** Breaker mechanism may be hydraulic or spring operated. Relevant spares shall be applicable.
- 3.1.17** Marshalling box of CB, Isolator & Earth switch etc is to be read it's drive mechanism box, relevant control / operation circuit box.
- 3.1.18** GIS to Cable termination, Transformer/Reactor direct connection with GIS, Transformer/Reactor direct connection with sf6/Air bushing is not envisaged.
- 3.1.19** GIS VT is not envisaged.

[4] OTHER TECHNICAL REQUIREMENTS:

- 4.1 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 16 Sqmm Aluminum (for each phase / polarity).

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

4.2.1 Base Plate / Channel / Metallic / Structural Member for seating of GIS system

4.2.2 Lattice / Pipe structure required for installation of GIS, GIB, SF6 to Air Bushing

4.2.3 Foundation bolt / Anchor Fastening bolts for GIS system

4.2.4 Equipment fixing hardware

4.2.5 Cable tray arrangement (mounted on structures of) GIS / GIB / SF6 to Air Bushing etc.

4.3 EARTHING/ GROUNDING MATERIAL FOR GIS SYSTEM

4.3.1 Supply of **40mm MS ROD, 75X12mm GI Flat, 50X06mm GI Flat is not envisaged in bidder's scope** of supply. The BOQ of these items to be provided by bidder during detailed engineering stage.

4.3.2 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.

4.3.3 Bidder to submit detailed calculations and layout drawings for earthing system during detailed engineering stage.

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

4.5 Storage, Installation, Testing & Commissioning Manual for Outdoor GIS: Bidder to submit detailed MANUAL / Erection Procedure for Outdoor Storage and Installation of GIS along with the technical bid. Testing & Commissioning Manual to be submitted during detailed engineering stage.

[5] SPECIFIC TECHNICAL REQUIREMENTS FOR CSD

- 5.1** CSD shall be deployed for optimization of switching behavior of bidder supplied GIS Breaker
- 5.2** 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.
- 5.3** 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.
- 5.4** Supervision of Erection, testing & Commissioning of CSD shall be in bidder's scope.
- 5.5** 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.
- 5.6** 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.**
- 5.7** CSD may be placed in Protection Panel (located in SPR) or in LCC. However, final location shall be decided during detailed engineering.

[6] BILL OF QUANTITIES: Please refer Annexure_BOQ

- 6.1** Total contract value may vary upto $\pm 30\%$ at contract stage.
- 6.2** Length / Layout of GIB is purely indicative and same shall be finalized during detailed engineering stage.

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 date of NOA. In case the test reports are of the test conducted earlier than 10 (ten) years from the date of NOA, 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 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.

Note: NOA stands for *Notification of Award* issued by Powergrid to BHEL for the reference project. **Date of NOA is 29 July 2019.**

- 6.3 GIS Structure** shall be on lump sum basis. Increase / decrease in structure quantity due to change in scope shall be paid on prorated basis.
- 6.4** Prices for all applicable accessories of GIS shall be included in the equipment prices.
- 6.5** 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.

[7] TECHNICAL QUALIFYING REQUIREMENTS: Please refer **Annexure_TQR**

Bidder to submit complete documents for technical qualifying requirement along with the bid.

[8] 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

[9] 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 PO.

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-3-01-09-01-02 (attached)**

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

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

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

- 11.1** Bidder shall also submit site acceptance testing (SAT) procedures and get them approved from BHEL/Owner/Customer before carrying out the site testing at site.
- 11.2** Bidder shall carry out the supervision of installation, execution of field testing and execution of commissioning of GIS and CSD including associated system. Further appropriate test and commissioning reports and as-built documentation as necessary be submitted.
- 11.3** Field testing and commissioning of GIS and CSD including associated system shall be done by Bidder/OEM only.
- 11.4** 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.

[12] SPECIAL TOOLS AND TACKLES:

Bidder shall supply all special tools and tackle (other than maintenance tools as mentioned in BOQ) **which are specifically required for GIS and are proprietary in nature.** Cost of the same shall be deemed inclusive in the offer for main item. List of such special tools and tackles should be clearly listed along with the technical offer. Any special tool which is not listed in the technical spec / bid but required during the erection/commissioning of GIS shall also be supplied by the bidder without time / cost implication.

In case, special tools and tackles which is proprietary in nature is not required for Erection/testing/commissioning or for smooth operation of GIS, supplier has to submit a certificate mentioning that no special tools and tackles are required for GIS.

- [13] DRAWINGS ENCLOSED FOR REFERENCE:** Please refer **Annexure_Drawing** for detail list of tender stage drawings. The attached drawings are for reference only. The customer approved drawing will be provided to successful bidder for detailed engineering. There will be no price implication on account of same.

[14] NOTES

- 14.1** Available data shall be provided to successful bidder, however, bidder may need to visit the site for collection of data as per design / study requirement.
- 14.2** 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 15 days. Further an RCA report should be submitted and necessary changes to be done as per the RCA report wherever required.
- 14.3** **Packing of GIS shall be suitable for storage in open-store** for minimum period of 6 months in given environmental conditions.
- 14.4** Any change in bay pitch (distance between bays) as per civil requirement for foundation layout during detailed engineering stage shall be incorporated by the bidder without any cost and delivery implication to BHEL.
- 14.5** deleted
- 14.6** All equipments shall perform satisfactorily under various other electrical, electromechanical and meteorological conditions of the site of installation.
- 14.7** All equipment shall be able to withstand all external and internal mechanical, thermal and electromechanical forces due to various factors like wind load, temperature variation, ice & snow, (wherever applicable) short circuit etc. for the equipment.
- 14.8** The equipment shall also comply with the following:
- 14.9** To facilitate erection of equipment, all items to be assembled at site shall be "match marked".
- 14.10** All piping, if any between equipment control cabinet/operating mechanism to marshalling box of the equipment, shall bear proper identification to facilitate the connection at site
- 14.11** Bidder to submit detailed "guaranteed and technical particulars" and "detailed drawings" for GIS during contract stage for approval. Bidder may need to visit to BHEL / Powergrid corporate engineering office for drawing / document approval if standard approval is not available.
- 14.12** 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.

- 14.13 CONSUMABLES:** Bidder to submit list of consumables during contract stage. Consumables with limited self-life shall be supplied on time before erection after clearance from BHEL site.
- 14.14 BAR CHART:** Supplier to submit detailed bar chart indicating all the milestones from Engineering till manufacturing/ testing, dispatch to site and commissioning. Bar Chart shall be approved by BHEL before commencement of work. Tentative bar chart to be submitted by bidder The spare parts of offered GIS should be available for minimum ten (10) years from the date of commissioning. on tender stage.
- 14.15 LAYOUT Drawing** – Bidder to submit layout drawing for ITARSI SS extension in line with the space available at Itarsi SS with the technical bid.
- 14.16** Master drawing list is to be submitted during commencement of detailed engineering on contract stage.
- 14.17** 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.
- 14.18** Bidder to submit all supporting documents in English. If document submitted by bidder is other than English language, self-attested English translated document should also be submitted.

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ANNEXURE-BOQ (REV 01)

400KV GIS (OUTDOOR TYPE) AT 400/220KV ITARSI SUBSTATION (REV 00)

SL	DESCRIPTION	UNIT	QTY	REMARKS
A	400kV Gas Insulated Switchgear (Outdoor Type)- Main Quantity			
A.01	SUPPLY- GIS : 400KV, 40KA FOR 1S, 3150A, ONE & HALF CIRCUIT BREAKER SCHEME - TRANSFORMER GIS BAY	SET	1	Fully equipped Bay module for ICT Bay
A.02	SUPPLY- GIS : 400KV, 40KA FOR 1S, 3150A, ONE & HALF CIRCUIT BREAKER SCHEME - TIE GIS BAY	SET	1	Fully equipped Bay module for TIE Bay
A.03	SUPPLY- GIS : 400KV, 40KA FOR 1S, 4000A , ONE & HALF CIRCUIT BREAKER SCHEME - BUS BARS	SET	2	Single phase isolated, SF6 gas-insulated metal enclosed Main Bus Bars. (1 SET = 3-Phase). GIS should be suitable for future extension. Ref. clause 5.43 (Section-2)
A.04	SUPPLY- GIS : 400KV, 40KA FOR 1S, 3150A, ONE & HALF CIRCUIT BREAKER SCHEME - GAS INSULATED BUS DUCT	MTR	200	420kV, 3000A rating. Single phase, SF6 Gas Insulated Bus Duct (GIB) from Main bus-1, Main Bus-2 and ICT bay to SF6 gas Bushing.
A.05	SUPPLY- GIS : 400KV, 40KA FOR 1S, 3150A, ONE & HALF CIRCUIT BREAKER SCHEME - SF6 TO AIR BUSHING	SET	9	Polymer Type complete in all respect except connectors.
A.06	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - STRUCTURE MATERIAL INCLUDING WALKWAY, PLATFORM, RAILING, FOUNDATION BOLTS, EMBEDDED ITEMS, RAILS AND/ OR OTHER MATERIALS ETC.	LOT	1	For GIS, GIB and SF6 to Air Bushing complete in all respect
A.07	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - LOCAL CONTROL CUBICLES (LCC)	NO	2	Including power, control & instrumentation cable as applicable.
A.08	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - SF6 GAS REQUIRED FOR PLACING GIS INTO SUCCESSFUL OPERATION	LOT	1	Including gas wastage during installation, testing & commissioning.
A.09	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - EARTHING MATERIALS INCLUDING HIGH FREQUENCY EARTHING, IF APPLICABLE	LOT	1	Excluding 40mm MS ROD, 75X12 & 50X6 GI Flat
A.10	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - CONSUMABLES FOR GIS	LOT	1	As per cl no. 14.13 of section-1 of Technical specification.
A.11	SUPPLY- GIS : ONE & HALF CIRCUIT BREAKER SCHEME - CONTROLLED SWITCHING DEVICE FOR CIRCUIT BREAKER	SET	2	Complete with all items.
A.12	SUPPLY- GIS : 400KV, SPECIAL CABLES OTHER THAN POWER & CONTROL CABLES REQUIRED FOR CSD FOR INTERFACING WITH CB AND RELAY PANEL	MTR	100	
B	Mandatory Maintenance Equipment			
B.01	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
B.02	SUPPLY- GIS : 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
B.03	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

ANNEXURE-BOQ (REV 01)

400KV GIS (OUTDOOR TYPE) AT 400/220KV ITARSI SUBSTATION (REV 00)

SL	DESCRIPTION	UNIT	QTY	REMARKS
B.04	SPARES- GIS : MANDATORY MAINTENANCE EQUIPMENT SUITABLE FOR GIS - SF6 GAS FILLING, EVACUATING, FILTERING, DRYING, PUMPING & STORAGE PLANT-SPARES FOR FIVE YEAR SUCCESSFUL OF EQUIPMENT	SET	1	For equipment mentioned at s. no. B.02
C	Mandatory Spares for GIS			
C.1	General (For 400kV Voltage Class)			
C.1.1	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - BUS BAR SECTIONS INCLUDING BUS BAR INTERCONNECTION MODULES, BUS DUCTS SECTIONS, COMPENSATORS/ EXPANSION JOINTS/BELLOWS, BENDS, END COVERS ALONG WITH ENCLOSURE OF EACH TYPE FOR EACH OF THE ABOVE MODULE/ ENCLOSURE. ALL ACTIVE PARTS SUCH AS CONDUCTOR, CONDUCTOR JOINTS, CORONA SHIELD ETC.	SET	1	1 SET= 1 number of each type and rating
C.1.2	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - SF6 GAS PRESSURE RELIEF DEVICE	SET	1	1 SET= 1 number of each type and rating
C.1.3	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - SF6 PRESSURE GAUGE CUM SWITCH / DENSITY MONITORS AND PRESSURE SWITCH AS APPLICABLE	SET	3	1 SET= SF6 Pressure gauge cum switch / Density monitors of each type.
C.1.4	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - COUPLING DEVICE FOR PRESSURE GAUGE CUM SWITCH FOR CONNECTING GAS HANDLING PLANT	SET	2	1 SET= 1 number of each type and rating
C.1.5	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - RUBBER GASKETS, "O" RINGS AND SEALS FOR SF6 GAS FOR GIS ENCLOSURE	SET	3	1 SET= Rubber Gaskets, "O" Rings and Seals for SF6 gas for GIS enclosure of each type
C.1.6	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS	SET	1	1 SET= 10% (In weight) of total molecular filter quantity.
C.1.7	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - CONTROL VALVES FOR SF6 GAS	SET	1	1 SET= Control Valves for SF6 gas of each type
C.1.8	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - SF6 GAS (20 % OF TOTAL GAS QUANTITY) IN NON-RETURNABLE CYLINDERS	LOT	1	In addition with SF6 gas mentioned at S. no. A.08.
C.1.9	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - PIPE LENGTH FOR SF6 CIRCUIT	SET	1	1 SET= Pipe length (Copper or Steel as applicable) for SF6 Circuit of each type (if applicable)
C.1.10	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - LOCKING DEVICE TO KEEP DISCONNECTORS (ISOLATORS) AND EARTHING SWITCHES/ FAST EARTHING SWITCHES IN CLOSE OR OPEN POSITION IN CASE OF REMOVAL OF THE DRIVING MECHANISM	SET	1	1 SET= 1 number of each type and rating
C.1.11	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - UHF PD SENSORS WITH BNC CONNECTOR	SET	2	1 SET= 1 number of each type and rating
C.1.12	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - BUS SUPPORT INSULATOR	SET	4	1 SET= 1 number of each type and rating
C.1.13	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - GAS BARRIERS	SET	4	1 SET= 1 number of each type and rating
C.1.14	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS - SF6 TO AIR BUSHING	NO	1	of each type and rating. Complete in all respect.

ANNEXURE-BQ (REV 01)

400KV GIS (OUTDOOR TYPE) AT 400/220KV ITARSI SUBSTATION (REV 00)

SL	DESCRIPTION	UNIT	QTY	REMARKS
C.2	400KV SFB CIRCUIT BREAKER:			
C.2.1	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - CIRCUIT BREAKER POLE WITHOUT PIR COMPLETE WITH INTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND MARSHALLING BOX WITH OPERATING MECHANISM	SET	1	1 SET= complete material to enable replacement of all applicable type/rating of CB by spare
C.2.2	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - FIXED, MOVING AND ARCING CONTACTS INCLUDING INSULATING NOZZLES	SET	1	1 SET= 1 number of each type and rating (for Main Chamber)
C.2.3	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - TRIP COIL ASSEMBLY WITH RESISTOR, AS APPLICABLE	SET	3	1 SET= 1 number of each type and rating
C.2.4	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - CLOSING COIL ASSEMBLY WITH RESISTOR, AS APPLICABLE	SET	3	1 SET= 1 number of each type and rating
C.2.5	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER- RELAYS, POWER CONTACTORS, PUSH BUTTONS, TIMERS & MCBS ETC.	SET	1	1 SET= 1 number of each type and rating
C.2.6	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - AUXILIARY SWITCH ASSEMBLY	SET	3	1 SET= 1 number of each type and rating
C.2.7	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - OPERATION COUNTER	SET	3	1 SET= 1 number of each type and rating
C.2.8	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - WINDSCOPE/ OBSERVING WINDOW	SET	2	1 SET= 1 number of each type and rating (if applicable)
	For Hydraulic Operated Mechanism, if applicable			
C.2.9	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - HYDRAULIC OPERATING MECHANISM WITH DRIVE MOTOR	SET	3	1 SET= 1 number of each type and rating
C.2.10	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - FERRULES, JOINTS AND COUPLINGS	SET	3	1 SET= 1 number of each type and rating
C.2.11	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - HYDRAULIC FILTER	SET	3	1 SET= 1 number of each type and rating
C.2.12	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - HOSE PIPE	SET	3	1 SET= 1 number of each type and rating
C.2.13	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER- NITROGEN ACCUMULATOR	SET	3	1 SET= 1 number of each type and rating
C.2.14	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - VALVES	SET	3	1 SET= 1 number of each type and rating
C.2.15	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - PIPE LENGTH	SET	3	1 SET= pipe length (copper & steel) of each size & type, if applicable
C.2.16	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - PRESSURE SWITCHES	SET	3	1 SET= 1 number of each type and rating
C.2.17	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - PRESSURE GAUGE WITH COUPLING DEVICE	SET	3	1 SET= 1 number of each type and rating
C.2.18	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - HYDRAULIC OIL	SET	1	1 SET= 20% of total Oil quantity
C.2.19	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER - PRESSURE RELIEF DEVICE	SET	3	1 SET= 1 number of each type and rating
	For Spring Operated Mechanism, if applicable			

ANNEXURE-BOQ (REV 01)

400KV GIS (OUTDOOR TYPE) AT 400/220KV ITARSI SUBSTATION (REV 00)

SL	DESCRIPTION	UNIT	QTY	REMARKS
C.2.20	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER- SPRING OPERATING MECHANISM INCLUDING CHARGING MECHANISM ETC	SET	1	1 SET= 1 number of each type and rating
C.2.21	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CIRCUIT BREAKER- SPRING CHARGING MOTOR	NO	2	1 SET= 1 number of each type and rating
C.3	400kV ISOLATORS :			
C.3.1	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- DISCONNECTOR INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR	SET	1	Complete SET of 3 phase disconnector of each type including main circuit enclosure, driving mechanism and support insulator etc. to enable complete replacement of all applicable type/rating of Isolator by spare
C.3.2	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- MAINTENANCE EARTHING SWITCH, INCLUDING MAIN CIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC	SET	1	Complete SET of 3 phase Maintenance Earthing switch of each type, including main circuit, enclosure, driving mechanism and support insulator etc. to enable complete replacement of all applicable type/rating of Earthing Switch by spare
C.3.3	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- COPPER CONTACT FINGERS & CORONA SHIELD FOR MALE & FEMALE CONTACT- FOR DISCONNECTOR	SET	1	for one complete (3 phase) disconnector of each type and rating
C.3.4	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- COPPER CONTACT FINGERS & CORONA SHIELD FOR MALE & FEMALE CONTACT- FOR MAINTENANCE EARTHING SWITCH	SET	1	for one complete (3 phase) earthing switch of each type and rating
C.3.5	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- OPEN / CLOSE CONTACTOR ASSEMBLY, TIMERS, KLY INTERLOCK, INTERLOCKING COILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS, RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC FOR ONE COMPLETE MOM BOX- FOR DISCONNECTOR	SET	1	for one complete MOV box (3 – phase gang operated or 1 – phase unit) For Isolator
C.3.6	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- 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- FOR MAINTENANCE EARTHING SWITCH	SET	1	for one complete MOM box (3 – phase gang operated or 1 – phase unit) For Maintenance Earth switch
C.3.7	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- LIMIT SWITCHES AND AUXILIARY SWITCH- FOR DISCONNECTOR	SET	1	for complete 3 phase equipment
C.3.8	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- LIMIT SWITCHES AND AUXILIARY SWITCH- FOR MAINTENANCE EARTHING SWITCH	SET	1	for complete 3 phase equipment (if applicable)
C.3.9	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR- DRIVE MECHANISM- FOR DISCONNECTOR	SET	1	1 SET= 1 number of each type and rating

ANNEXURE-BOQ (REV 01)

400KV GIS (OUTDOOR TYPE) AT 400/220KV ITARSI SUBSTATION (REV 00)				
SL	DESCRIPTION	UNIT	QTY	REMARKS
C.3.10	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - DRIVE MECHANISM- FOR MAINTENANCE EARTHING SWITCH	SET	1	1 SET= 1 number of each type and rating
C.3.11	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM- FOR DIS-CONNECTOR	SET	1	1 SET= 1 number of each type and rating
C.3.12	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS DISCONNECTOR - MOTOR FOR DRIVE MECHANISM- FOR MAINTENANCE EARTHING SWITCH	SET	1	1 SET= 1 number of each type and rating
C.4	400kV CURRENT TRANSFORMER			
C.4.1	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR GIS CURRENT TRANSFORMER - COMPLETE CT WITH ENCLOSURE	NO	1	Complete CT of one pole with enclosure to enable replacement of all applicable type/rating of CT by spare
C.5	LOCAL CONTROL CUBICLE			
C.5.1	SPARES- GIS : 400KV, MANDATORY SPARES SUITABLE FOR LOCAL CONTROL CUBICLE - AUX. RELAYS, CONTACTOR, PUSH BUTTONS, SWITCHES, LAMPS, ANNUNCIATION WINDOWS, MCB, FUSES, TIMERS ETC.	SET	2	1 SET= 1 number of each type and rating
D	SERVICES			
D.1	SERVICES- GIS : 400KV, INSULATION CO-ORDINATION STUDIES FOR GIS SYSTEM	LOT	1	Including VFTO report
D.2	SERVICES- GIS : 400KV, SITE VISIT FOR SUPERVISION OF UNLOADING & VERIFICATION OF MATERIALS FOR PROPER STORAGE & UP-KEEPING AT SITE	LOT	1	
D.3	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS INCLUDING EARTHING	LOT	1	
D.4	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS- FOR GAS INSULATED BUS DUCT	LOT	1	
D.5	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF GIS- FOR SF6 TO AIR BUSHING	SET	9	
D.6	SERVICES- GIS : 400KV, SUPERVISION OF ERECTION OF CSD COMPLETE IN ALL RESPECT	SET	2	
D.7	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS	LOT	1	
D.8	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS- FOR GAS INSULATED BUS DUCT	LOT	1	
D.9	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF GIS- FOR SF6 TO AIR BUSHING	SET	9	
D.10	SERVICES- GIS : 400KV, TESTING & COMMISSIONING OF CSD	SET	2	
D.11	SERVICES- GIS : 400KV, FINAL SUCCESSFUL HV/ POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	LOT	1	
D.12	SERVICES- GIS : 400KV, FINAL DOCUMENTATION	LOT	1	

ANNEXURE-BOQ (REV 01)

400KV GIS (OUTDOOR TYPE) AT 400/220KV ITARSI SUBSTATION (REV 00)

SL	DESCRIPTION	UNIT	QTY	REMARKS
E	SPARES- UNIT PRICES OF INDIVIDUAL ITEM/EQUIPMENT (Unit Prices of Individual Equipment included here or in mandatory 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)			
E.1	SPARES- GIS : 400KV, 40KA FOR 1S, 3150A, CIRCUIT BREAKER ONE COMPLETE POLE WITHOUT PIR, ENCLOSURE AND OPERATING MECHANISM.	SET	1	
E.2	SPARES- GIS : 400KV, 40KA FOR 1S, 3150A, DISCONNECTOR, INCLUDING MAIN CIRCUIT, ENCLOSURE, SUPPORT INSULATOR AND WITHOUT DRIVING MECHANISM	SET	1	
E.3	SPARES- GIS : 400KV, MAINTENANCE EARTHING SWITCH, INCLUDING MAIN CIRCUIT, ENCLOSURE, SUPPORT INSULATOR AND WITHOUT DRIVING MECHANISM	SET	1	
E.4	SPARES- GIS : 400KV, 40KA FOR 1S, 3150A, SINGLE PHASE BUS BAR	MTR	1	
E.5	SPARES- GIS : 400KV, GIS METALLIC ENCLOSURE	MTR	1	
E.6	SPARES- GIS : 400KV, EXPANSION JOINTS FOR BELLOWS	SET	1	For Single Phase

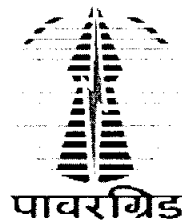
F	SERVICES (Unit Prices of Individual services included here are required for any Addition/Deletion of Equipment and replacement of damaged items. Vendor to ensure that the unit prices have a logical relationship with prices of assemblies in main items. Quoting for unit prices is mandatory and shall be considered for evaluation)			
F.1	GIS SERVICES- GIS : 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR SUPERVISION OF ERECTION OF GIS	MANDAY	1	
F.2	GIS SERVICES- GIS : 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - SERVICES FOR TESTING & COMMISSIONING OF GIS	MANDAY	1	
F.3	SERVICES- GIS : 400KV, REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - HIRING CHARGES OF HV TEST KIT WITH OPERATOR	LOT	1	
F.4	SERVICES- GIS : 400KV, TRAINING FOR GIS AT SITE	DAY	1	

FOR INTERNAL USE ONLY

**PRE COMMISSIONING FORMATS FOR GAS INSULATED
SUBSTATIONS**

DOC: D-3-01-09-01-02

Revision-2



पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड
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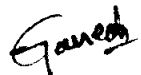
POWER GRID CORPORATION OF INDIA LTD.
ASSET MANAGEMENT DEPARTMENT

**POWER GRID CORPORATION OF INDIA LTD.
ASSET MANAGEMENT DEPARTMENT**

PRE COMMISSIONING FORMATS FOR GAS INSULATED SUBSTATIONS

PRE COMMISSIONING FORMATS FOR GAS INSULATED SUBSTATIONS				
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02	CC/AM	01.03.19	Sd/-	Sd/-

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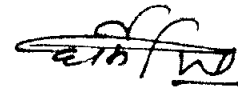
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Sl.No.	Chapter	Page No.	Action
01	All chapters	All Pages	Replace all
02	All chapters	All Pages	Replace all

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Erection Guidelines & Checklist

I. OBJECTIVE

On site Erection of Gas Insulated Substation needs be considered as an extension of manufacturing process and same level of quality standards must be adhered during site erection so that assembled Gas Insulated Substation complies all the criteria considered while designing. Any "short cuts" taken during site erection may lead to adverse effect on Gas Insulated Substation. Long term reliability of finally assembled Gas Insulated Substation depends significantly on the level of cleanliness and adherence to standard processes during erection. A comprehensive checklist has been given below which needs to be followed by site during installation & erection and maintained by site as installation record of GIS.

II. GUIDELINES & CHECKLIST

Sl	GIS work activity and precaution to be taken	Compliance (OK/Not OK)	Remarks (if any)
1.	Completion of Civil Works & Cleaning		
a.	GIS Hall Civil works must be complete in all respects prior to commencement of erection works of Gas Insulated Substation.		
b.	Thorough cleaning of GIS hall to be ensured before start of GIS Erection.		
c.	It should be ensured that dust and dirt are not present in GIS Hall.		
2.	GIS Hall Sealing		
a.	GIS Hall must be properly sealed and all the openings including Bus Duct entry from GIS wall, Windows, Roof, Fixed glasses in GIS walls must be fixed & should be in close condition.		
b.	The work of GIS hall rolling shutter, entry doors etc should also be complete to control the opening.		
c.	Bus duct exit in the GIS hall wall shall be kept covered by suitable means (metal sheet/ ply board) until permanent cover is provided after installation of bus ducts so as to make it properly sealed and should be able to withstand high wind and rains coming inside of GIS hall.		
3.	GIS Hall Floor Finish		

a.	GIS Hall floor must be compact & firm and Poly Urethane (P.U.) paint must be applied on floor before starting erection works.		
4.	GIS Door Closer		
a.	Entry door of GIS Hall must have automatic closing facility so that entry of dust/dirt can be avoided after entry of personnel.		
5.	No simultaneous Work		
a.	During the period of GIS module assembly and erection work ,any other other work in the GIS (like civil works, AHU ducts, cable laying & termination, illumination system cabling etc) should not be undertaken which can affect cleanliness or create any sort of particle, dust etc.		
b.	Walls and ceiling shall be in a condition so that neither dirt nor plaster might fall or rub off and formation of condensation water on ceiling/ walls shall be prevented under any circumstances.		
6.	Restricted Entry in GIS Hall		
a.	At the time of GIS erection work maintaining cleaning is top most requirement. Entry to only authorised persons must be allowed.		
7.	Regular Cleaning of Assembly and Erection Area		
a.	Cleanliness must be maintained in GIS Hall throughout erection process. Vacuum cleaner may be used for achieving the same.		
b.	In order to achieve same, cleaning to be carried out in GIS Hall working area by vacuum cleaner at regular intervals.		
8.	Storage Area		
a.	On arrival of GIS modules in packed condition from manufacturer's facility, the packing should be stored identified area only as decided by POWERGRID.		
b.	The storage area should be sufficiently raised above FGL such that under no circumstances during the entire storage period there should be no waterlogging in storage area and any part of packing should not be submerged due to accumulation of water.		
c.	Regular clearing of weeds and bushes must be ensured in storage area to avoid damage to packing.		

9.	Unpacking and shifting of modules	
a.	GIS modules stored in storage area which needs to be shifted to GIS Hall for erection must be unpacked immediately before installation.	
b.	Unpacking of GIS modules shall not be done inside the GIS hall to maintain cleanliness of GIS assembly area as packing contains lot of dirt and unwanted material.	
c.	Unpacking of GIS modules to be done outside of GIS hall and cleaned from outside before shifting the same to GIS hall.	
10.	Shock Recorder/Indicator	
a.	Manufacturer provides Impact Recorders in the packing of all major GIS equipments (CBs, VTs etc) from factory for monitoring of abnormal shocks during transport and handling. Mechanical Shock indicators are provided in smaller equipments and modules. Limits of shocks in all three directions to be provided by manufacturer. After unpacking material before erection, impact recorders are to be removed and recorded data to be downloaded for review of abnormal shocks.	
b.	Shock recorder data and report with analysis of recorded data to be submitted by manufacturer within 3 weeks of removal of impact recorders.	
c.	In case of shock exceeding the limits, manufacturer expert shall do joint internal inspection of affected GIS units and shall submit analysis report before giving clearance for erection.	
d.	In case of packings with shock indicators, at the time of unpacking status of shock indicator to be noted. If shock indicator found operated (shock exceeding limit) manufacturer expert shall do joint internal inspection of affected GIS units and shall submit analysis report before giving clearance for erection.	
11.	Checking of pre-filled N2 in GIS modules	
a.	GIS equipments are transported in sealed condition with transport cover and pre-filled with positive N2 pressure. At the time unpacking before erection of GIS, N2 pressure in all modules to be checked. (Checklist for checking of packing, shock and N2 pressure is given as Format - A)	

12.	Uniform & Cleaning	
a.	Persons entering the GIS Hall during the entire erection period must clean their shoes for that proper foot mat need to be kept at the entry door.	
b.	GIS erection team must wear working uniform which shall be made of non fluffy material.	
13.	AHU Operation	
a.	Prior to commencing erection, Air Handling Unit must be commissioned and made functional so that positive pressure can be maintained in GIS Hall to prevent entry of dust and foreign material from outside.	
14.	Document Submission : Prior to taking up erection works, manufacturer must submit following documents :	
a.	Method statement for carrying out erection works along with details about Material handling, Erection procedures, vacuuming & gas filling, precautions to be taken during erection.	
b.	List of T&Ps	
c.	List of consumables & cleaning agents	
d.	Reference documents to be used during erection	
15.	List of Manufacturer's Certified Engineer & Supervisor	
a.	List of engineers and supervisors certified/qualified to handle and supervise erection works of GIS as per the standard and procedures recommended by manufacturer to be submitted by the vendor prior to start of GIS erection.	
b.	Authorization Certificate for Manufacturer's Engineer & Supervisor should come from competent level.	
16.	GIS Drawings: Following Drawings should be available and displayed on the wall of GIS Hall during the entire GIS Erection period	
a.	Approved Single Line Diagram (SLD) of the project	
b.	SF6 Gas line diagram	

c.	General Arrangement drawing with details of module number of each bay	
17.	Instruction Manual	
a.	Manufacturer's instruction manual for GIS Storage, Handling , Erection and O&M should be available at site before start of GIS erection work for reference of relevant procedures	
18.	Unwanted storage of material	
a.	Only T&P and consumables required for GIS erection shall be kept in GIS during erection.	
b.	GIS hall shall not be used as general purpose store for any kind of material.	
c.	Only inventory required for immediate erection and associated T&P are allowed inside GIS at the time of GIS erection.	
19.	Erection by EOT Crane	
a.	Only EOT crane is allowed for indoor GIS erection for the quality and safety of the work.	
b.	Under no circumstances Hydra or Crane to be used for indoor GIS erection in order to avoid dust & dirt and diesel fumes from the crane.	
20.	Gas Insulated Bus Ducts (GIB)	
a.	Gas Insulated Bus Duct (GIB) assembly should be done preferably in GIS hall and to be taken to outdoor for installation with proper cover on open sides.	
b.	If sufficient space is not available in GIS hall for GIB assembly, temporary outdoor shed with dust proof arrangement must be specially made for GIB assembly meeting all safety and cleaning requirements stated at earlier points.	
21.	Gas Insulated Bus Ducts (GIB) Installation	
a.	In case of outdoor installation of Gas Insulated Bus Duct (GIB) or of GIS compartment and components shall be duly protected from	

	dust and moisture ingress using temporary covers.		
22.	Cleaning of assembly parts		
a.	Cleaning is of utmost importance and hence before assembly, all the loose metal parts, subassemblies and all contact & sealing surfaces shall be cleaned before installation of components of GIS assembly.		
b.	Only recommended cleaning agents/material by manufacturer and as described in the instruction manual to be used.		
c.	Further, Prior to opening, gas compartment shall be thoroughly cleaned and vacuum cleaning of the installation area shall also be done specially the immediate vicinity of the flanges to be connected. Dust disturbance in the area to be avoided.		
23.	Pre-installation precautions		
a.	Once the transport covers are removed, installation of flanges shall be done without any interruptions, if interruptions cannot be avoided open flanges are to be covered with clean plastic foil. Transport covers, O-rings and other packing material shall be taken out of GIS after immediately after removal.		
b.	O-rings used for temporary transport packing to be scraped after opening of transport cover and removed from GIS erection area to avoid any mixing with new O-rings to be used for erection purpose.		
c.	O Rings shall be properly stored and taken out only before installation. O-Rings are also to be cleaned before use with manufacturer authorized cleaning agent.		
d.	At all points of time during installation authorized personnel shall use disposable gloves to avoid contamination.		
24.	Cable termination work		
a.	Cable termination at GIS equipments and LCC panels shall commence only after completion of GIS equipment as during GIS installation period laying and termination of cables interferes with the GIS erection work and affects cleanliness due to spreading of metal particles generated from gland plate cutting/ grinding, cable		

	armour/ screen cuttings etc.	
25.	Field Quality Plan	
a.	Approved Field Quality Plan shall be followed strictly during site work.	

Signature :	Signature :
Name :	Name :
Designation :	Designation :
GIS Manufacturer	POWERGRID Site Incharge

PRE COMMISSIONING TEST - EOT CRANE & SHOCK RECORDER

I. EOT CRANE

Load Test to be conducted on EOT Crane as per IS 3177:1999 (Reaffirmed 2004) "Indian Standard: Code of Practice for Electric Overhead Cranes and Gantry Cranes other than steel work cranes "

Note: Above test to be conducted before starting installation of GIS bays in GIS hall

PRE COMMISSIONING TEST - SHOCK RECORDER

II. SHOCK RECORDER ANALYSIS

Shock Recorders are to be provided in all the critical compartments during transportation like Circuit Breaker, Voltage Transformers etc. After receipt of compartments at site, shock recorder data needs to be downloaded preferably at site in presence of POWERGRID representative and analysis of the data needs to be submitted before start of erection activities. Incase of violation of limit for the shocks in any of the three directions, internal inspection of the compartment needs to be carried out so as to decided rectification measures based on the findings.

PRE COMMISSIONING CHECKS ON SF6 GAS

I. Quality Checks on SF6 Gas

Bay Details:

Ambient Temperature:

Reference Drawing Number:

Sl. No	Gas Compartment	Moisture Content at atmospheric pressure (in ppmv)			Dew point at atmospheric pressure			Pressure			% Purity		
		R	Y	B	R	Y	B	R	Y	B	R	Y	B

Kit Details

Make:

Model:

Calibration Validity date:

Permissible limit: Moisture Content (200 ppmv), Dew point (- 36 deg C) & Purity (99 %)

Note:

- Dew point of SF6 gas to be measured after at least 120 hours of gas filling (as per IEC 62271-203 Clause No : 10.2.101.6)
- Gas pressure reading to be monitored and recorded by the executing agency after every two weeks till energisation for identification of leakage in gas compartment if any and rectification.
- Gas quality test to be done only by using testing kit which has the pump back facility so that after measurement of gas quality, SF6 gas is not wasted and sent back to GIS compartment.

II. Checks on SF6 Density Monitor

Bay Details:

Ambient Temperature:

Density Monitor Details:

(Make & type)

Sl No	Gas Compartment	Phase	Loss of SF6(Stage I)			Lockout/trip Alarm (Stage 2A)			Lockout/trip Alarm (Stage 2B)		
			Rated/Design Value	Factory test value	Actual Value	Rated/Design Value	Factory Test value	Actual Value	Rated/Design Value	Factory Test value	Actual Value
		R									
		Y									
		B									
		R									

		Y							

III. SF6 Leakage test

Bay Details:

Sl. No	Gas Compartment	Phase	Initial filling pressure	Pressure after 24 hrs	Pressure after 7 days
		R			
		Y			
		B			
		R			
		Y			
		B			
		R			
		Y			
		B			
		R			
		Y			
		B			
		R			
		Y			
		B			

PRE COMMISSIONING CHECKS ON CIRCUIT BREAKERS

I. General Details

DETAILS	
Region:	Sub-Station:
Bay Name:	LOA No:
Make:	Year of Manufacturer:
Equipment Designation:	Type:
Sr. No:	Rated Breaking Capacity (kA):
Rating:	Control Voltage (DC):
Operating Voltage:	Date of Erection:
Date of Receipt at Site:	Date of Energisation:

II. Operating System:

Spring	
Hydraulic	
Hydro-Spring	

i. Hydraulic/Hydro-Spring System

a) Accumulator

	R Ø	Y Ø	B Ø
Make			
Serial number			
Type			
Year of manufacture			

b) Pump details

Make		Volt	
Serial number		Amperes	
Type		Hp/ kW	
Year of manufacturer		O/L setting (Thermal O/L)	

c) Details of relays/contactors used

Schematic drawing no _____

Circuit Reference	Make	Type
Oil Pressure Switch		
Closing Lockout		
Auto Reclosing Lockout		
Operational Lockout		
Anti Pumping Contactor		
Pole Discrepancy Timer		
SF6 Alarm/Lockout		

d) Operation checks

Date of Hydraulic Oil filling _____

Type of Hydraulic Oil (make of oil/ complying standard) _____

Pressurising hydraulic system

Sl.No	Description	Factory Test Value	Site Test Value	Remark Record Deficiencies, If Any
1	Pre-filling pressure of N ₂ in accumulator (bar / deg. C)			
2	Pump running time for charging hydraulic system from initial pressure to working pressure			
3	Checking over-pressure relief valve (open/close)			
4	Hydraulic pressure drop for 12 hr			
	Breaker ON position			Passing criteria: less than 3% per 12 Hrs
	Breaker OFF position			
5	Oil pressure monitor			
	Pump on / off bar			
	Pump running time			

6	Auto reclosing lockout (oil) Pressure contact _____ make/break			
7	Closing lockout (oil) pressure Contact _____ make/break			
8	Trip-1 lockout (oil) Pressure contact _____ make/break			
9	Trip-2 lockout (oil) Pressure contact _____ make/break			

Factory test report ref no: _____

Oil pressure drop during operations and pump running time in seconds

Sl.No	Description	Site Test Value
(i)	Pressure before operation(Bar)	
	Pressure after closing operation(Bar)	
	Pump running time to normalise pressure (Sec)	
(ii)	Pressure before operation(Bar)	
	Pressure after opening operation(Bar)	
	Pump running time to normalise pressure (Sec)	
(iii)	Pressure before operation(Bar)	
	Pressure after close/open operation (Bar)	
	Pump running time to normalise pressure (Sec)	
(iv)	Pressure before operation(Bar)	
	Pressure after open-close-open operation(Bar)	
	Pump running time to normalise pressure (Sec)	

Note: Pump MCB to be kept OFF in order to record drop in pressure after O/C/ CO operation. Subsequently switch ON MCB to record normalisation time.

Factory test report ref no: _____

ii) Spring Operating System

a) Motor details

Make		Volt	
Sl no		Amperes	
Type		Hp/kw	
Year of Manufacture		Setting (thermal overload)	
Current taken by motor for charging the spring (amp)		IR of spring charging motor	

b) Spring operating time

Details	R- Ø		Y- Ø		B- Ø	
	Factory	Site	Factory	Site	Factory	Site
Charging Time						
Spring Charging Motor Supervision Time	NA		NA		NA	

Factory test report ref no: _____

c) Details of relays/contactors used : schematic drawing no

Circuit Reference	Make	Type
Closing lockout		
Auto reclosing lockout		
General lockout		
Anti pumping relay		
Pole discrepancy timer		

d) Charging of spring of Circuit Breaker manually - OK/Not OK

III. Trip/ Close Coil Resistance Measurement

COIL DETAILS	MEASURED VALUE IN Ohm		
	R - $\emptyset$	Y - $\emptyset$	B - $\emptyset$
TRIP COIL - I			
TRIP COIL - II			
CLOSE COIL			

IV. Circuitry and Operational Checks

SI No	Circuit Reference	Operational Check	
		Local	Remote
A	Tripping Through TC-I		
B	Tripping Through TC-II		
C	Closing Circuit		
D	Anti-hunting Feature		
E	Pole Discrepancy Feature		
F	Breaker Position Indication		
G	Heater In Switch Cubicle		
H	Heater In Control Cubicle		
I	Illum. In Switch Cubicle		
J	Illum. In Control Cubicle		

V. Operating Time (In milli-seconds)

Phase (Ø)	Close (Max 150ms)	Closing Coil Current	Trip		Tripping Coil Current		Close Open		OCO (OK/NOT OK)	
			Trip - I	Trip - II	Trip - I	Trip - II	Trip - I	Trip - II	Trip - I	Trip - II
R- Ø main contact										
R- Ø PIR										
Auxiliary contact										
Y - Ø main contact										
Y - Ø PIR										
Auxiliary contact										
B - Ø main contact										
B - Ø PIR										
Auxiliary contact										

Permissible limits

Timing	765 KV	400 KV	220 KV	132 KV
Close	150 ms	150 ms	150 ms	150 ms
Open	25 ms	25 ms	35 ms	40 ms
Phase to Phase time difference – Closing	5.0 ms			
Phase to Phase time difference - Opening	3.33 ms			

VI. IR Value of Control Circuit(using 500 volt megger)

Make of Kit:

Date of Calibration:

Coil Details	Unit	Value
R – Ø TRIP COIL – I	MΩ	
R – Ø TRIP COIL – II	MΩ	
R – Ø CLOSE COIL	MΩ	
Y – Ø TRIP COIL – I	MΩ	
Y – Ø TRIP COIL – II	MΩ	
Y – Ø CLOSE COIL	MΩ	
B – Ø TRIP COIL – I	MΩ	
B – Ø TRIP COIL – II	MΩ	
B – Ø CLOSE COIL	MΩ	

Permissible limit (Minimum): 50 MΩ

CAUTION: Isolate necessary dc for trip coil I and trip coil II, closing coil before meggering.

VII. Breaker Operation Counter Reading

Counter Type	Put ✓ Mark
ELECTRICAL	
MECHANICAL	

(Reading to be recorded before energisation)

Sl. No	Phase	Reading	Date
A	R-Ø		
B	Y-Ø		
C	B-Ø		

VIII. Dynamic Contact Resistance & Travel Measurement

Availability of Travel Transducer to be ensured prior to commencement of DCRM test.

Phase (Ø)	Factory	Site	Remarks	Approval From CC/AM Obtained
R				
Y				
B				

IX. Operation Time Measurement of Pole Discrepancy Relay

Pole discrepancy relay	Setting	Actual

Note- 2.5 Sec for CBs with Auto Reclose Function & 0.5 Sec for CBs without Auto Reclose Function.

X. Local Close Interlock Checked(with Earth Switch open)

Yes	No

XI. Final Documentation Review

i. Factory test results are available

Yes	No

ii. Final documents of Pre- Commissioning checks reviewed and approved

Yes	No

iii. Document regarding spares equipment, O&M manuals etc available at site for O&M purpose

Yes	No
-----	----

iv. After modification, if any, "As built Drawings" are available at site

Yes	No
-----	----

v. CC-OS approved DCRM signatures available

Yes	No
-----	----

Signature:

Signature:

Signature:

Signature:

Name:

Name:

Name:

Name:

Designation:

Designation:

Designation:

Designation:

Organization:

(Erection Agency)

(POWERGRID Site

(POWERGRID

(Supplier

I/C)

Commissioning Team)

Representative)

Members:

(Wherever

1.

Applicable)

2.

3.

4.

PRE COMMISSIONING CHECKS ON CURRENT TRANSFORMERS

I. General Details

DETAILS	
Region:	Sub-Station:
Bay Name:	LOA No:
Make:	Rating:
Sr. No: R- Ø: Y- Ø: B- Ø:	Type:
Year of Manufacturer: R –Ø: Y- Ø: B- Ø:	Date of Receipt at site: R –Ø: Y- Ø: B- Ø:
Date of Erection: R –Ø: Y- Ø: B- Ø:	Date of Energisation:

II. Rated Data And Duty

Core	Ratio	Class	Burden	KVp	Protection / Metering
Winding I					
Winding II					
Winding III					
Winding IV					
Winding V					
Winding VI					

III. Pre-Commissioning Checks:

Sl. No	Description	Status		Remark
		Yes	No	Record Deficiencies, If Any
1	Equipment is cleaned and free from dust / dirt foreign materials etc.			
2	Equipment is free from all visible defects on physical inspection			
3	Levelling and alignment of structure and base frame is checked			
4	Erection completed as per schematic			
5	Any paint removed / scratched in transit has been touched up			
6	Check primary polarity of CTs erected as per relevant drawing. Name plate details and P1/ P2 marking are available on equipment enclosure.			
7	All the cable identification tags provided and all cores are provided with identification ferrules in CT sec box and LCC panel.			
8	Check secondary cables are properly routed and dressed with proper support/ trays and unused holes at cable entry are sealed.			
9	Check the IR value of secondary cable			
10	Check external cabling from LCC panel to relay panel completed			
11	Ensure unused secondary cores, if any, has been shorted and earthed in LCC panel.			
12	Check star point has been formed properly and grounded at relay panel end only.			
13	Check that lugs used in secondary circuit are of ring type			
14	Check direction of primary (P1/ P2) w.r.t. Bus/ line on erection			

IV. Insulation Resistance Measurement

a. Insulation Resistance Measurement in $M\Omega$ (Using 500 V Megger)

Make & Sl . No of testing kit _____

Date of last Calibration of the kit _____

Ambient temp. in $^{\circ}C$ _____

Between	Unit	Phase		
		R $\emptyset$	Y $\emptyset$	B $\emptyset$
Secondary Core I – Earth	$M\Omega$			
Secondary Core II – Earth	$M\Omega$			
Secondary Core III – Earth	$M\Omega$			
Secondary Core IV – Earth	$M\Omega$			
Secondary Core V – Earth	$M\Omega$			
Secondary Core VI – Earth	$M\Omega$			

b.

Between	Unit	Phase		
		R $\emptyset$	Y $\emptyset$	B $\emptyset$
Core I – Core II	$M\Omega$			
Core I – Core III	$M\Omega$			
Core I – Core IV	$M\Omega$			
Core I – Core V	$M\Omega$			
Core I – Core VI	$M\Omega$			
Core II – Core III	$M\Omega$			
Core II – Core IV	$M\Omega$			
Core II – Core V	$M\Omega$			
Core II – Core VI	$M\Omega$			
Core III – Core IV	$M\Omega$			
Core III – Core V	$M\Omega$			
Core III – Core VI	$M\Omega$			
Core IV – Core V	$M\Omega$			
Core IV – Core VI	$M\Omega$			
Core V – Core VI	$M\Omega$			

V. Measurement of Secondary Winding Resistance (In Ohm)

Make & Sl. No of testing kit _____

Date of last Calibration of the kit _____

Ambient temp. in °C _____

Core	Terminal	Unit	R $\emptyset$		Y $\emptyset$		B $\emptyset$	
			Factory	Site	Factory	Site	Factory	Site
CORE I	1S1 – 1S2	Ω						
	1S1 – 1S3	Ω						
	1S1 – 1S4	Ω						
CORE II	2S1 – 2S2	Ω						
	2S1 – 2S3	Ω						
	2S1 – 2S4	Ω						
CORE III	3S1 – 3S2	Ω						
	3S1 – 3S3	Ω						
	3S1 – 3S4	Ω						
CORE IV	4S1 – 4S2	Ω						
	4S1 – 4S3	Ω						
	4S1 – 4S4	Ω						
CORE V	5S1 – 5S2	Ω						
	5S1 – 5S3	Ω						
	5S1 – 4S4	Ω						
CORE VI	6S1 – 6S2	Ω						
	6S1 – 6S3	Ω						
	6S1 – 6S4	Ω						

VI. POLARITY TEST

Core	Between		Phase		
			R $\emptyset$	Y $\emptyset$	B $\emptyset$
CORE I	1S1 (+VE)	1S2 (-VE)			
	1S1 (+VE)	1S3 (-VE)			
	1S1 (+VE)	1S4 (-VE)			
CORE II	2S1 (+VE)	2S2 (-VE)			
	2S1 (+VE)	2S3 (-VE)			
	2S1 (+VE)	2S4 (-VE)			
CORE III	3S1 (+VE)	3S2 (-VE)			
	3S1 (+VE)	3S3 (-VE)			
	3S1 (+VE)	3S4 (-VE)			
CORE IV	4S1 (+VE)	4S2 (-VE)			
	4S1 (+VE)	4S3 (-VE)			
	4S1 (+VE)	4S4 (-VE)			
CORE V	5S1 (+VE)	5S2 (-VE)			
	5S1 (+VE)	5S3 (-VE)			
	5S1 (+VE)	5S4 (-VE)			
CORE VI	6S1 (+VE)	6S2 (-VE)			
	6S1 (+VE)	6S3 (-VE)			
	6S1 (+VE)	6S4 (-VE)			

VII. Current Ratio Test

Make & Sl. No of testing kit _____

Date of last Calibration of the kit _____

R Phase-

Core	Between		Rated Ratio	Actual Ratio	Percentage Error
CORE I	1S1	1S2			
	1S1	1S3			
	1S1	1S4			
CORE II	2S1	2S2			
	2S1	2S3			
	2S1	2S4			
CORE III	3S1	3S2			
	3S1	3S3			
	3S1	3S4			
CORE IV	4S1	4S2			
	4S1	4S3			
	4S1	4S4			
CORE V	5S1	5S2			
	5S1	5S3			
	5S1	5S4			
CORE VI	6S1	6S2			
	6S1	6S3			
	6S1	6S4			

Y Phase-

Core	Between		Rated Ratio	Actual Ratio	Percentage Error
CORE I	1S1	1S2			
	1S1	1S3			
	1S1	1S4			
CORE II	2S1	2S2			

CORE III	2S1	2S3		
	2S1	2S4		
	3S1	3S2		
CORE IV	3S1	3S3		
	3S1	3S4		
	4S1	4S2		
CORE V	4S1	4S3		
	4S1	4S4		
	5S1	5S2		
CORE VI	5S1	5S3		
	5S1	5S4		
	6S1	6S2		
CORE VII	6S1	6S3		
	6S1	6S4		

B Phase-

Core	Between		Rated Ratio	Actual Ratio	Percentage Error
CORE I	1S1	1S2			
	1S1	1S3			
	1S1	1S4			
CORE II	2S1	2S2			
	2S1	2S3			
	2S1	2S4			
CORE III	3S1	3S2			
	3S1	3S3			
	3S1	3S4			
CORE IV	4S1	4S2			
	4S1	4S3			
	4S1	4S4			

CORE V	5S1	5S2			
	5S1	5S3			
	5S1	5S4			
CORE VI	6S1	6S2			
	6S1	6S3			
	6S1	6S4			

VIII. Magnetizing Curve Performance

R Phase-

Core	Between		Rated Knee Point Voltage	Actual Knee Point Voltage	Ext. Current at Rated Knee point Voltage	Ext. Current at Actualr. Knee point Voltage
*CORE I	1S1	1S2				
	1S1	1S3				
	1S1	1S4				
*CORE II	2S1	2S2				
	2S1	2S3				
	2S1	2S4				
*CORE V	5S1	5S2				
	5S1	5S3				
	5S1	5S4				
*CORE VI	6S1	6S2				
	6S1	6S3				
	6S1	6S4				

Y Phase-

Core	Between		Rated Knee Point Voltage	Actual Knee Point Voltage	Ext. Current at Rated Knee point Voltage	Ext. Current at Actualr. Knee point Voltage
------	---------	--	--------------------------	---------------------------	--	---

*CORE I	1S1	1S2		
	1S1	1S3		
	1S1	1S4		
*CORE II	2S1	2S2		
	2S1	2S3		
	2S1	2S4		
*CORE V	5S1	5S2		
	5S1	5S3		
	5S1	5S4		
*CORE VI	6S1	6S2		
	6S1	6S3		
	6S1	6S4		

B Phase-

Core	Between		Rated Knee Point Voltage	Actual Knee Point Voltage	Ext. Current at Rated Knee point Voltage	Ext. Current at Actualr. Knee point Voltage
*CORE I	1S1	1S2				
	1S1	1S3				
	1S1	1S4				
*CORE II	2S1	2S2				
	2S1	2S3				
	2S1	2S4				
*CORE V	5S1	5S2				
	5S1	5S3				
	5S1	5S4				
*CORE VI	6S1	6S2				
	6S1	6S3				
	6S1	6S4				

*Note : To be carried out only for protection cores. Format has been designed considering a six core CT. Format may be modified by site depending upon number of Cores

IX. Final Documentation Review

i. Final documents of Pre- Commissioning checks reviewed and approved

Yes	No

ii. Document regarding spares equipment, O&M manuals etc available at site for O&M purpose

Yes	No

iii. After modification, if any, “As built Drawings” are available at site

Yes	No

Signature:	Signature:	Signature:	Signature:
Name:	Name:	Name:	Name:
Designation:	Designation:	Designation:	Designation:
Organization:	(Erection Agency)	(POWERGRID Site I/C)	(POWERGRID Commissioning. Team)
(Supplier Representative)			Members:
(Wherever Applicable)			1.
			2.
			3.
			4.

PRE COMMISSIONING CHECKS ON POTENTIAL TRANSFORMERS

I. General Details

DETAILS	
Region:	Sub-Station:
Bay Name:	LOA No:
Make:	Primary Voltage Rating:
Secondary Voltage Rating:	Secondary Voltage Burden:
Winding - I:	Winding - I:
Winding - II:	Winding - II:
Winding - III:	Winding - III:
Sr. No:	Type:
R- Ø:	
Y- Ø:	
B- Ø:	
Year of Manufacturer:	Date of Receipt at site:
R- Ø:	R- Ø:
Y- Ø:	Y- Ø:
B- Ø:	B- Ø:
Date of Erection:	Date of Energisation:
R- Ø:	
Y- Ø:	
B- Ø:	

II. Impact Recorder

Status of Impact Recorder : OK/Not OK (If Not OK case may be referred to manufacturer for inspection)

III. Pre Commissioning Checks

Sl. No	Description	Status		Remarks Record Deficiencies, If Any
		YES	NO	
1	Equipment is free from all visible defects on physical inspection			
2	Check VT LV side winding has been provided with double earthing			

3	Check that PT secondary terminal box is earthed correctly as per specified GA drg.			
4	All nuts and bolts are tightened			
5	All fittings as per outline general arrangement drawing.			
6	Labelling and identification marking is available on GIS enclosure.			
7	Any paint removed / scratched in transit has been touched up			
8	Check secondary cable end box is properly fixed and ensure cable entry at the bottom.			
9	Check rating / healthiness of fuses at PT secondary terminal box			
10	Check the IR value of secondary cable (> 50 M ohms for control cables)			
11	All the cable identification tags provided and all cores are provided with identification ferrules at secondary terminal box and LCC panel			

IV. Continuity of Winding

i. Between terminals 1a – 1n

Yes	No

ii. Between terminals 2a – 1n

Yes	No

iii. Between terminals 3a – 1n

Yes	No

V. Secondary Winding Resistance

Phase	Core – I		Core – II		Core – III	
	Factory	Site	Factory	Site	Factory	Site
R - $\emptyset$						
Y - $\emptyset$						
B - $\emptyset$						

Factory Test Report Ref. No: _____

VI. Insulation Resistance Measurement (at 500 V)

Between	Unit	Measured Value		
		R $\emptyset$	Y $\emptyset$	B $\emptyset$
Secondary Core – I to Earth	M Ω			
Secondary Core – II to Earth	M Ω			
Secondary Core – III to Earth	M Ω			
Core – I to Core – II	M Ω			
Core – I to Core – III	M Ω			
Core – II to Core – III	M Ω			

VII. Voltage Ratio Test

To be tested at the time of HV test (during fifteen minute conditioning)

Phase	Primary Voltage	Secondary Voltage		Rated Ratio	Measured Ratio	Percentage Error
		Theoretical	Measured			
R						
Y						
B						

VIII. Final Documentation Review

i. Final documents of Pre- Commissioning checks reviewed and approved

Yes	No

ii. Document regarding spares equipment, O&M manuals etc available at site for O&M purpose

Yes	No

iii. After modification, if any, “As built Drawings” are available at site

Yes	No

Signature:

Signature:

Signature:

Signature:

Name:

Name:

Name:

Name:

Designation:

Designation:

Designation:

Designation:

Organization:

(Erection Agency)

(POWERGRID Site

(POWERGRID

(Supplier

I/C)

Commissioning. Team)

Representative)

Members:

(Wherever

1.

Applicable)

2.

3.

4.

PRE-COMMISSIONING FORMATS FOR ISOLATOR AND GROUNDING SWITCH**I. GENERAL DETAILS**

DETAILS	
Region:	Sub-Station:
Feeder name:	LOA No. :
Make:	Type:
Sr. No.:	Operating Voltage rating
R Ø:-	
Y Ø:-	
B Ø:-	
Control Voltage:	Current Carrying capacity:
Year of Manufacture:	Date of Receipt at site:
R Ø:-	R Ø:-
Y Ø:-	Y Ø:-
B Ø:-	B Ø:-
Date of Erection:	Date of Energisation :
R Ø:-	
Y Ø:-	
B Ø:-	

II. PRE-COMMISSIONING CHECKS

SL.NO	DESCRIPTION	STATUS		REMARK / RECORD DEFICIENCIES, IF ANY
		YES	NO	
1	Equipment is free from dirt/dust foreign materials etc.			
2	Equipment is free from all visible defects on physical Inspection			
3	All nuts and bolts are tightened correctly as per specified Torque			
4	Equipment erection is complete in all respect as per instruction Manual (attach remaining activities, if any)			
5	Auxiliary contacts and relays have been cleaned and free from rust / damage			

6	Functional checking of auxiliary contacts for indications and interlocks			
7	Earth switch connected to earth firmly			
8	Earth switch link grounding point marked clearly			
9	Interlocks checked as per approved scheme with all combinations			
10	Check that operation and positioning of the limit switch & the auxiliary contacts assembly are ok			
11	Check that all three phase isolators are closing & opening at a time			
12	Position indicator of isolator/earth switch drive checked			
13	Checking of manual operation through handle			
14	Electrical operation blocking during manual operation			

III. MOTOR DETAILS

	R - $\emptyset$	Y - $\emptyset$	B - $\emptyset$
Make			
Type			
Volt			
Amperes			
Hp/ kW			
O/L setting (Thermal Over load)			

IV. INSULATION RESISTANCE MEASUREMENT

Make of testing kit :

Date of calibration :

Ambient temperature :

Using 500 volt megger measure resistance between the winding of motor and earth

SL. NO	BETWEEN	PHASE		
		R $\emptyset$	Y $\emptyset$	B $\emptyset$
1	Winding to Earth			

PERMISSIBLE LIMIT (Min): 50 M ohm

V. OPERATIONAL CHECKS

- i. Operate the isolator and record the motor current

ISOLATOR OPERATION	MOTOR CURRENT					
	R - $\emptyset$		Y - $\emptyset$		B - $\emptyset$	
	FACTORY	SITE	FACTORY	SITE	FACTORY	SITE
CLOSE						
OPEN						

- ii. Operation of isolator from local / remote Ok/Not Ok

ISOLATOR OPERATION	CONTROL PANEL	
	LOCAL	REMOTE
CLOSE		
	OK	OK
OPEN		
	OK	OK

- iii. Measurement of operating time

OPERATION	UNIT	PHASE		
		R - $\emptyset$	Y - $\emptyset$	B - $\emptyset$
OPENING TIME	Sec			
CLOSING TIME	Sec			

VI. FINAL DOCUMENTATION REVIEW

- i. Final documents of Pre Commissioning checks reviewed and approved

Yes	No

ii. Document regarding spares equipment, O&M manuals etc available at site for O&M purpose

Yes	No

iii. After modification, if any, "As built Drawings" are available at site

Yes	No

Signature:	Signature:	Signature:	Signature:
Name:	Name:	Name:	Name:
Designation:	Designation:	Designation:	Designation:
Organization: (Supplier Representative) (Wherever Applicable)	(Erection Agency)	(POWERGRID Site I/C)	(POWERGRID Commissioning Team) Members: 1. 2. 3. 4.

PRE COMMISSIONING CHECKS ON GIS

I. Contact Resistance Measurement

Contact Resistance Measurement to be conducted for whole GIS by injecting 100 A current or more.

Contact Resistance Measurement to be carried out using following philosophy:

- a. Contact Resistance Measurement should be carried out using two adjacent Earth Switches. Measurement path shall include resistance of Main Conductor as well as Earth Switches.
- b. Long Sections by skipping adjacent Earth Switches shall not be acceptable
- c. Design/ factory test values to be provided by Manufacturer before starting Contact Resistance Measurement.
- d. In case any deviation in measured value of contact resistance w.r.t. design value, checking of connections and re-measurement should be attempted prior to forwarding results to CC/AM for review.
- e. Justification for variation in contact resistance beyond permissible limit to be taken from Manufacturer.
- f. Measurement of Contact Resistance can also be done by using milli volt drop method in case of limitation on account of cable length to be used for injecting current by CRM kit.

Typical Configuration for performing Contact Resistance Measurement for reference SLD (Double Main Bus Scheme) attached as Annexure – I has been shown in the table.

Make of Testing Kit:

Serial Number of Kit:

Date of Calibration of Kit:

Ambient Temperature:

Bay/Equipment Details	Phase	Between		Date	Measured Value	*Expected /Design Value
		Point No	Point No			
	R	1	2			
	Y	1	2			
	B	1	2			
	R	2	3			
	Y	2	3			
	B	2	3			
	R	3	4 (Bus – I)			
	Y	3	4 (Bus – I)			
	B	3	4 (Bus – I)			
	R	3	4 (Bus – II)			
	Y	3	4 (Bus – II)			
	B	3	4 (Bus – II)			
	R	3	5			
	Y	3	5			
	B	3	5			

	R	3	6			
	Y	3	6			
	B	3	6			
	R	4	5			
	Y	4	5			
	B	4	5			
	R	4	6			
	Y	4	6			
	B	4	6			
	R	6	7			
	Y	6	7			
	B	6	7			
	R	5	8			
	Y	5	8			
	B	5	8			
	R	7	8			
	Y	7	8			
	B	7	8			

Permissible limit: +/- 20 percentage of design value

Note:

1. CRM Measurement for a bay to be carried out in following parts:
 - a. Line/ICT/Reactor side Isolator Earth switch (Point no: 1) to CB – Line/ICT/Reactor side Earth switch (Point no: 2)
 - b. CB – Line/ICT/Reactor side Earth switch (Point no: 2) to CB – Bus side Earth switch (Point no: 3)
 - c. CB – Bus side Earth switch (Point no: 3) to adjacent bay CB – Bus side Earth switch (Point no: 4) (Through Both bus)
2. CRM measurement from Bus side Isolators (Q1/89A & Q2/89B) to Bus Earth Switch to be carried out for each bay for references at the time of Maintenance in future.

Typical Configuration for performing Contact Resistance Measurement for reference SLD (One and Half Breaker Scheme) attached as Annexure – II has been shown in the table.

Bay/Equipment Details	Phase	Between		Date	Measured Value	*Expected /Design Value
		Point No	Point No			
	R	1	2			
	Y	1	2			
	B	1	2			
	R	2	3			
	Y	2	3			
	B	2	3			
	R	3	4			
	Y	3	4			
	B	3	4			
	R	4	5			
	Y	4	5			
	B	4	5			
	R	5	6			
	Y	5	6			
	B	5	6			
	R	6	14			
	Y	6	14			
	B	6	14			
	R	1	9			
	Y	1	9			
	B	1	9			
	R	6	7			
	Y	6	7			
	B	6	7			
	R	1	8			
	Y	1	8			
	B	1	8			
	R	2	16			
	Y	2	16			
	B	2	16			
	R	15	16			
	Y	15	16			
	B	15	16			
	R	3	16			
	Y	3	16			
	B	3	16			
	R	15	19			
	Y	15	19			
	B	15	19			
	R	4	20			

	Y	4	20			
	B	4	20			
	R	5	20			
	Y	5	20			
	B	5	20			
	R	20	21			
	Y	20	21			
	B	20	21			
	R	20	24			
	Y	20	24			
	B	20	24			

Permissible limit: +/- 20 percentage of design value

Note:

1. CRM measurement from Bus side Isolators to Bus Earth Switch to be carried out for each bay for references at the time of Maintenance in future.

II. DS & ES Electrical Operations Test

a. For Double Main Bus Scheme, Sample SLD for reference attached as Annexure - III

Bay Details	Equipment Details	Operation	SCADA	LCC Panel Indication Lamp	Status Indicator At Equipment
	Q1/89A	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q2/89B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q51/ES	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q52/ES	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q9/89L	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q8/89LE	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK

b. For One and Half Breaker Scheme, Sample SLD attached as Annexure - IV

Bay Details	Equipment Details	Operation	SCADA	LCC Panel Indication Lamp	Status Indicator At Equipment
	Q1A	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q51A	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q52A	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q2A	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q2C	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK

	Q52C	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q51C	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q1C	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q2B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q52B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q51B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q1B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q54A-R	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q54A-Y	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q54A-B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q11A-R	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q11A-Y	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q11A-B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q10B-R	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q10B-Y	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q10B-B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q55A-R	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q55A-Y	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q55A-B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q55B-R	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q55B-Y	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q55B-B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Q10B-R	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
		Open	OK/NOT OK	OK/NOT OK	OK/NOT OK

Q10B-Y	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
Q10B-B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
Q11B-R	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
Q11B-Y	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
Q11B-B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
Q54B-R	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
Q54B-Y	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Open	OK/NOT OK	OK/NOT OK	OK/NOT OK
Q54B-B	Close	OK/NOT OK	OK/NOT OK	OK/NOT OK
	Open	OK/NOT OK	OK/NOT OK	OK/NOT OK

III. Alarms & Annunciation Check

Description of Alarm	Initiating Point		Checked At	
	Device Name (Density Monitor/ Relay etc)	Terminal No As per Drawing	LCC Panel Facia	SCADA HMI Alarm
Compartment 1 R phase Loss of SF6				
Compartment 1 Y phase Loss of SF6				
Compartment 1 B phase Loss of SF6				
Compartment 1 General Lockout				
Compartment 1 R phase Zone trip				
Compartment 1 Y phase Zone trip				
Compartment 1 B phase Zone trip				
Compartment 2 R phase Loss of SF6				
Compartment 2 Y phase Loss of SF6				
Compartment 2 B phase Loss of SF6				
Compartment 2 General Lockout				

Compartment 2 R phase Zone trip					
Compartment 2 Y phase Zone trip					
Compartment 2 B phase Zone trip					
Compartment N R phase Loss of SF6					
Compartment N Y phase Loss of SF6					
Compartment N B phase Loss of SF6					
Compartment N General Lockout					
Compartment N R phase Zone trip					
Compartment N Y phase Zone trip					
Compartment N B phase Zone trip					
CB Lockout					
CB Phase Discrepancy					
CB Motor Protection					
CB Motor Run Time Exceed					
CB Spring Discharge					
DC Failure					
Dis connector Q1 Blocked Mode					
Dis connector Q2 Blocked Mode					

Dis connector Q9 Blocked Mode				
ES Q51 Blocked Mode				
ES Q52 Blocked Mode				
ES Q53 Blocked Mode				
Dis connector Q1 Manual Mode				
Dis connector Q2 Manual Mode				
Dis connector Q9 Manual Mode				
ES Q51 Manual Mode				
ES Q52 Manual Mode				
ES Q53 Manual Mode				
Any other alarms				

IV. CHECKING OF INTERLOCKS

For Double Main Bus Scheme

Typical Configuration for checking interlocks for reference bay attached as Annexure – V has been shown in the table. The same principle should be replicated to each bay and the conditions should be derived from the scheme approved by Engineering department.

Circuit Breaker	Q0							
Operation	Q1	Q2	Q9	Q51	Q52	Possible/Not Possible	OK/Not OK	
Close	Close	Open	Close	NA	NA	Possible		
	Open	Open	Close	NA	NA	Not Possible		
	Open	Open	Open	NA	NA	Not Possible		
	Close	Open	Open	NA	NA	Not Possible		
	Open	Close	Close	NA	NA	Possible		
	Open	Open	Close	NA	NA	Not Possible		
	Open	Open	Open	NA	NA	Not Possible		
	Open	Close	Open	NA	NA	Not Possible		
	NA	NA	NA	Close	Close	Possible		
	NA	NA	NA	Open	Open	Not Possible		
	NA	NA	NA	Close	Open	Not Possible		
	NA	NA	NA	Open	Close	Not Possible		
Isolator	Q1							
Operation	C404 - Q51 (Bus Coupler Bay)	Q0	Q2	Q51	Q52	Selector Switch Position of Q1	Possible/N ot Possible	OK/Not OK
Close/Open	Open	Open	Open	Open	Open	Not in Manual	Possible	
	Close	Open	Open	Open	Open	Not in Manual	Not Possible	
	Open	Close	Open	Open	Open	Not in Manual	Not Possible	
	Open	Open	Close	Open	Open	Not in Manual	Not Possible	
	Open	Open	Open	Close	Open	Not in Manual	Not Possible	
	Open	Open	Open	Open	Close	Not in Manual	Not Possible	
	Open	Open	Open	Open	Open	Manual	Not Possible	
Operation	C404 - Q0 (Bus Coupler Bay)	C404 - Q1 (Bus Coupler Bay)	C404 - Q2 (Bus Coupler Bay)	Q0	Q2	Selector Switch Position of Q1	Possible/N ot Possible	OK/Not OK
	Close	Close	Close	Close	Close	Not in	Possible	

Close/Open						Manual		
	Open	Close	Close	Close	Close	Not in Manual	Not Possible	
	Close	Open	Close	Close	Close	Not in Manual	Not Possible	
	Close	Close	Open	Close	Close	Not in Manual	Not Possible	
	Close	Close	Close	Close	Open	Not in Manual	Not Possible	
	Close	Close	Close	Close	Close	Manual	Not Possible	

Isolator	Q2							
Operation	C404 - Q52 (Bus Coupler Bay)	Q0	Q1	Q51	Q52	Selector Switch Position of Q2	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Open	Open	Not in Manual	Possible	
	Close	Open	Open	Open	Open	Not in Manual	Not Possible	
	Open	Close	Open	Open	Open	Not in Manual	Not Possible	
	Open	Open	Close	Open	Open	Not in Manual	Not Possible	
	Open	Open	Open	Close	Open	Not in Manual	Not Possible	
	Open	Open	Open	Open	Close	Not in Manual	Not Possible	
	Open	Open	Open	Open	Open	Manual	Not Possible	
Operation	C404 - Q0 (Bus Coupler Bay)	C404 - Q1 (Bus Coupler Bay)	C404 - Q2 (Bus Coupler Bay)	Q0	Q2	Selector Switch Position of Q2	Possible/Not Possible	OK/Not OK
Close/Open	Close	Close	Close	Close	Close	Not in Manual	Possible	
	Open	Close	Close	Close	Close	Not in Manual	Not Possible	
	Close	Open	Close	Close	Close	Not in Manual	Not Possible	
	Close	Close	Open	Close	Close	Not in Manual	Not Possible	
	Close	Close	Close	Close	Open	Not in Manual	Not Possible	
	Close	Close	Close	Close	Close	Manual	Not Possible	

Earth Switch	Q51					
Operation	Q1	Q2	Q9	Selector Switch Position of Q51	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Not in Manual	Possible	
	Close	Open	Open	Not in Manual	Not Possible	
	Open	Close	Open	Not in Manual	Not Possible	
	Open	Open	Close	Not in Manual	Not Possible	
	Open	Open	Open	Manual	Not Possible	

Earth Switch	Q52					
Operation	Q1	Q2	Q9	Selector Switch Position of Q52	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Not in Manual	Possible	
	Close	Open	Open	Not in Manual	Not Possible	
	Open	Close	Open	Not in Manual	Not Possible	
	Open	Open	Close	Not in Manual	Not Possible	
	Open	Open	Open	Manual	Not Possible	

Isolator	Q9							
	Q0	Q51	Q52	Q8	LV E/SW	Selector Switch Position of Q9	Possible/Not Possible	OK/Not OK
Operation	Open	Open	Open	Open	Open	Not in Manual	Possible	
Close/Open	Close	Open	Open	Open	Open	Not in Manual	Not Possible	
	Open	Close	Open	Open	Open	Not in Manual	Not Possible	
	Open	Open	Close	Open	Open	Not in Manual	Not Possible	
	Open	Open	Open	Close	Open	Not in Manual	Not Possible	
	Open	Open	Open	Open	Close	Not in Manual	Not Possible	
	Open	Open	Open	Open	Open	Manual	Not Possible	

Earth Switch	Q8				
Operation	Q9	Q9 IV side	Selector Switch Position of Q8	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Not in Manual	Possible	
	Close	Open	Not in Manual	Not Possible	
	Open	Close	Not in Manual	Not Possible	
	Open	Open	Manual	Not Possible	

For One & Half Breaker Scheme

Typical Configuration for checking interlocks for reference bay attached as Annexure – VI has been shown in the table. The same principle should be replicated to each bay and the conditions should be derived from the scheme approved by Engineering department.

For an ICT Main Bay

Isolator	709-89A						
Operation	709-89AE2	Bus side Earth Switch Any Other bay-89AE2	709-89BE	709-89AE1	709-52	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Close	Not Possible	

Isolator	709-89B							
Operation	709-89BE	709-89AE1	709-52	709-89TSE1R	709-89TSE1Y	709-89TSE1B	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Open	Not Possible	
	Open	Open	Close	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Open	Close	Not Possible	

Earth Switch	709-89AE2			
Operation	Isolator of Main Bay connected to Bus same as 709	709-89A	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Earth Switch	709-89AE1			
Operation	709-89A	709-89B	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	
Earth Switch	709-89BE			
Operation	709-89A	709-89B	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Circuit Breaker	709-52 (Local Operation)			
Operation	709-89AE1	709-89BE	Possible/Not Possible	OK/Not OK
Close/Open	Close	Close	Possible	
	Open	Close	Not Possible	
	Close	Open	Not Possible	

Isolator	709-89T-R											OK / Not OK
Operation	709-52	708-52	LV Side - Main CB	LV Side - Tie CB	709-89T-S1R&S2R	709-89TE-R	LV Side ICT - 89TE-R	709-89TSE1 R	709-89TSE1 Y	709-89TSE1 B	Possible/Not Possible	
Close/Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Close	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Close	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Close	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Open	Close	Not Possible	

Isolator		709-89T-Y										OK/ Not OK
Operation	709-52	708-52	LV Side - Main CB	LV Side - Tie CB	709-89T-S1Y&S2Y	709-89TE-Y	LV Side ICT - 89TE-Y	709-89TSE1R	709-89TSE1Y	709-89TSE1B	Possible/Not Possible	
Close/Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Close	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Close	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Close	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Open	Close	Not Possible	
Isolator		709-89T-B										OK/ Not OK
Operation	709-52	708-52	LV Side - Main CB	LV Side - Tie CB	709-89T-S1B&S2B	709-89TE-B	LV Side ICT - 89TE-B	709-89TSE1R	709-89TSE1Y	709-89TSE1B	Possible/Not Possible	
Close/Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Close	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Close	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Close	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Open	Close	Not Possible	

Isolator		709-89T-S1R&S2R										OK / Not OK
Operation	709-52	708-52	LV Side - Main CB	LV Side - Tie CB	709-89T-R	709-89T-S1Y&S2Y	709-89T-S1B&S2B	709-89TSE1 R	709-89TSE1 Y	709-89TSE1 B	Possible/ Not Possible	
Close/Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Close	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Close	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Close	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Open	Close	Not Possible	

Isolator		709-89T-S1Y&S2Y										OK/ Not OK
Operation	709-52	708-52	LV Side - Main CB	LV Side - Tie CB	709-89T-Y	709-89T-S1R&S2R	709-89T-S1B&S2B	709-89TSE1 R	709-89TSE1 Y	709-89TSE1 B	Possible/ Not Possible	
Close/Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Close	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Close	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Close	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Open	Close	Not Possible	

Isolator	709-89T-S1B&S2B											
Operation	709-52	708-52	LV Side - Main CB	LV Side - Tie CB	709-89T-B	709-89T-S1R&S2R	709-89T-S1Y&S2Y	709-89TSE1 R	709-89TSE1 Y	709-89TSE1 B	Possible/Not Possible	OK / Not OK
Close/Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Close	Open	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Close	Open	Open	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Close	Open	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Open	Open	Open	Open	Open	Close	Not Possible	

For a Tie Bay (Line & ICT)

Isolator	708-89A							
Operation	708-52	708-89AE	708-89BE	709-89TSE1R	709-89TSE1Y	709-89TSE1B	Possible/Not Possible	OK/ Not OK
Close/Open	Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Open	Not Possible	
	Open	Open	Close	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Open	Not Possible	
	Open	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Open	Close	Not Possible	

Isolator	708-89B				
Operation	708-52	708-89AE	708-89BE	Possible/Not Possible	OK/ Not OK
Close/Open	Open	Open	Open	Possible	
	Close	Open	Open	Not Possible	
	Open	Close	Open	Not Possible	
	Open	Open	Close	Not Possible	

Earth Switch	708-89AE			
Operation	708-89A	708-89B	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Earth Switch	708-89BE			
Operation	708-89A	708-89B	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Circuit Breaker	708-52 (Local Operation)			
Operation	708-89AE	709-89BE	Possible/Not Possible	OK/Not OK
Close/Open	Close	Close	Possible	
	Open	Close	Not Possible	
	Close	Open	Not Possible	

For a Line Main Bay

Isolator	707-89A						
Operation	707-89AE2	Bus side Earth Switch Any Other bay-89AE2	707-89BE	707-89AE1	707-52	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Open	Not Possible	
	Open	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Open	Close	Not Possible	

Isolator	707-89B				
Operation	707-89BE	707-89AE1	707-52	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Possible	
	Close	Open	Open	Not Possible	
	Open	Close	Open	Not Possible	
	Open	Open	Close	Not Possible	

Isolator	707-89L				
Operation	707-89LE	708-52	707-52	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Possible	
	Close	Open	Open	Not Possible	
	Open	Close	Open	Not Possible	
	Open	Open	Close	Not Possible	

Earth Switch	707-89AE1			
Operation	707-89A	707-89B	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Earth Switch	707-89BE			
Operation	707-89A	707-89B	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Earth Switch	707-89AE2			
Operation	Isolator of Main Bay connected to Bus same as 707	707-89A	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Circuit Breaker	707-52 (Local Operation)			
Operation	707-89AE1	709-89BE	Possible/Not Possible	OK/Not OK
Close/Open	Close	Close	Possible	
	Open	Close	Not Possible	
	Close	Open	Not Possible	

For ICT (without Spare ICT Switching Scheme) Main Bay

Typical Configuration for checking interlocks for reference bay attached as Annexure – VII has been shown in the table. The same principle should be replicated to each bay and the conditions should be derived from the scheme approved by Engineering department.

Isolator	4Z-89B					
Operation	4n-89BE2	4Z-52	4Z89BE/BE-1	4Z-89AE	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Open	Possible	
	Close	Open	Open	Open	Not Possible	
	Open	Close	Open	Open	Not Possible	
	Open	Open	Close	Open	Not Possible	
	Open	Open	Open	Close	Not Possible	

Earth Switch	4Z-89BE/BE1			
Operation	4Z-89B	4Z-89A	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Isolator	4Z-89A				
Operation	4Z-52	4Z-89AE	4Z-BE/BE1	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Possible	
	Close	Open	Open	Not Possible	
	Open	Close	Open	Not Possible	
	Open	Open	Close	Not Possible	

Earth Switch	4Z-89AE			
Operation	4Z-89B	4Z-89B	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Isolator	4Z-89T				
Operation	4Z-52	4B-52	4Z-89TE	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Open	Possible	
	Close	Open	Open	Not Possible	
	Open	Close	Open	Not Possible	
	Open	Open	Close	Not Possible	

Earth Switch	4Z-89TE			
Operation	4Z-89T	220 KV Line Isolator	Possible/Not Possible	OK/Not OK
Close/Open	Open	Open	Possible	
	Close	Open	Not Possible	
	Open	Close	Not Possible	

Circuit Breaker	4Z-52 (Local Operation)				
Operation	4Z-52 Mode	4Z-89AE	4Z-89BE/BE1	Possible/Not Possible	OK/Not OK
Close/Open	Local	Open	Open	Possible	
	Local	Close	Open	Not Possible	
	Local	Open	Close	Not Possible	

V. High Voltage and Partial Discharge Measurements

a. Onsite Sensitivity Test

The sensitivity verification test to be done in accordance to CIGRE Task Force 15/33.03.05 of working group 15.03. the onsite UHF sensor Sensitivity verification is done before performing HV test & PD test so as to ascertain the proper functioning of UHF sensors & kit. Artificial pulses are injected into PD couplers to stimulate electromagnetic wave and measured in the adjacent couplers. Sensitivity test is performed by injecting a artificial pulse magnitude equivalent to apparent charge of 5 pc in UHF sensors and then detecting PD in adjacent UHF sensors. The calibration/test report of artificial pulse injector to prove equivalence to 5 pC in accordance to Step I of the CIGRE Task Force TF 15/33.05.05 procedure is required to be submitted by the testing agency. Sensitivity values measured at sensors during on-site sensitivity verification test as a reference value and saved to compare with actual PD measured to determine if actual PD is less/ more than 5 pC. By conducting sensitivity test, it can be ensured that a defect/ particle creating a partial discharge of 5 pc or above can be detected during PD measurements by the kit. As per CIGRE recommendation, Onsite Sensitivity Test should be done using same UHF sensors, Pulse Generator & PD Test System which have been in the factory at the time of determination of artificial pulse magnitude.

The artificial pulse injected at any PD coupler must be detectable by the adjacent PD couplers and if the same is not detected, matter to be taken up with manufacturer for review of location of PD couplers of GIS.

Requirements:

Sensitivity test plan to be submitted to Site Incharge for approval with following details :

- Single Line Diagram showing position of UHF sensors along with sensor ID
- Sensor Combinations to be used for sensitivity measurement as per "Sensitivity – Sensor Combination Table" shown below.
- Test report of artificial pulse injector to prove equivalence to 5 pC in accordance to Step I of the CIGRE Task Force TF 15/33.05.05
- Calibration report of standard signal generator.

Typical Configuration for conducting Sensitivity test for reference SLD attached as Annexure – VIII has been shown in the table.

Sensitivity – Sensor Combination Table

Bay/ Equipment Details	Phase	Pulse Injected at Sensor No	Measuring Sensor & Measured Value (in dB, %, mV)		Measuring Sensor & Measured Value (in dB, %, mV)		Measuring Sensor & Measured Value (in dB, %, mV)	
			Sensor	Value	Sensor	Value	Sensor	Value
	R	1	2					
	Y	1	2					
	B	1	2					
	R	2	8		1			
	Y	2	8		1			
	B	2	8		1			
	R	6	5		10		9	
	Y	6	5		10		9	

	B	6	5		10		9	
	R	10	11		4			
	Y	10	11		4			
	B	10	11		4			

Based on above combinations shown in table as reference, sensitivity test for different combinations possible at site shall be performed.

Prior to commencement of test, sensitivity test plan submitted by manufacturer to be sent to CC/AM for approval atleast one week in advance.

b. High Voltage Test

High Voltage test is performed on GIS before commencing PD measurement. Test voltage will be applied between phase and earth with other two phases and enclosure in earthed condition. Test voltage will be supplied by a resonant test system of variable frequency. High Voltage is achieved by resonating the test kit at a particular frequency. The resonant frequency will be different depending on capacitance of GIS test sections. Test frequency should not be less than frequency guaranteed by VT manufacturer.

Requirements:

1. Secondary circuit of VT are open.
2. Secondary circuit of CT are short circuited and earthed.
3. HV cables are disconnected from GIS.
4. ICTs, Reactors and Transmission lines are disconnected from GIS.
5. Valid Calibration report of HV test kit is available.
6. All the Earth switches of the testing section shall be open and earthing link shall be tight
7. Voltage transformers to be connected (minimum upto rated voltage) and tested with switchgear

Note: It is to be ensured that all pre commissioning test shall be completed before starting High Voltage test (as per IEC 62271-102 Clause No : 10.2.101.1.1).

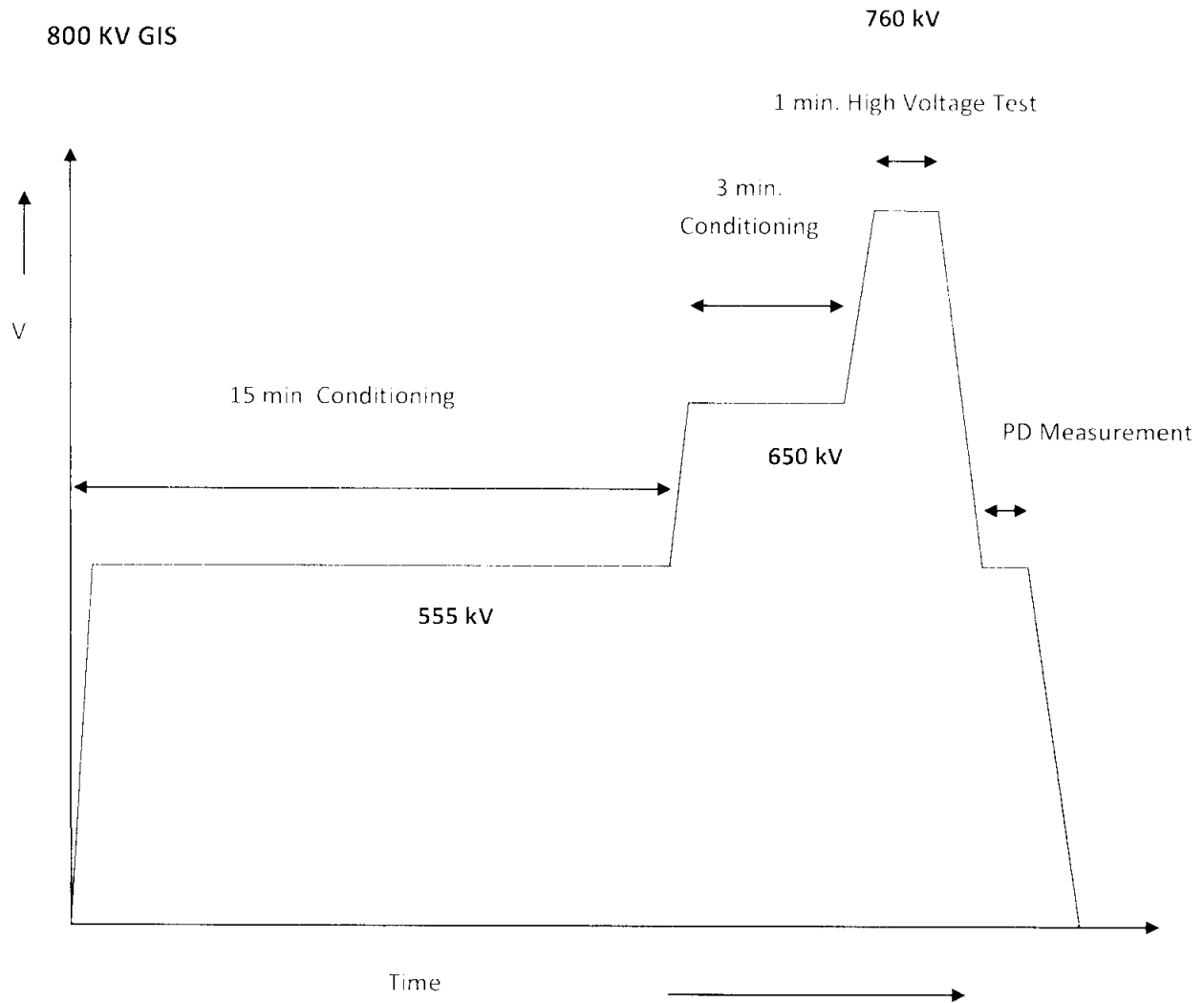
Prior to commencement of HV test, test plan for same submitted by manufacturer to be sent to CC/AM for approval atleast one week in advance.

Make of Testing Kit:

Serial Number of Kit:

Date of Calibration of Kit:

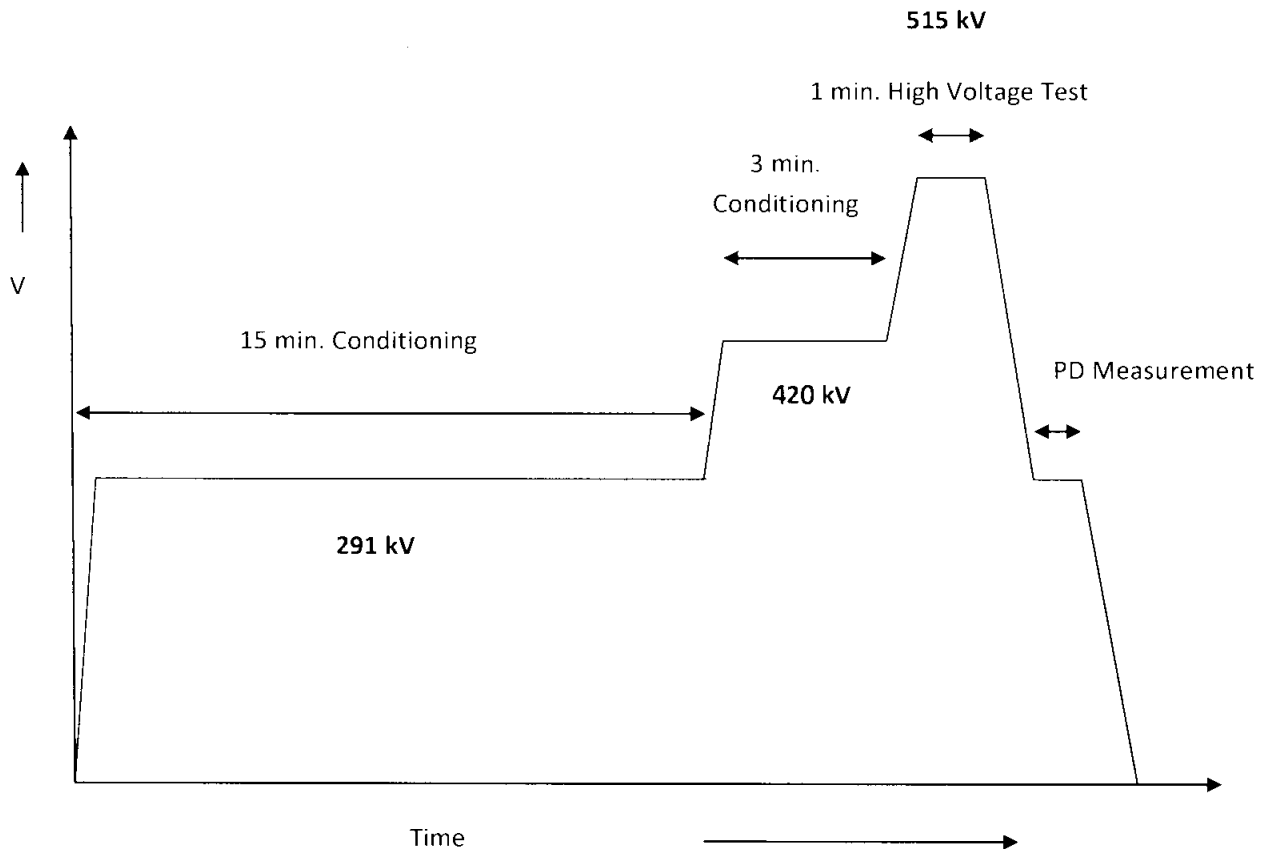
Ambient Temperature:



Note: $U_d = 0.45 \times 0.8 \times \text{lightning impulse voltage}$
As per IEC 62271-203

Bay/Equipment Details	Phase	Date	555 KV for 15 minutes	650 KV for 3 minutes	760 KV for 1 minute	PD Voltage 555 KV	Remarks (if any) Regarding Flashovers
	R						
	Y						
	B						
	R						
	Y						
	B						
	R						
	Y						

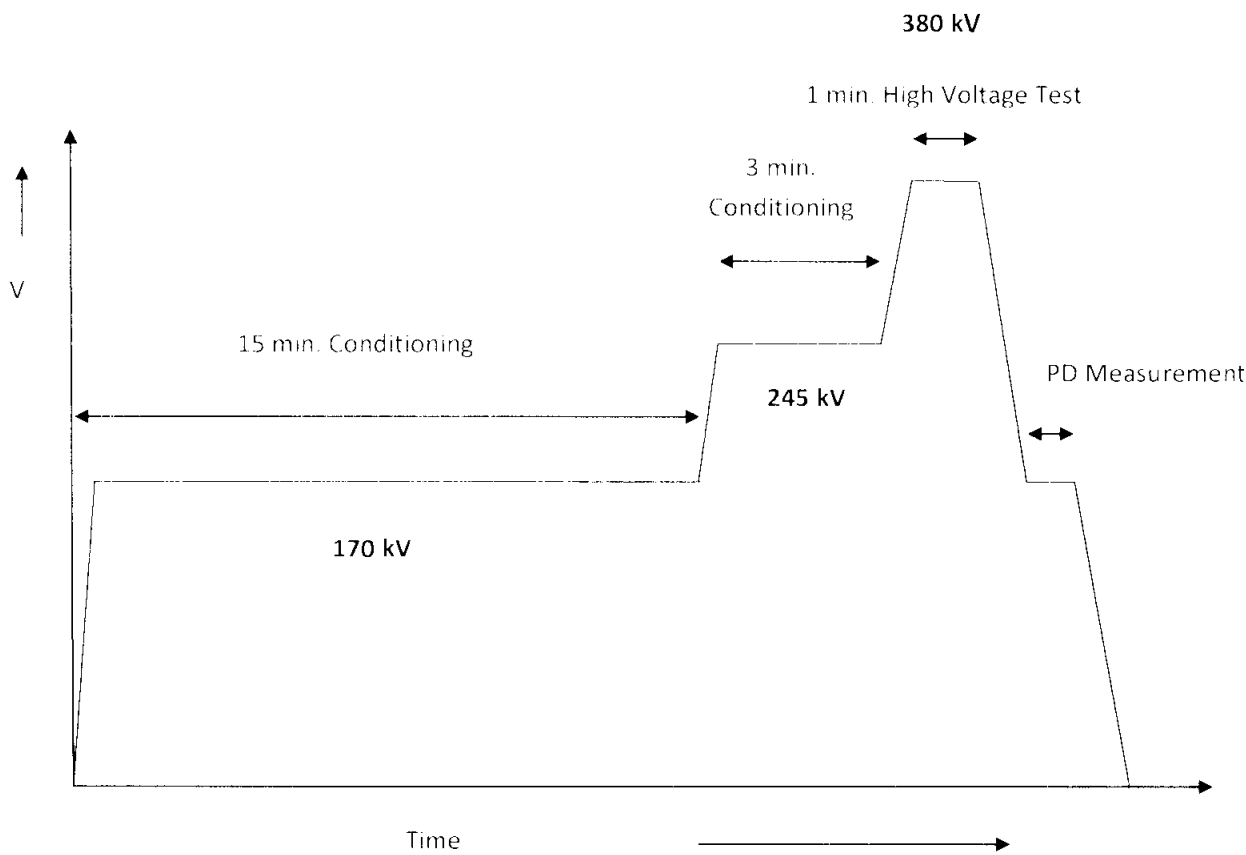
420 KV GIS



Note: $U_d = 0.45 \times 0.8 \times \text{lightning impulse voltage}$
 As per IEC 62271-203

Bay/Equipment Details	Phase	Date	291 KV for 15 minutes	420 KV for 3 minutes	515 KV for 1 minute	PD Voltage 291 KV	Remarks (if any) Regarding Flashovers
	R						
	Y						
	B						
	R						
	Y						
	B						
	R						
	Y						
	B						

245 KV GIS



Note: $U_d = 0.45 \times 0.8 \times \text{lightning impulse voltage}$
As per IEC 62271-205

Bay/Equipment Details	Phase	Date	170 KV for 15 minutes	245 KV for 3 minutes	380 KV for 1 minute	PD Voltage 170 KV	Remarks (if any) Regarding Flashovers
	R						
	Y						
	B						
	R						
	Y						
	B						
	R						
	Y						
	B						

c. Partial Discharge Measurement

PD measurement is conducted to detect any void/contamination/surface defect/floating particle defect in GIS before commissioning. PD test to be done immediately after completion of Hi Voltage as shown in HV test diagram above.

Maximum permissible Limit for PD measurement of GIS is 5 pC as per IEC 62271-203. The PD measurement taken for each UHF coupler is compared with the results obtained in sensitivity test to compare if the actual PD is higher than 5 pC.

Note:

1. Background Noise pattern without High Voltage and artificial pulse injection shall also recorded for reference at the time of PD Measurement.
2. PD Measurement kit to be synchronized with Voltage feedback from Hi voltage test system.
3. PD graphs corresponding to each sensor measured during test needs to be saved both in soft as well as hard form for future reference at the time of O&M period.
4. In case any partial discharge is observed at any sensor, PRPD pattern of that sensor to be recorded to ascertain type of partial discharge (void/floating electrode/noise stc).

d. Switching Impulse Test (To be carried out only incase provision for this test exists in Scope of Contract)

Switching Impulse Test is carried out on 800kV rating Gas Insulated Substation to detect presence of contaminations & abnormal field configurations.

Requirements

- a. GIS must be filled with SF6 at rated pressure.
- b. Secondary windings of all CTs should be short circuited & grounded.
- c. Voltage Transformers must be open
- d. Surge Arresters must be dis-mantled.
- e. During Test, ICTs, Reactors, Transmission lines & Cables must be disconnected from GIS.
- f. Valid Calibration report of Impulse Voltage Generator test kit is available.
- g. All the Earth switches of the testing section shall be open and earthing link shall be tight

Procedure

GIS shall be subjected to three impulses of each polarity (positive & negative) and values of impulses shall be calculated as per following formula mentioned in IEC 62271 – 100 :

Test Voltage = $0.8 \times \text{Rated Switching Impulse Level}$

As per Technical Specifications, Rated Switching Impulse Level for 800kV GIS has been mentioned as 1550kV.

Test Voltage = $0.8 \times 1550 = 1240\text{kV peak}$

In order to pass the test, GIS must withstand three impulses of each polarity (positive & negative) with full test test voltage (i.e. 1240kV pk).

VI. Earth Resistance Measurement

Earth Resistance needs to be measured for Outdoor Yard (at each voltage level) and each Bay in GIS Hall.

Indoor GIS Hall

SI	Bay	Resistance (In Ohm)

Outdoor (To be Measured at Minimum 2 locations in yard for each Voltage Level)

SI	Voltage Level	Resistance (In Ohm)	
		Location – I	Location – II

FORMAT FOR RECORD OF MAJOR FAILURES OF EQUIPMENT AND COMPONENTS DURING PRE-COMMISSIONING STAGE

In order to have complete information of problems observed during pre-commissioning stage for assessment of quality of product and erection workmanship, record of major problems is required to be maintained. This helps in identifying the critical area vulnerable/ prone to failure and analysing the same to avert the same in future during O&M stage with the help of manufacture/ supplier. The record of major problems observed during erection and pre-commissioning stage to be maintained in the format given below and to be signed by contractor, manufacturer & POWERGRID. The problems including GIS mechanical assembly parts, motor drives & drive mechanism, SF6 gas leakage, Density monitor and contacts, items rejected due to transport /storage damage, failures observed during HV test with details of location and reason found after opening the compartment, detection of partial discharge during HV test , improper contact resistance, CB, Isolator, CT, VT improper test values, indication and interlocks etc may be recorded.

SL. NO.	DATE OF OBSERVATION	BAY NO	EQUIPMENT/COMPONENT DETAILS	DESCRIPTION OF PROBLEM	ACTION TAKEN
1.					
2					
3					
4					
5					
6					

Signature

POWERGRID

CONTRACTOR

MANUFACTURER

FORMAT FOR RECORDING HEALTHINESS OF GIS PACKING ON RECEIPT AT SITE

Sl	Packing No./ Description	Physical damage to packing (Yes/No)	Positive N2 pressure (Yes/No)	Shock Indicator Operated (Yes/No)	Impact Recorder data & Report submitted (Yes/No)	Impact Limit Violation (Yes/No)	Remarks (if any)
1.							
2.							
3.							
4.							
5.							
10.							

Signature :	Signature :
Name :	Name :
Designation :	Designation :
GIS Manufacturer	POWERGRID Site Incharge

[illegible]

1110X11 1110X5

1110X3

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W1 M1
110 X3
X 0105
4010A

011 ES 8

807 01A 11
3150A

807 01A 11
3150A

9
807 01A 11

807 01A 11

807 01A 11
3150A 404A

807 01A 11
3150A 404A

10

10

807 05A 11
3150A

807 05A 11

807 01A 11
3150A

2
807 02A 11
3150A

807 01A 11
3150A

807 01A 11
3150A

11

3

807 0520 11

807 0520 11

807 01A 11
3150A 404A

807 01A 11
3150A 404A

807 051 11
3150A

12

807 01A 11

807 01A 11

4
807 051 11
3150A

807 02B 11
3150A

13

807 052B 11

807 02B 11
3150A

5

807 052B 11

807 000 11

807 00B 11
3150A 404A

807 00B 11
3150A 404A

807 051B 11
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14

807 01B 11
3150A

807 051B 11

6

807 01B 11
3150A

01 11 ALPHA 11
3150A 404A

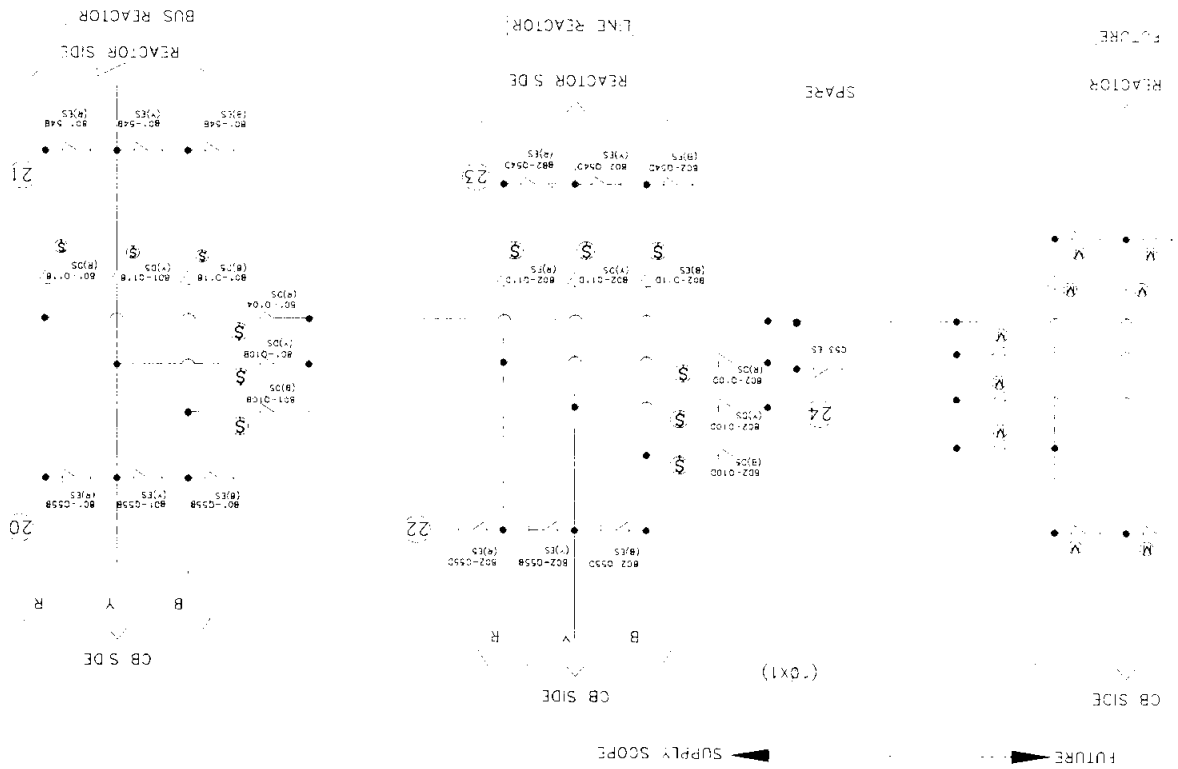
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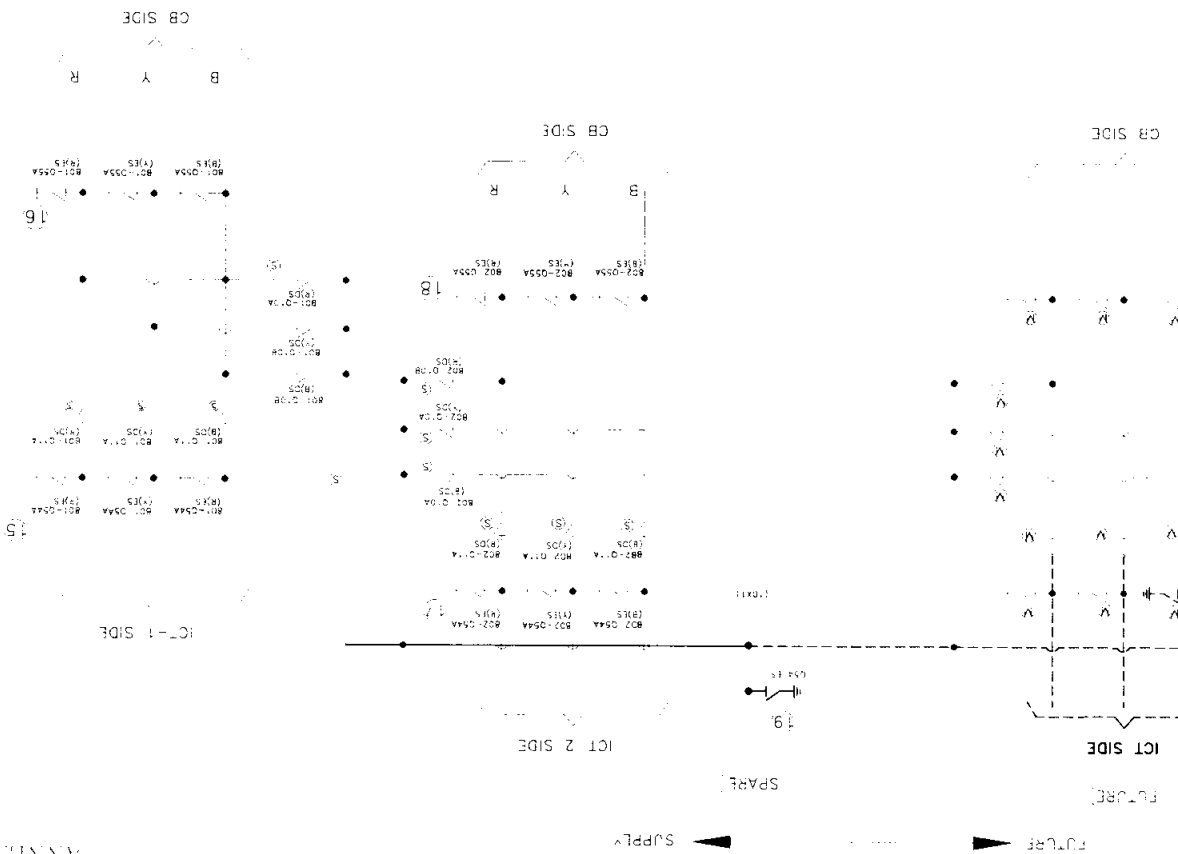
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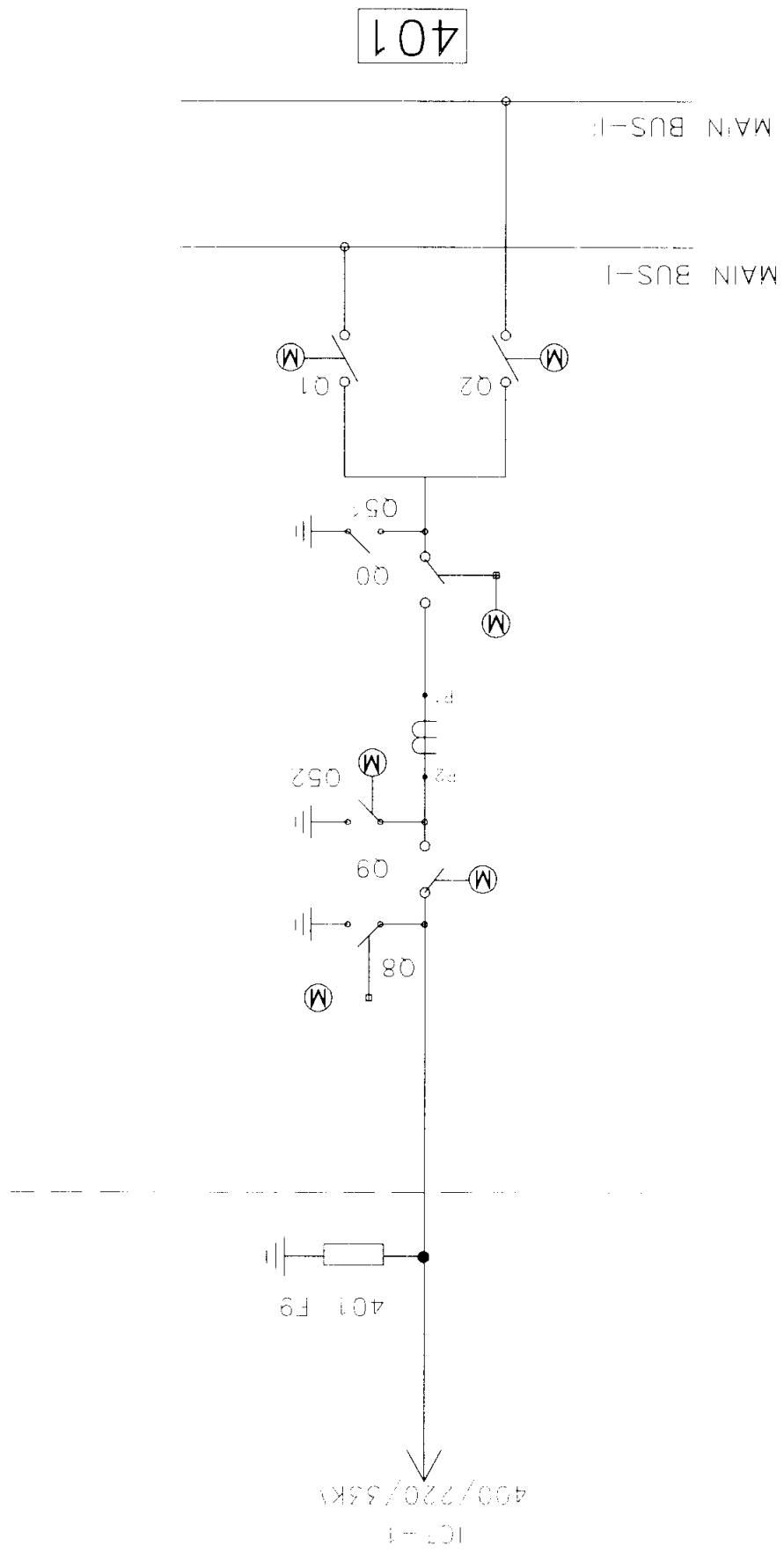
1110X3

DETAIL "B" (SINGLE PHASE)



DETAIL "A" (SINGLE PHASE)





11-11-11

Z. (10X3)

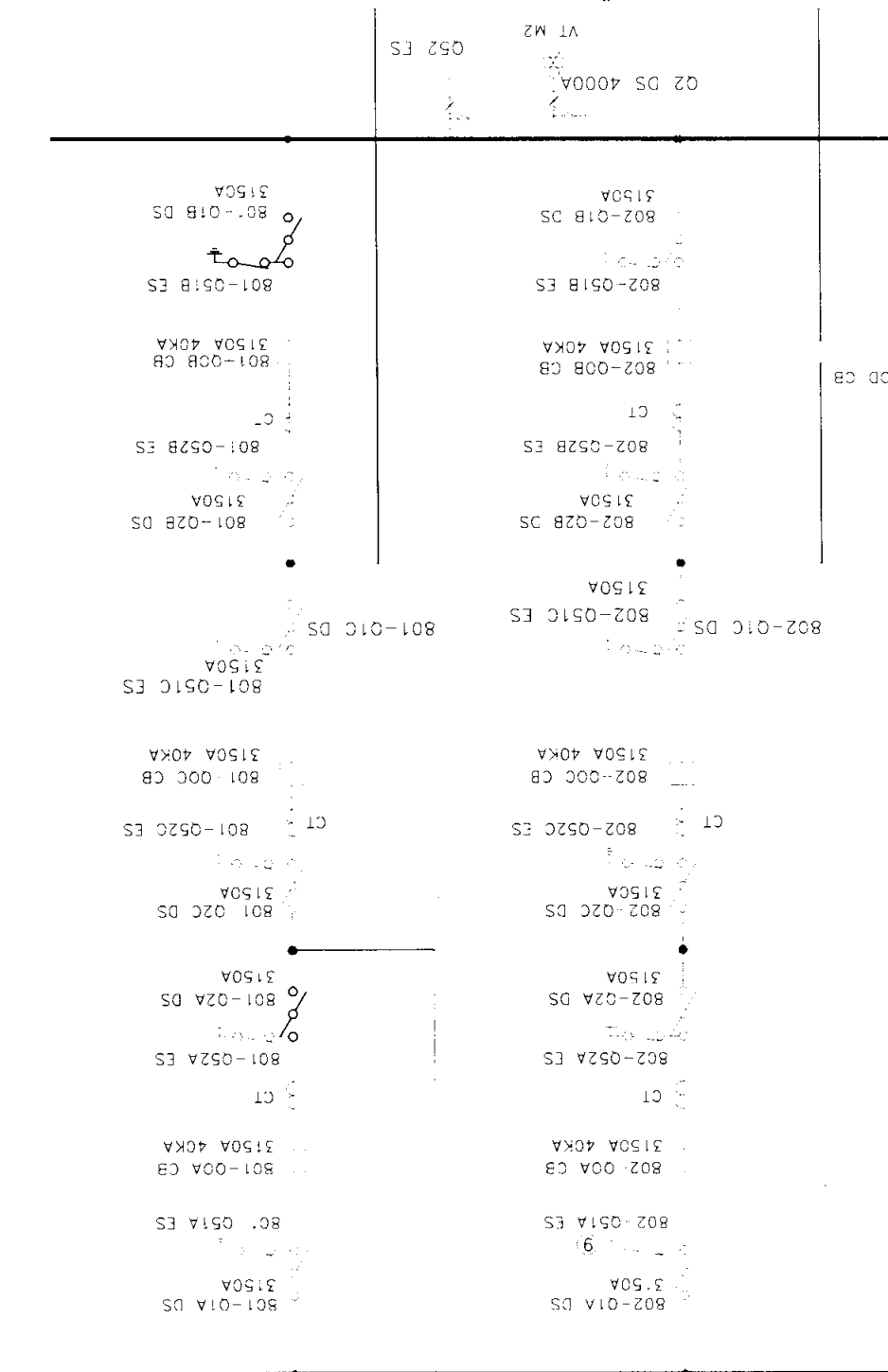
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Z. (10X3)

DETAIL A

VT-M1
(10 X3)
Q1DS
Q1DS
4000A

Q51 ES



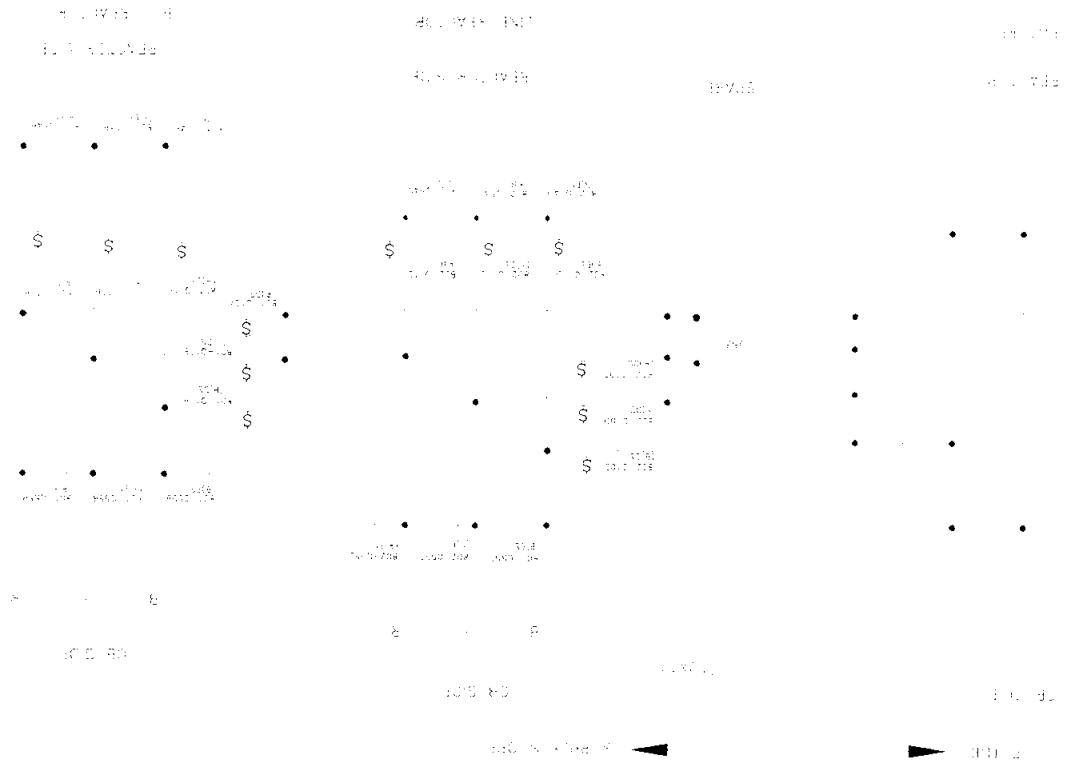
DETAIL B

Z. (10X3)

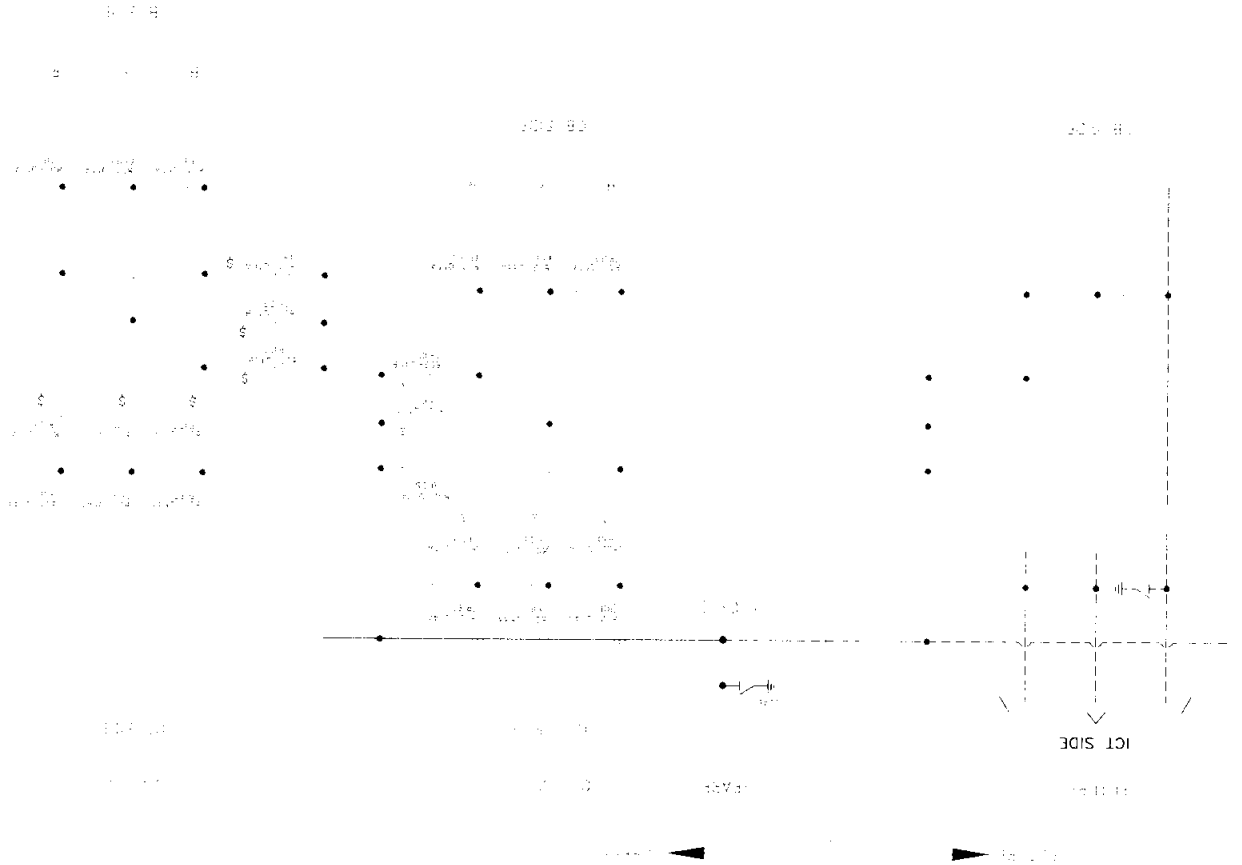
Z. (10X3)

Q52 ES

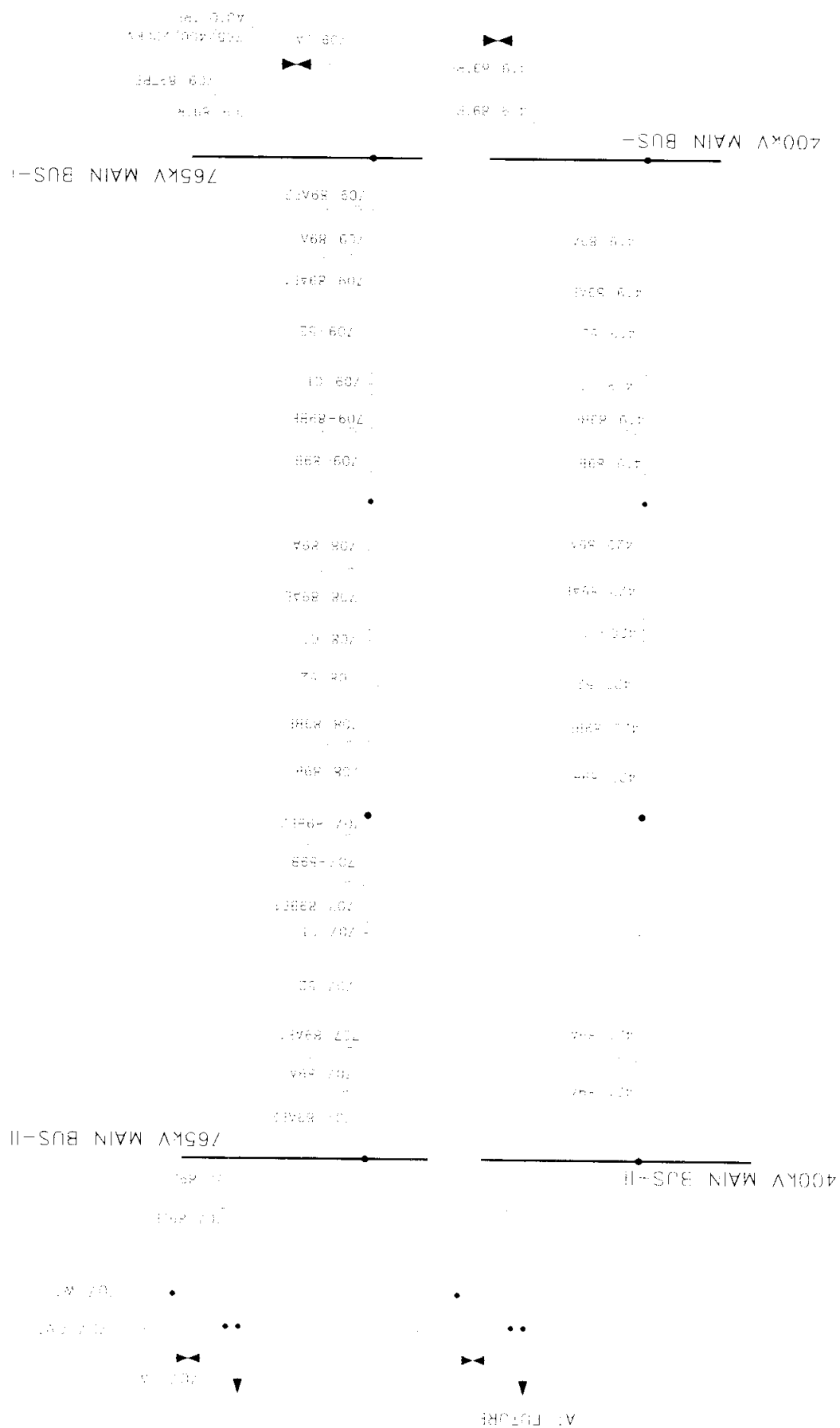
(SINGLE PHASE) DETAIL "A"



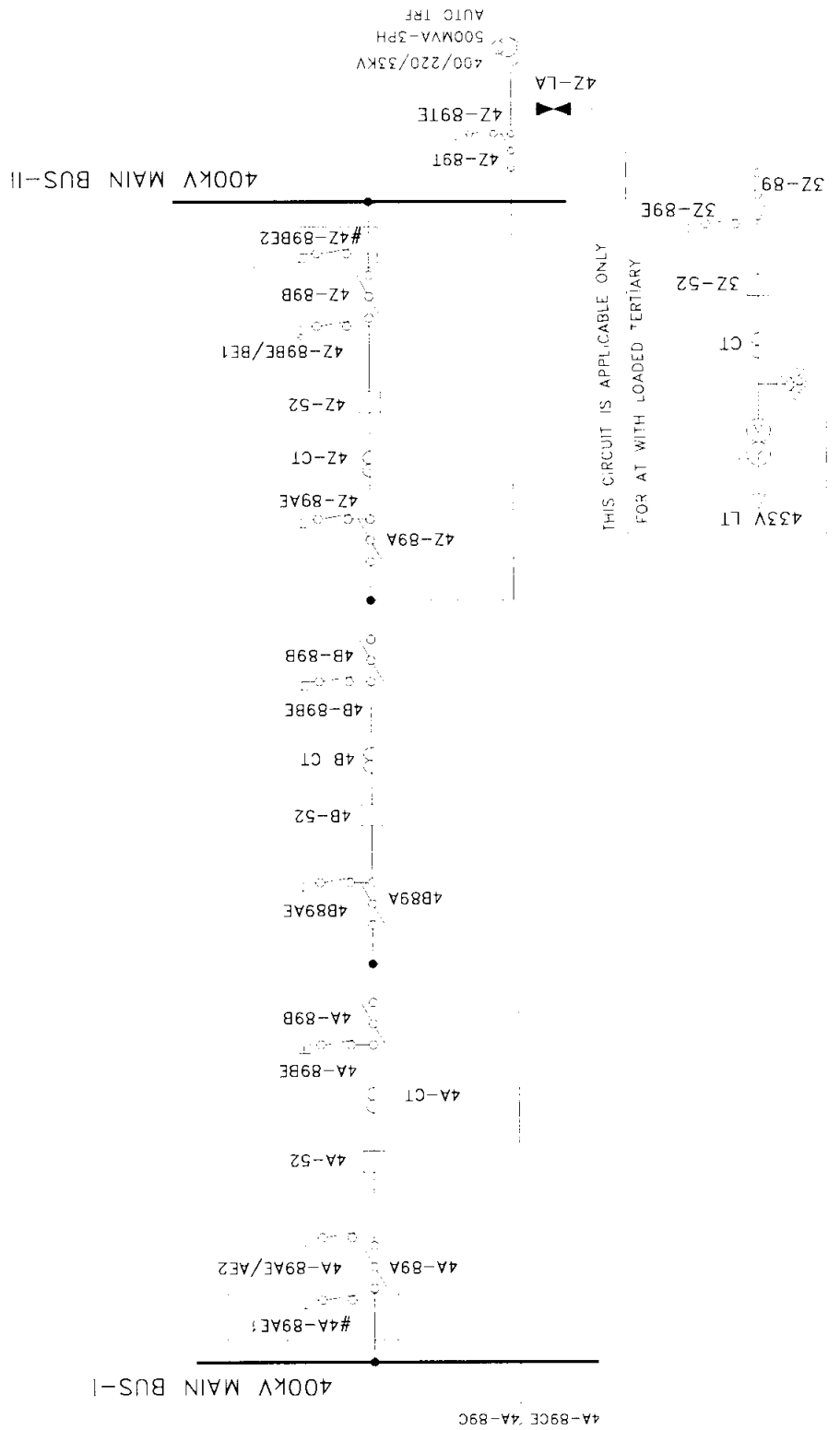
(SINGLE PHASE) DETAIL "A"







OTHER FEEDER



Section-2, Annexure-10 (Rev.01)
STANDARD MANDATORY SPARES FOR GAS INSULATED SWITCHGEAR

S.No.	Description	Unit	Quantity (Extn. S/s)
1.0	General (For 400kV Voltage Class)		
1.1	Bus Bar Sections including Bus Bar Interconnection Modules, Bus Ducts Sections, Compensators/ expansion joints/bellows, Bends, end covers along with enclosure of each type. For each of the above module/enclosure all active parts such as conductor, conductor joints, corona shield etc of each type.	Set	1
1.2	SF6 gas Pressure Relief Device assembly of each type	Set	1
1.3	SF6 Pressure gauge cum switch / Density monitors and pressure switch as applicable, of each type	Set	3
1.4	Coupling device for pressure gauge cum switch for connecting Gas handling plant of each type	Set	2
1.5	Rubber Gaskets, "O" Rings and Seals for SF6 gas for GIS enclosure of each type	Set	3
1.6	Molecular filter for SF6 gas with filter bags (10 % of total weight)	Set	1
1.7	Control Valves for SF6 gas of each type	Set	1
1.8	SF6 gas (20 % of total gas quantity)	Lot	1
1.9	Pipe length (Copper or Steel as applicable) for SF6 Circuit of each type (if applicable)	Set	1
1.10	Locking device to keep the Dis-connectors (Isolators) and Earthing/Fast Earthing switches in close or open position in case of removal of the driving Mechanism	Set	1
1.11	UHF PD Sensors of each type along with BNC Connector	Nos.	2
1.12	Support Insulators of each type	Nos.	4 (Each Type)
1.13	Gas Barriers of each type	Nos.	4 (Each Type)
1.14	SF6 to air bushing of each type & rating complete in all respect	No.	1
2.0	400kV SF6 CIRCUIT BREAKER:		
2.1	Complete Circuit Breaker (one phase) with PIR complete with interrupter, main circuit, enclosure and Marshalling Box with operating mechanism to enable replacement of all applicable type/rating of CB by spare (if applicable)	Set	1
2.2	Complete Circuit Breaker (one phase) without PIR complete with interrupter, main circuit, enclosure and Marshalling Box with operating mechanism to enable replacement of all applicable type/rating of CB by spare (if applicable)	Set	1
2.3	Fixed, moving and arcing contacts including insulating nozzles of each type (for Main Chamber & PIR Chamber as applicable)	Set	1
2.4	Trip coil assembly with resistor as applicable of each type	Set	3
2.5	Closing coil assembly with resistor as applicable of each type	Set	3

[Section-2/ Page 92]

2.6	Relays, Power contactors, push buttons, timers & MCBs etc of each type & rating	Set
2.7	Auxiliary switch assembly of each type	Set
2.8	Operation Counter	Set
2.9	Windoscope / Observing window of each type	Set
2.11	For Hydraulic Operated Mechanism, if applicable	
2.11.1	Hydraulic operating mechanism with drive motor of each type	Set
2.11.2	Ferrules, joints and couplings of each type	Set
2.11.3	Hydraulic filter of each type	Set
2.11.4	Hose pipe of each type	Set
2.11.5	N ₂ Accumulator of each type	Set
2.11.6	Valves of each type	Set
2.11.7	Pipe length (copper & steel) of each size & type	Set
2.11.8	Pressure switches of each type	Set
2.11.9	Pressure gauge with coupling device of each type	Set
2.11.10	Hydraulic oil (20% of total Oil quantity)	Set
2.11.11	Pressure Relief Device of each type	Set
2.12	For Spring Operated Mechanism, if applicable	
2.12.1	Complete Spring (Operating Mechanism including charging mechanism etc. of each type	Set
2.12.2	Spring (charging Motor	Nos.
3.0	400kV ISOLATORS :	
3.1	Complete set of 3-phase dis-connector of each type including main circuit, enclosure, driving mechanism and support Insulator etc. to enable complete replacement of all applicable type/rating of Isolator by spare	Set
3.2	Complete set of 3-phase Maintenance Earthing switch of each type, including main circuit, enclosure, driving mechanism and support Insulator etc. to enable complete replacement of all applicable type/rating of Earth Switch by spare	Set
3.3	Complete set of 3-phase Fast Earthing switch of each type, including main circuit, enclosure, driving mechanism and support Insulator etc. to enable complete replacement of all applicable type/rating of Earth Switch by spare (if applicable)	Set
3.4	(Copper contact fingers & corona shield for dis-connector male & female contact For one complete (3-phase) dis-connector of each type and rating	Set
3.5	(Copper contact fingers & corona shield for Maintenance Earthing switch male & female contacts, for one complete (3- phase) earthing switch of each type and rating	Set
3.6	(Copper contact fingers & corona shield for Fast Earthing switch male & female contacts, for one complete (3-phase) earthing switch of each type and rating (if applicable)	Set

3.7	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) for dis-connector and (3 – phase gang operated or 1 – phase unit) for earthing switch of each type and rating		
3.7.1	For Isolator	Set	1
3.7.2	For Maintenance Earth switch	Set	1
3.7.3	For Fast Earthing Switch (if applicable)	Set	1
3.8	Limit switch and Aux. Switches for complete 3 phase equipment		
3.8.1	For Isolator	Set	1
3.8.2	For Maintenance earth switch	Set	1
3.8.3	For Fast Earthing Switch (if applicable)	Set	1
3.9	Drive Mechanism of each type		
3.9.1	For Isolator	Set	1
3.9.2	For Maintenance earth switch	Set	1
3.9.3	For Fast Earthing Switch (if applicable)	Set	1
3.10	Motor for Drive Mechanism of each type		
3.10.1	For Isolator	Set	1
3.10.2	For Maintenance earth switch	Set	1
3.10.3	For Fast Earthing Switch (if applicable)	Set	1
4.0	400kV CURRENT TRANSFORMER		
4.1	Complete CT of each type and rating with enclosure to enable replacement of all applicable type/rating of CT by spare	Nos.	1
5.0	400kV Voltage Transformer		
5.1	Complete PT of each type and rating with enclosure to enable replacement of all applicable type/rating of VT by spare (if applicable)	No.	1
6.0	400kV SURGE ARRESTOR		
6.1	Complete Gas insulated Surge arrester of each type and ratings with enclosure (if applicable)	No.	1
6.2	Surge counter/ monitor of each rating and type (if applicable)	No.	1
7.0	Local Control Cubicle (LCC)		
7.1	Aux. relays, Contactor, Push Buttons, Switches, Lamps, Annunciation Windows, MCB, Fuses, Timers etc. of each type & rating	Set	2
8.0	Oil/ SF6 bushing (400kV) for Transformer/Reactor of each rating (if applicable)	No.	1

TECHNICAL CHECK LIST			
1	Technical Qualifying Requirement		
1.1	The bidder to furnish relevant documents for meeting the qualifying requirement. Performance certificates shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder it shall be notarized.	Confirmed	Yes/No
1.2	The bid shall be submitted by the Manufacturer of GIS & its accessories in case of Indian Manufacturer. The bidder's scope includes supply and services such as Supervision of installation, Execution of Testing and commissioning.	Confirmed	Yes/No
1.3	All the documents shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder it shall be notarized.	Confirmed	Yes/No
2	Un-priced BOQ		
2.1	Confirm that all items have been quoted separately. (If any item has not been quoted, the same shall be specifically brought out with technical reasons thereof) Record the same in schedule of technical deviations.	Confirmed	Yes/No
2.2	Any other supply/ service required for the execution for the complete work of GIS & its accessories is deemed to be included in the offer, whether specifically mentioned in the specification or not. Bidder to submit list of items along with their respective quantities required for completeness of GIS & its accessories.	List of items required to be attached.	Yes/No
2.3	Foundation for GIS shall be constructed by Civil contractor based on the input (configuration, structure loads etc.) provided by bidder. The supply of all structural material to be embedded including foundation bolts, plates etc. as well as consumables like grouting material etc. shall be in bidder's scope. The erection of structure shall be done by BHEL under supervision of bidder.	Confirmed	Yes/No
2.4	deleted		
2.5	Confirm that the consumables (list to be enclosed by bidder during contract stage) with shelf life of fewer than two years shall be supplied before erection after specific clearance by BHEL.	Confirmed	Yes/No
2.6	Commissioning spares for testing & commissioning of GIS till handing over shall be under bidder's scope.	Confirmed	Yes/No
2.7	Detailed list of Tools & tackle & Testing Equipment to be supplied at site on returnable/ non-returnable basis.	List attached	Yes/No
2.8	The Switchgear shall be complete with all necessary terminal boxes, SF6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring equipment and piping, support structures.	Confirmed	Yes/No
2.9	The scope of supply shall also include all erection and mounting hardware and interconnecting cables within GIS.	Confirmed	Yes/No
2.10	Design philosophy of earthing submitted with the bid	Confirmed	Yes/No
2.11	Design of Earthing of GIS shall be in bidder scope. The items and accessories required for completeness of earthing shall be in bidder's scope. Mesh on floor shall be provided by BHEL as per bidder's design.	Confirmed	Yes/No
3	Technical		
3.1	Requirement of AC and DC auxiliary loads	Enclosed with bid	Yes/No
3.2	Catalogues of GIS	Enclosed with bid	Yes/No

TECHNICAL CHECK LIST			
3.3	Catalogues of all Maintenance equipment. Bidder to confirm that offered equipment meets the requirements of specification.	Enclosed with bid	Yes/No
4	Calculations		
4.1	The design of the equipment shall be such that the agreed permitted movement of foundations and mechanical or thermal effects do not impair the assigned performance of the equipment.	Confirmed	Yes/No
4.2	Insulation co-ordination study shall be conducted and based on the same the number & location of surge arresters shall be decided. The	Confirmed	Yes/No
4.3	Measures to limit external over voltages (e.g. surge arresters) should be considered and detailed out based on the site conditions etc.	Enclosed with bid	Yes/No
5	Technical Deviations		
5.1	Confirm that the Complete systems have been offered as per the requirements of Technical Specification and Technical Deviation sheet has been submitted. Deviations mentioned elsewhere in the bid will not be considered.	Confirmed	Yes/No
6	Bar chart		
6.1	Bidder will submit detailed bar chart indicating all the milestones from Engineering till manufacturing/ testing, dispatch to site and commissioning	Confirmed	Yes/No
7	Conditions		
7.1	Store shall be provided by BHEL for GIS and accessories. Confirm that the space required for the material being supplied, both indoor and outdoor has been indicated.	Details given with the bid.	Yes/No
8	Site Test		
8.1	Only special tools shall be in bidder's scope. Bidder to submit list of general tools, tackle, slings, spanners, gauges, slings and other lifting devices, drills, instruments and appliances necessary for the complete assembly and erection at site of the GIS, required for installation, gas filling, maintenance, site testing of the GIS which shall be arranged by BHEL	Confirmed	Yes/No
8.2	Bidder to furnish detailed BOQ for non-returnable Tools and Tackles along with unit prices to be handed over to ultimate customer as per technical specification.	Details given with the bid.	Yes/No
8.3	All field tests including tests during installation, pre-commissioning, commissioning, field acceptance tests shall be conducted by the bidder, in presence of representative of the BHEL/ Customer . No separate site test will be conducted by BHEL/Customer	Confirmed	Yes/No
9	TYPE TESTS REQUIREMENTS		
9.1	The offered GIS should have been type tested (as per relevant IEC). The GIS and equipment/components shall be of same make and type as that used in type test.	Confirmed	Yes/No
9.2	Type test report for GIS shall be submitted along with the bid. Differences, if any, in the items offered and those which have been type tested shall be clearly brought out along with explanation for suitability.	Confirmed and enclosed with bid	Yes/No
	In case the test reports are not found technically valid during contract stage by BHEL/Customer, the bidder shall repeat these test(s) at <u>no</u> extra cost <u>to</u> the purchaser <u>and</u> no delivery implication.		

TECHNICAL CHECK LIST			
9.3	Technical valid - Any error or incompleteness (any/all additional type tests not carried out) or discrepancy in the test reports vis-à-vis offered equipment due to any design / manufacturing changes (including substitution of components) or non-compliance with the requirement stipulated in the Technical Specification.	Confirmed	Yes/No
9.4	The type tests conducted earlier should have either been conducted in an accredited independent laboratory (accredited base on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accreditation body of the country where laboratory is located). The short circuit test should have been conducted in a laboratory which should be a member of STL (Short Circuit Testing Liaison - www.stl-liaison.org). If the laboratory is not a national laboratory and member of STL, relevant papers of accreditation shall be submitted in English.	Confirmed.	Yes/No
	If the laboratory is in-house, the tests should have been witnessed by a client.	Details provided with bid.	
9.5	The type test report shall be complete including the list of test objects, photographs, oscillographs, test arrangement, drawing of tested objects (GIS, equipment etc.) and test connections. The type test report shall be in English. If it is in any other language, it should include an English version (Translation shall be attested by the Bidder). The English version should be complete with measured values and conclusion.	Confirmed	Yes/No
10	Erection Procedure		
10.1	Storage & Installation Manual for Outdoor GIS: Bidder to submit the manual along with technical bid.	Confirmed	Yes/No

Date:

Bidder's Stamp & Signature

Contact Details:

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	Differences, if any, in the items offered and those which have been type tested shall be clearly brought out along with explanation for suitability.		
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