

8	Coating/cladding concentricity error	μm	< 12
9	Proof Test	GPa	0.7
10	Fibre Curl	m	≥ 4
11	Zero-Dispersion Wavelength	nm	1300 to 1322
12	Zero-Dispersion Slope	ps / [km-nm- nm]	~ 0.090
13	Maximum Dispersion	ps/ [nm-km]	
	1285-1330 nm		~ 3.5
	1550 nm		~ 18
14	Fibre Macrobend :	dB	$\leq 0.05 @ 1550 \text{ nm}$
	(1 turn @ 32 mm diameter)		
15	Coating Strip Force	N	1.3 - 8.9
16	Cut-off Wavelength	nm	≤ 1260
17	Standards / Compliance		ITU-G Rec. G.652D., or EIA/TIA or Bell core Standards or IEC 793 and IEC 794 and any more
18	Cable Length		The fibre shall not have any joints throughout the spool length.
19	Polarization Mode Dispersion Link Design Value	Ps / sqrt (km)	≤ 0.5
20	Temperature Dependence - 60 deg C to +85 deg C	dB/Km	≤ 0.05
21	Temperature & Humidity Cycling -10 deg C to +85 deg C up to 95% RH	dB/km	≤ 0.05
22	Water Immersion, 23 deg C	dB/km	≤ 0.05
23	Heat Aging, 85 deg C	dB/km	≤ 0.05

NOTE:- The fibre should be as per international standard ITU G 652

2. FEATURES

1	The cable core shall be water blocked with dry water-blocking materials, making access and handling of individual tubes easier and craft-friendly.
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2	The cables shall be designed for point to point applications as well as mid- span access, and provide a high-level of protection for fibre installed in the outside plant environment.
3	The cable shall be armoured with a corrugated polymer coated steel tape
4	The buffer tubes shall be compatible with standard hardware, cable routing and fan-out kits
5	The fibre cable shall be constructed with industry standard 3 mm buffer tubes, stranded around a central strength member.
6	The fibre cable shall also be designed to provide optimum performance from 1265nm to 1625nm making it suitable as per specific application as per project requirement

3. PACKING & FORWARDING

The cable shall be delivered on suitable /wooden cable drums sealed with wooden laths. The cable drum shall be transported, stored and delivered in and upright position. On delivery the drum will be visually inspected for any damage. If any damage has occurred to the drum the cable shall be OTDR tested at the Contractors expense prior to installation. Otherwise the laths shall only be removed immediately before installation.

Each cable drum shall have a data sheet attached with the following information:

- Manufacturer's name
- Cable Drum number
- Cable type and fibre count
- Length of cable in metres
- Cable Tag Name (like substation)
- Purchase order number
- Mass of cable on drum in kg
- Date of manufacture

Additionally, the direction of turning and a warning arc describing minimum bend radius shall be indicated on the cable drum.

5. INSPECTION AND TEST REQUIREMENTS

OFC cables shall be tested for all routine and acceptance tests as per applicable IS standard in presence of TPI.

The applicable type test reports shall be submitted during inspection which is conducted any NABL accredited labs and valid within five years. If type test reports are not available same shall be conducted on sample basis as per applicable IS standards.

END

IOCL - APPROVED COMPONENTS' ~~MAKE~~ MAKE - LIST

Description : SCAP AND CONTROL PANELS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	ABB INDIA LTD		
2	GE T & D INDIA LTD		
3	DANISH PRIVATE LIMITED		
4	EASUN REYROLLE LTD		
5	SIEMENS LIMITED		

Description : SWITCHBOARD FIXED FOR PACKAGE EQUIPTS			
SL. No.	Supplier Name		
Approved Suppliers			
1	ACCUSONIC CONTROLS PVT LTD		
2	DHARIA SWITCHGEAR & CONTROL.		
3	ELECTRO ALLIED PRODUCTS		
4	LARSEN & TOUBRO LTD		
5	M.K. ENGINEERS & CONTROLS PVT. LTD.		
6	MAKTEL SYSTEMS		
7	NITYA ELECTRO CONTROLS		
8	POPULAR SWITCHGEARS PVT LTD		
9	POSITRONICS PVT LTD		
10	TRICOLITE ELECTRICAL INDUSTRIES PVT LTD		
11	VIDHYUT CONTROL (INDIA) PVT LTD		
12	ZENITH ENGINEERING CORP.		

IOCL - APPROVED COMPONENTS' ~~LIST~~ MAKE - LIST

Description : BATTERIES-LEAD ACID (VRLA) - Only if allowed in Detailed technical specification.

	Supplier Name		
Approved Suppliers			
1	AMARA RAJA BATTERIES LTD		
2	EXIDE INDUSTRIES LTD.		
3	HBL POWER SYSTEMS LTD		
4	NED ENERGY LIMITED		

Description : BATTERIES-NICKLE CADMIUM

Supplier Code	Supplier Name		
Approved Suppliers			
1	AMCO SAFT INDIA LTD		
2	HBL POWER SYSTEMS LTD		

Description : U.P.S.SYSTEM

Supplier Code	Supplier Name		
Approved Suppliers			
1	AMETEK SOLID STATE CONTROLS		
2	VERTIV ENERGY PVT. LTD.		
3	GUTOR ELECTRONICS LTD		
4	HITACHI HI-REL POWER ELECTRONICS P. LTD		
5	TOSHIBA CORPORATION		

Description : MOTOR-INDUCTION-HV (INCL. TYPE SAFE AREA)

Sl. No.	Supplier Name		
Approved Suppliers			
1	ABB INDIA LTD (BARODA)		
2	BHEL		
3	CROMPTON GREAVES LTD.		
4	KIRLOSKAR ELECTRIC CO LTD		
5	MARATHON ELECTRIC MOTOR I LTD		

Description : PLANT COMMUNICATION SYSTEM			
Sl. No.	Supplier Name		
Approved Suppliers			
1	INDUSTRONIC IND.-ELEC. GMBH & CO. KG		
2	NEUMAN ELEKTRONIK GMBH & CO		
Description : RELAY/ AUXILIARY RELAYS/LMS/ SAS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	ABB AS		
2	ABB INDIA LTD		
3	EMERSON PROCES MGMT ASIA PACIFIC PTE LTD		
4	EMERSON PROCESS MANAGEMENT INDIA PVT LTD		
5	FOXBORO SCADA SPA		
6	HONEYWELL AUTOMATION INDIA LTD.		
7	SCHWEITZER ENGINEERING LABORATORIES		
8	SCHNEIDER ELECTRIC INDIA PVT LTD		
9	SIEMENS LIMITED		
10	EASUN REYROLLE LTD		
11	GE INDIA INDUSTRIAL PVT LTD		

Description : LIGHTING AND POWER PANELS			
Sl. No.	Supplier Name	Country	Holiday Desc
Approved Suppliers			
1	ABB LTD		
2	C & S ELECTRIC LTD		
3	HAVELLS INDIA LTD		
4	NOVATEUR ELECTRICAL & DIGITAL SYSTEMS P		

Description : LV POWER SWITCHES			
Sl. No.	Supplier Name		
Approved Suppliers			
1	SIEMENS		
2	L&T		
3	GE POWER CONTROLS		
4	SCHNEIDER ELECTRIC INDIA PVT LTD		
5	ABB		

Description : FUSE SWITCH COMBINATION			
Sl. No.	Supplier Name		
Approved Suppliers			
1	C & S ELECTRIC LTD		
2	GE INDIA INDUSTRIAL PVT LTD		
3	LARSEN & TOUBRO LTD		
4	SCHNEIDER ELECTRIC INDIA PVT LTD		
5	NOVATEUR ELECTRICAL & DIGITAL SYSTEMS		
6	SIEMENS LIMITED		
7	STANDARD ELECTRICALS LTD		
8	HAVELLS INDIA LTD		

Description : TIMERS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	ELECTRONIC AUTOMATION PVT		
2	LARSEN & TOUBRO LTD		
3	SIEMENS LIMITED		

Description : DC CONTACTOR			
Sl. No.	Supplier Name		
Approved Suppliers			
1	LARSEN & TOUBRO LTD		
2	SIEMENS LIMITED		
3	ELECTROMAG		
4	SCHNEIDER ELECTRIC INDIA PVT LTD		
5	BCH		

Description : LV POWER/ CONTROL CONTACTORS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	SIEMENS		
2	L&T		
3	GE POWER CONTROLS		
4	SCHNEIDER ELECTRIC INDIA PVT LTD		
5	ABB		
6	BCH ELECTRIC LTD		
7	C & S ELECTRIC LTD		

Description : CURRENT TRANSFORMERS/POTENTIAL TRANSFORMERS - LV			
Sl. No.	Supplier Name		
Approved Suppliers			
1	GILBERT & MAXWELL ELECTRICALS PVT LTD		
2	PRECISE ELECTRICALS		
3	PRAGATI ELECTRICALS PVT LTD		
4	KALPA ELEKTRIKAL PVT LTD		
5	NARAYAN POWERTECH PVT LTD		
6	SILKAANS ELECTRICALS MFG.CO.PVT.LTD		

Description : CURRENT TRANSFORMERS/POTENTIAL TRANSFORMERS -HV			
Sl. No.	Supplier Name		
Approved Suppliers			
1	ABB LTD		
2	KAPPA ELECTRICALS		
3	PRAGATI ELECTRICALS PVT LTD		
4	KALPA ELECTRIKAL PVT LTD		
5	ELECTRICAL CONTROLS & SYSTEMS		
6	MEGAWIN SWITCHGEAR P LTD		

Description : MCB/ELCB/MCCB			
Sl. No.	Supplier Name		
Approved Suppliers			
1	ABB LTD		
2	LEGRAND (INDIA) PVT. LTD		
3	GE INDIA INDUSTRIAL PVT LTD		
4	SCHNEIDER ELECTRIC INDIA PVT LTD		
5	HAVELLS INDIA LTD		
6	NOVATEUR ELECTRICAL & DIGITAL SYSTEMS P		
	SIEMENS LIMITED		

Description : MCB			
Sl.	Supplier Name		
Approved Suppliers			
1	ABB LTD		
2	LEGRAND (INDIA) PVT. LTD		
3	SCHNEIDER ELECTRIC INDIA PVT LTD		
4	HAVELLS INDIA LTD		
5	NOVATEUR ELECTRICAL & DIGITAL SYSTEMS P		
6	SIEMENS LIMITED		
7	C & S ELECTRIC LTD		
8	INDIANA CURRENT CONTROL LTD		
9	STANDARD ELECTRICALS LTD		

Description : FUSE			
Sl. No.	Supplier Name		
Approved Suppliers			
1	GE INDIA INDUSTRIAL PVT LTD		
2	LARSEN & TOUBRO LTD		
3	COOPER BUSSMAN INDIA PVT LTD		
4	NOVATEUR ELECTRICAL & DIGITAL SYSTEMS P		
5	SIEMENS LIMITED		

Description : MCCB			
Sl. No.	Supplier Name		
Approved Suppliers			
1	GE INDIA INDUSTRIAL PVT LTD		
2	SCHNEIDER ELECTRIC INDIA PVT LTD		
3	SIEMENS LIMITED		
4	LARSEN & TOUBRO LTD		

Description : TARRIF METERS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	SECURE METERS LTD.		
2	LARSEN & TOUBRO LTD		

Description : COMPOSITE METERS (STATIC)			
Sl. No.	Supplier Name		
Approved Suppliers			
1	SIEMENS		
2	LARSEN & TOUBRO LTD		
3	SATEC (MARKETED BY M. B. CONTROL & SYSTEMS PVT. LTD		

Description : CABLE TERMINATION AND JOINTING KIT			
Sl. No.	Supplier Name		
Approved Suppliers			
1	RAYCHEM RPG LTD.		
2	3M ELECTRO AND COMMUNICATION PVT LTD.		
	HEAT SHRINK TECHNOLOGIES LTD.		
	YAMUNA POWER AND INFRASTRUCTURE LIMITED		

Description : TERMINAL BLOCKS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	ELMEX		
2	CONNECTWELL		
3	ALLEN BRADLEY		
4	WAGO AND CONTROLS (I) LTD		
5	GEWISS		
6	FUGI ELECTRIC INDUSTRIES COMPANY LTD.		

Description : TRANSDUCERS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	MINILEC		
2	ABB		
3	PEPPERL + FUCHS		

Description : ANNUNCIATION SYSTEM			
Sl. No.	Supplier Name		
Approved Suppliers			
1	MINILEC		
2	IIC		
3	PIRI		
4	JAISUN & HUTCHISON		
5	CHHABI		
6	FUGI ELECTRIC INDUSTRIES COMPANY LTD.		
7	AUTOMATIC ELECTRIC		
8	DIGICONT		
9	VAISHNO		

Description : CABLE GLANDS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	BALIGA LIGHTING EQUIPMENTS		
2	COMET BRASS PRODUCTS		
3	FCG POWER INDUSTRIES PVT.		
4	FLAMPROOF EQUIPMENT PVT. LTD.		
5	FLEXPRO ELECTRICALS PVT. LTD.		
6	COMET INDUSTRIES		
7	STANDARD METAL INDUSTRIES		
8	SUDHIR SWITCHGEARS PVT LTD.		
9	KAYSONS TECHNO EQUIPMENTS PVT. LTD.		

Description : LAMPS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	PHILIPS		
2	CG POWER AND INDUSTRIAL SOLUTIONS		
3	BAJAJ		
4	OSRAM		
5	WIPRO		
6	VENTURE		

Description : LIGHTING POLES			
Sl. No.	Supplier Name		
Approved Suppliers			
1	BOMBAY TUBES AND POLES		
2	SHIVAM POLES		
3	JINDAL		
4	ELECTRIC TUBES AND POLES		
5	POWER CONTROL CORPORATION		
6	RIDDHI POLES		
7	BAJAJ		
8	UNITECH FABRICATORS AND ENGINEERS PVT. LTD.		
9	SURYA ROSHNI LIMITED		

Description : INDICATING METERS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	AUTOMATIC ELECTRIC		
2	MECO INSTRUMENTS		
3	RISHABH INSTRUMENTS		
4	NIPPEN ELECTRICAL INSTRUMENTS.		
5	SECURE METERS LTD.		

Description : PUSH BUTTON AND INDICATION LAMPS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	L&T LTD.		
2	SIEMENS LTD.		
3	TEKNIC ELECTRIC PVT. LTD.		
4	C&S ELECTRIC LTD.		
5	ESSEN DEINKI		
6	HOTLINE SWITCGEARS AND CONTROLS		
7	PRECIFINE PRODUCTS PVT. LTD.		
8	SCHNEIDER ELECTRIC (I) PVT. LTD.		
9	SHRI TULSI SWITCHGEARS PVT. LTD.		

Description : AVIATION LAMPS			
Sl. No.	Supplier Name		
Approved Suppliers			
1	GE LIGHTING		
2	WIPRO		
3	FLEXPRO		

Description : CONTROL AND SELECTOR SWITCHES			
Sl. No.	Supplier Name		
Approved Suppliers			
1	KAYCEE INDUSTRIES LTD.		
2	SIEMENS LTD.		
3	L&T LTD.		
4	GE T&D LTD.		
5	HOTLINE SWITCGEARS AND CONTROLS		
6	RELIABLE ELECTRONIC COMPONENT PVT. LTD.		
7	SWITRON DEVICES		

Description : THERMOPLASTIC PIPES HDPE/PP/PVC/PE/CPVC

Sl. No.	Supplier Name		
Approved Suppliers			
1	GEORG FISCHER PIPING SYSTEMS INDIA		
2	IPLEX PIPELINES AUSTRALIA		
3	POLYPIPE US		
4	PIPELIFE NORGE AS NORWAY		
5	FUTURE PIPE INDUSTRIES NETHERLANDS		
6	TYCO WATER AUSTRALIA		
7	NARAYANI POLYPIPES INDIA		
8	DUTRON POLYMERS INDIA		
9	PARIXIT INDUSTRIES INDIA		
10	EVEREST POLYCHEM INDUSTRIES PVT. LTD INDIA		

(BIDDER MUST COMPLY TO THE AMENDMENTS AS APPLICABLE TO THE TENDER SCOPE OF WORK)

TENDER NO.: RPRC182491

TECHNICAL CORRIGENDUM-2

Sl. No.	Tender Reference	DID READ	SHOULD READ
1	Section 1/ Additional Design / Guidelines clause 7.0, &	Power Factor Correction Equipment &	In line with tender specification clause :5.0 on page 26 of 1047, no capacitor bank is envisaged for 220 KV or 33 KV system. Lighting control for new 220 KV GIS switchgear and switchyard area. Lighting control must be done for lighting circuit level.
	Section-3 Chapter-9 Clause 1.4(e)	Lighting control, PF control for new 220 KV GIS switchgear and switchyard area.	Total area lighting shall be divided in different circuits. Minimum required independent feeders shall be for cabinet room, switchgear rooms, switchyard lighting, maintenance and operator room, VAM room, metering room, battery room, cable cellar area. Each lighting feeder shall have a provision of auto and manual control. Auto-control shall be through astronomical timers.
2	Section C - Sheet 108/1047, Clause 11.2	Suitable Cable differential CT at PR & PNCP -33 KV cabling system – The source end/ intermediate isolation panel CT shall be designed in line with generation bus feeder CT details specifically for cable differential protection. If Cable differential CT is mismatched / not available at existing generation bus system of PR and PNCP, such required CT shall be designed, supplied, installed and tested by LSTK contractor. The cable differential relays shall be supplied for both end of cable system along with all required hardware like LIU, OFC cables, patch cords etc. The installation, wiring and testing of cable differential system in existing panels is also in LSTK contractor scope.	Suitable Cable differential CT at PR & PNCP -33 KV cabling system – The source end/ intermediate isolation panel CT shall be designed in line with generation bus feeder CT details specifically for cable differential protection. Existing current transformers as available in the generation bus incomers of both PR and PNCP will be used and no augmentation is required. The cable differential relays shall be supplied for both end of cable system along with all required hardware like LIU, OFC cables, patch cords etc. The installation, wiring and testing of cable differential system in existing panels is also in ~~LSTK~~ contractor scope. The feeder details of PR generation bus incomers and PNCP end generation bus incomers is provided in Annex-S-2/C-1/10 and S-2/C-1/11

3	Section C - Sheet 71/1047 Clause 8.6 & 8.7	Busduct shall be supplied with busbar flexible links for connection at both the ends and expansion joints for every 3m of busduct and busduct support materials.	Busduct shall be supplied with busbar flexible links for connection at both the ends and expansion joints for every 3m of busduct or as per the OEM design calculations. The bidder to submit the design calculation in line with relevant standards.
4.	Clause 13. Of technical corrigendum-1 (Annexure-A)	33/19 KV Copper Cable minimum sizing for the complete project shall be considered as stated below: Cabling from 220 KV/34.5 KV Transformer to PR generation bus at SS-28—3Runs X 3 Core X 300 sqmm per feeder i.e. total 6 Runs for PR connectivity. Cabling from 220 KV/34.5 KV Transformer to PR side LIB at SS-63 —3Runs X 3 Core X 300 sqmm per feeder i.e. total 6 Runs for PNCP connectivity.	33/19 KV Copper Cable minimum sizing for the complete project shall be considered as stated below: Cabling from 220 KV/34.5 KV Transformer to PR generation bus at SS-63—3Runs X 3 Core X 300 sqmm per feeder i.e. total 6 Runs for PR connectivity per transformer. Cabling from 220 KV/34.5 KV Transformer to PR side LIB at SS-63 —3Runs X 3 Core X 300 sqmm per feeder i.e. total 6 Runs for PNCP connectivity.

for

[Signature]

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5	Clause 14. Of technical corrigendum-1 (Annexure-A)	33/19 KV Copper Cable (3 runs of 3C X 400 sqmm minimum per feeder i.e. per transformer to individual incomers in generation bus which is a total of 4 feeders.) for power evacuation from 220 KV/33 KV transformers terminals to existing generation buses in PR. In PR, 33 KV cables shall be directly terminated to spare incoming panels to Generation Buses as per tentative interconnection SLD attached as Annexure- S-2/C-1/5. Separate feeder cables will be provided from transformer to individual incomer breakers. Transformer 33 KV terminal box shall be suitable for termination of minimum 6 runs of 3C X 400 sqmm cables. All integration requirements for hook-up of grid system with the generation bus will be in the scope of vendor. Any adaptor box/panel extension for termination of cables will be in the scope of the vendor including design and supply of all required materials. Compatibility of protection system of new and existing generation system shall be in the scope of the vendor. Any additional hardware/CT/PT shall be in the scope of vendor including design and supply of all required materials. The required space for extension is available in existing switchgear rooms. The GA diagram and detailed feeder SLD of PR generation bus (Ss-63 feeder) is attached as Annex- S-2/C-1/10 and detailed feeder SLD of PNCP SS-09 generation bus feeders is attached as Annex- S-2/C-1/11. The separate cable trays shall be provided of adequate design and size shall be provided in the cable cellars of SS-28 and SS-9 for facilitating the laying of new cables as per project requirements. Structural works for new cable tray system shall also be in the scope of LSTK contractor including supply of all required materials.	The contradiction in cables size is a typographic error. The clarification of the same is given below: 33/19 KV Copper Cable (3 runs of 3C X 300 sqmm minimum per feeder i.e. per transformer to individual incomers in generation bus which is a total of 4 feeders.) for power evacuation from 220 KV/33 KV transformers terminals to existing generation buses in PR. In PR, 33 KV cables shall be directly terminated to spare incoming panels to Generation Buses as per tentative interconnection SLD attached as Annexure- S-2/C-1/5. Separate feeder cables will be provided from transformer to individual incomer breakers. Transformer 33 KV terminal box shall be suitable for termination of minimum 6 runs of 3C X 300 sqmm cables. All integration requirements for hook-up of grid system with the generation bus will be in the scope of vendor. Any adaptor box/panel extension at PR end for termination of cables will be in the scope of the vendor including design and supply of all required materials. Compatibility of protection system of new and existing generation system shall be in the scope of the vendor. The required space for extension is available in existing switchgear rooms. Existing panel CT and PT shall be used at both PR and PNCP end and accordingly, the protection compatibility to be ensured. Any additional hardware/CT/PT shall be in the scope of vendor including design and supply of all required materials The GA diagram and detailed feeder SLD of PR generation bus (SS-63 feeder) is attached as Annex- S-2/C-1/10 and detailed feeder SLD of PNCP SS-09 generation bus feeders is attached as Annex- S-2/C-1/11. The separate cable trays shall be provided of adequate design and size shall be provided in the cable cellars of SS-28, SS-63 and SS-9 for facilitating the laying of new cables as per project requirements. Structural works for new cable tray system shall also be in the scope of LSTK contractor including supply of all required materials.
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6	Clause 11.1 on Page 107 of 1047 of Section-C	PNCP is having a Siemens make 33 KV GIS system . The new grid connection will be provided in 2 nos of spare panels of existing GIS system. The design, selection , supply and installation of suitable adopter/ connector system shall be provided in ISBL scope of work for termination of new 33 KV cables provided in this tender work. LSTK contactor shall ensure requirement of all such related interface activities to ensure proper termination of new 33 KV cables in existing GIS system. If any SF6 gas evacuation and refilling will be required , same shall be arranged and executed by ISBL contractor including all required special tools and tackles.	PNCP is having a Siemens make 33 KV GIS system . The new grid connection will be provided in 2 nos of spare panels of existing GIS system. The design, selection , supply and installation of suitable adopter/ connector system shall be provided in ISBL scope of work for termination of new 33 KV cables provided in this tender work. The required cable connection system is not available in existing panels and accordingly required hardware shall be supplied by LSTK contractor including requirement of all such related interface activities to ensure proper termination of new 33 KV cables in existing GIS system. If any SF6 gas evacuation and refilling will be required , same shall be arranged and executed by ISBL contractor including all required special tools and tackles.
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6	Clause 172 of Technical Corrigendum-1 (Annexure-A)	All approval and certifications including its co-ordination with state transmission authorities (HVPNL/UHBVN), CEA, OISD, PESO, statutory bodies shall be in scope of LSTK contractor.	All approval and certifications (except load sanctioning approval) including its co-ordination with state transmission authorities (HVPNL/UHBVN), CEA, OISD, PESO, statutory bodies shall be in scope of ~~LSTK~~ contractor. Following approval may be required from HVPNL/UHBVN: a. GELO approval ✓ b. Drawings and design data approvals ✓ c. Protection system approvals. d. Construction approval e. Pre-charging and charging approval f. Approval for PLCC equipments ✓ g. NOC for open access system ~~LSTK~~ contractors scope for approval and certifications is detailed below: a. Timely submission of all drawings and documents as per requirements of approving authorities. ~~LSTK~~ contractor shall be responsible for ensuring all required data and drawings are prepared as per formats and procedures of approving authorities. b. Any corrections and modifications in data and drawings as per requirements of approving authority and resubmissions for approval. c. Regular follow-up with all concerns for ensuring timely approval. d. Submission of applications and data on behalf of IOCL as per requirement of approving authorities. e. Co-ordination and arrangement of site visits for audits as per requirement of approving authorities. Any site testing requirements during audit shall also be arranged by ~~LSTK~~ contractor.
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			f. Any site correction required as per requirements of approving authority and within the scope of tender after due consent of Engineer Incharge. It is responsibility of ~~1874~~ contractor that all required system design and site works are done as per requirements of concerned approving authorities to ensure timely approval. Accordingly any modifications within the scope of contract and as per requirements approving authorities shall be the scope of ~~1874~~ contractor including required materials and services. g. Any other co-ordination activities required for final approval to ensure timely issue of required approvals.
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7.	Section-C Section-2 SCC Technical Part-A 10.1.1.29	Electrical System Study: The detailed electrical system study of new 220 KV GIS system including existing generation system of PR and PNCP shall be carried out by vendor for following objectives as per CEA and HVPNL guidelines and requirements i) Load flow studies ii) Short circuit and transient stability studies iii) Grid Islanding setting derivation iv) Load shedding adequacy check v) Protection co-ordination of new system. vi) EMTP studies (for switching / dynamic over-voltages, insulation coordination, etc) Required data of existing IOCL system will be provided by owner while for HVPNL, the data shall be collected by the vendor. Lump load concept may be used for existing load of PR and PNCP. The system study report shall be submitted to owner for approval. Any major change or addition in system design/hardware based on the system study report shall be vendor's scope.	Electrical System Study: The detailed electrical system study of new 220 KV GIS system including existing generation system of PR and PNCP shall be carried out by vendor for following objectives as per CEA and HVPNL guidelines and requirements i) Load flow studies ii) Short circuit and transient stability studies iii) Grid Islanding setting derivation iv) Load shedding adequacy check v) Protection co-ordination of new system. vi) Electromagnetic transient studies (for switching / dynamic over-voltages, insulation coordination, etc) Required data of existing IOCL system will be provided by owner while for HVPNL, the data shall be collected by the vendor. Lump load concept may be used for existing load of PR and PNCP. The system study report shall be submitted to owner for approval. For equipment ratings, wherever minimum requirements are specified, sizing may change as per detailed design calculations and same shall be in the scope of ~~owner~~ contractor without any extra financial implication. For equipments where nominal rating are mentioned, same shall be final.
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		The list of firms/agencies for the purpose of carrying out the electrical system study is as following: • ☐ Engineers India Limited • ☐ Project & Development India :Limited • ☐ TOYO Engineering India Pvt. Limited • ☐ JACOBS Engineering Group • ☐ MECON Limited • ☐ Foster Wheeler India Pvt. Limited. • ☐ National Thermal Power Corporation Limited • ☐ Sterlin & Wilson Pvt. Limited. • ☐ Bechtel India Pvt. Limited. • ☐ Tata Consulting Engineers Limited. • ☐ Tractebel Engineering Pvt. Ltd. • ☐ Power Grid Corporation of India Limited • ☐ ABB Ltd • ☐ Siemens Ltd • ☐ GE • ☐ Toshiba • ☐ L&T Or any other reputed agency with approval of EIC	The list of firms/agencies for the purpose of carrying out the electrical system study is as following: • ☐ Engineers India Limited • ☐ Project & Development India :Limited • ☐ TOYO Engineering India Pvt. Limited • ☐ JACOBS Engineering Group • ☐ MECON Limited • ☐ Foster Wheeler India Pvt. Limited. • ☐ National Thermal Power Corporation Limited • ☐ Sterlin & Wilson Pvt. Limited. • ☐ Bechtel India Pvt. Limited. • ☐ Tata Consulting Engineers Limited. • ☐ Tractebel Engineering Pvt. Ltd. • ☐ Power Grid Corporation of India Limited • ☐ ABB Ltd • ☐ Siemens Ltd • ☐ GE • ☐ Toshiba • ☐ L&T Or any other reputed agency with approval of EIC
8	Technical Specification for 220kV GIS/ Section-3 Chapter-1 \ Clause 7.b	The GIS system shall be suitable for future extension on either end by the addition of extra feeders, bus couplers, bus-bars, circuit breakers, dis-connectors, and other switch gear components. The arrangement of gas sections or compartments shall be such as to facilitate future extension without any drilling, cutting or welding on the existing equipment. To add equipment, it shall not be necessary to move or dislocate the existing switchgear bays	The GIS system shall be suitable for future extension on either end or single end as per OEM design by the addition of extra feeders, bus couplers, bus-bars, circuit breakers, dis-connectors, and other switch gear components. The arrangement of gas sections or compartments shall be such as to facilitate future extension without any drilling, cutting or welding on the existing equipment. To add equipment, it shall not be necessary to move or dislocate the existing switchgear bays

9	Technical specification clause 8.2 on Page 70 of 1047 of Section-C.	GIS Manufacturer shall furnish details of precaution taken to prevent bimetallic corrosion wherever dissimilar materials (such as Copper, Aluminum) are used in line with IEC1639, including the following. ☐ Aluminum conductor in the bus duct and the current carrying part in the bushing. ☐ Terminal clamp and the current carrying part in the bushing if bushing stud is not of Copper.	GIS Manufacturer shall furnish details of precaution taken to prevent bimetallic corrosion wherever dissimilar materials (such as Copper, Aluminum) are used in line with IEC1639, including the following. ☐ Aluminum conductor in the bus duct and the current carrying part in the bushing. ☐ Terminal clamp and the current carrying part in the bushing if bushing stud is not of Copper. Bus bars shall be of electrolytic grade materials of proper sizing and metallurgy as per requirements of tender specifications and applicable standards.
10	Sect-3 chapter-9 clause -1.0 (iii)	Redundant managed switched Ethernet Local Area Network communication infrastructure with hot standby	SAS system shall have redundancy as detailed below 1- Redundent RTU units 2- Redundent Power supply units 3- Redundant managed switched Ethernet Local Area Network communication infrastructure with hot standby 4- Redudent ring/ start topology of communication network.



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11	Clause 1.1.1 of on page 266 of 1047 of Section-C	This specification covers design, manufacture, assembly, testing at manufacturer's works before dispatch, inspection, supply & delivery (including loading, transportation & unloading on platform at site), erection, installation, all civil work including foundation, site testing & commissioning of 04 nos. oil filled 220/34.5kV, 50/65MVA (ONAN/ONAF) power transformers as detailed in this specification including Nitrogen injection based fire system, high velocity water spray based fire system, On line dehydration system, On line PD monitoring system, FO sensor based temperature monitoring, OLTC, RTCC with AVR and complete with all other required accessories for safe, efficient, satisfactory and trouble free operation of the equipment and in compliance with IS/ IEC/ HVPNL & CEA guidelines.	This specification covers design, manufacture, assembly, testing at manufacturer's works before dispatch, inspection, supply & delivery (including loading, transportation & unloading on platform at site), erection, installation, all civil work including foundation, site testing & commissioning of 04 nos. oil filled 220/34.5kV, 50/65MVA (ONAN/ONAF) power transformers as detailed in this specification including Nitrogen injection based fire system, high velocity water spray based fire system, On line dehydration system, On line PD monitoring system, FO sensor based temperature monitoring, OLTC, RTCC with AVR and complete with all other required accessories for safe, efficient, satisfactory and trouble free operation of the equipment and in compliance with IS/ IEC/ HVPNL & CEA guidelines. The online PD monitoring shall be similar of GIS system. All required sensors shall be permanently installed in transformers and portable data acquisition system shall be provided which be both in GIS as well as transformers for periodic online PD monitoring. The portable PD analyser kit shall be used for detection and measurement of PD and the measurement shall be stored in the instrument and further downloadable to a PC for further analysis to locate actual source of PD..
12	Section-3 Chapter-1 Special Tools Tackles and Equipment Section-3 Chapter-1 clause 8.24/(e) and (g)	On line PD monitoring system for 220 kV GIS modules. Portable PD analyzer/measurement kit suitable for GIS along with required accessories	In line with tender clause viii – a on Page 222 of 1047 of Section-C, Portable PD analyzer/measurement kit suitable for both GIS and Power Transformer along with required Accessories as per tender specification is to be provided.

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13	Clause 9.1.5 of Section-2 Part on Page no.: 95 of 1047.	Online PD analyzer comprising of both acoustic based as well as capacitive coupler based system along with hardware and monitoring system is also to be provided for 220 KV system. This system shall be integrated with new SCADA system for online monitoring of PD parameters.	In line with tender clause viii – a on Page 222 of 1047 of Section-C , Periodic Online PD analyzer comprising of acoustic based with detailed specification as mentioned in Section-3 Chapter-1 and Section-3 Chapter-2.
14	Sl. No.: 104 on Page 43 of 80 of Annexure-A of Technical corrigendum-1.	Bushing CTs shall preferably be provided for REF protection as specified in Part – II Cl. 2.5. The bushing shall be removable without disturbing the CTs. The detailed design of the CTs shall be in the scope of the LSTK contractor considering the tender and project requirements.	Bushing CTs shall preferably be provided for REF protection. The bushing shall be removable without disturbing the CTs. The detailed design of the CTs shall be in the scope of the ~~LSTK~~ contractor considering the tender and project requirements. The REF bushing CTs are exclusively are part of new transformers and its sizing and selection shall be as per transformer rating and applicable standards and is in the scope of ~~LSTK~~ contractor. For transformer differential protection, the zone of protection shall be as detailed below: a. For PR Transformers: The zone will be from 220 KV transformer bay CT to grid incomer panel in SS-63. The feeder detail of SS-63 is attached as Annex-S-2/C-1/10. b. For PNCP Transformers: The zone will be from 220 KV transformer bay CT to LIB panel in SS-63.
15	ANNEXURE – S-3/C-2/3 Clause 6.0 on Page 328 of 1047.	Each system of Dual Redundant AVR relay shall have facility to control all the four transformers in parallel.	Each system of Dual Redundant AVR relay shall have facility to control all the four transformers in parallel. An automatic switch-over to AUTO-2 in case of any malfunctions in AUTO-1 should be available. During normal operation, the output commands for tap changes from selected working Relay and commands from other must be in blocked condition.

16	Technical corrigendum point - 21 on page 14 of 80 & Technical corrigendum point - 87 on page 37 of 80	The SCAP/ Remote control hardware and HMI panel to be installed in existing control room of both PR and PNCP. The existing control room shall be extended for accommodation of new hardware in PR. Complete design supply and site work for extension of control shall be in the scope of vendor. Separate base foundation system to be developed from ground floor itself and same shall be connected with existing PR control room by breaking the wall in between. Extension will be required only at the control room level. So no modification in existing control room arrangement is required, except breaking the wall with proper sealing arrangement between two rooms. Extension of existing control room of PR and construction of room of approximate dimension of 5 m X 4 m with height similar to control room floor (approximate 10 M height) for installation of SCAP panel. Bidder shall develop complete room including its foundations, RCC super-structures, false floor and false ceiling.	The SCAP/ Remote control hardware and HMI panel to be installed in existing control room of both PR and PNCP. The existing control room shall be extended for accommodation of new hardware in PR. Following clarification to be followed for installation of HMI and SCAP in PR side 1- New HMI of SAS & LMS to be installed in GT control room adjacent to existing HMI panels. The HMI cabinets including its installation and ~~associated false floor modification~~ will be in the scope of ~~2272~~ contractor. 2- New SCAP of GIS system shall be installed in STG control room which is adjacent of GT control room. Existing available space to be used for installation of SCAP. Adequate space is available in STG control room area for SCAP panel installation. The Floor of STG control room is of RCC and required floor cutouts which shall be developed in floor by diamond cutting tools or other mechanized cutting/ drilling tools. For installation of SCAP panle on RCC floors, required floor chipiing with provision of floor brackets or grouting of panels can be opted. All required design, supply of material, shifting of material and ~~installation of~~ panel, is in the scope of ~~2272~~ contractor. Extension of existing control room of PR and construction of room of approximate dimension of 8 m X 8 m with height similar to control room floor (approximate 10 M height). Bidder shall develop complete room including its foundations, RCC super-structures, false floor and false ceiling. Separate base foundation system to be developed from ground floor itself and same shall be connected with existing PR control room by breaking the wall in between. Extension will be required only at the control room level. So no modification in existing control room arrangement is required, except breaking the wall with proper sealing arrangement between two rooms. As no major modification is required in existing building and there is no increase in the building load on existing building, its design references are not relevant.
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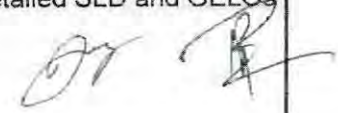
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			The new control room extension building shall have complete independent load bearing members. PNCP side – Available space in existing control room will be used for installation of new SCAP panel. ~~Related modification in base floor, proper support structure and installation of panels is in the scope of LSTK contractor.~~
17	Sl. No.: 78 on Page 33 of 80 of Annexure-A in Technical Corrigendum-1	Development of walkway connectivity between existing sub-station (SS No.: 63) to new 220 GIS switchgear building at first floor level with required elevations for road crossings for operational requirements. All kinds of modification, repair works in existing sub-station shall also be in the scope of LSKT contractors.	Development of cable rack cum walkway for connectivity between existing sub-station (SS No.: 63) to new 220 GIS switchgear building at suitable elevation required for road crossing as per applicable standards. The cable rack and walkway shall be build with structural construction of required capacity to ensure cable laying works as per project requirement. This cable rack needs to be aligned and terminated at the Junction point with the existing walkway cum cable rack of SS-28 to SS-63. Additional cable trays along with the support shall be provided in this existing walkway for proper laying of cables. This cable rack shall be above ground facility with suitable ground clearances as per applicable site conditions and applicable guidelines.
18	Clause 9.0 of S-2/C-1/2 on Page 126 of 1047 of Section-C	220 KV, 2000 Amp, Isolator with earthing switches with accessories required including its lattice type support galvanised structure in line with the technical specification attached	220 KV, 2000 Amp, Isolator with earthing switches with accessories required including its lattice type support galvanised structure in line with the technical specification attached. The detailed technical specification is attached as Annexure-S-3/C-4/8.

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19	Sl. No.: 197 on Page 76 of 80 of Annexure-A of technical corrigendum-1	The available space along with existing 132 KV switchyard to be used for new ISBL facility. The dismantling, removal, levelling, soil filing, scrap removal of existing structure on this plot like store building, any abandon foundations to be done by vendor. The shifting of disposable materials/ dismantled earth work to locations inside/outside the refinery premises shall be in the scope of vendor. Owner shall indicate the location of disposal to the vendor. The disposal of all scrap, debris, dismantled materials from existing area to the place shown by IOCL within the refinery premises shall be in the scope of LSTK bidder. However the final	The available space along with existing 132 KV switchyard to be used for new ISBL facility. The dismantling, removal, levelling, soil filing, scrap removal of existing structure on this plot like store building any abandon foundations to be done by vendor. The shifting of disposable materials/ dismantled earth work to locations inside the refinery premises shall be in the scope of vendor. Owner shall indicate the location of disposal to the vendor. The disposal of all scrap, debris, dismantled materials associated with LSTK scope of work from new 220 KV GIS plot, all cable routes, SS28, SS-63 and SS-9, control room to the place shown by IOCL within the refinery premises shall be in the scope of LSTK bidder.
20	Section-2/Part-A/Cl. no. 10.1.1.2/Pg no. 97.	220 kV SF-6 based full indoor GIS switchgears of 11 bays comprising of breakers, isolators, all type of Current Transformers & Potential transformer including 0.2 S class dedicated CT/PT for metering. In addition to above switchyard shall have Earth switches, dis-connectors switches, CVTs, LA , wave trap & PLCC equipments. The tentative SLD of switchyard system shall be attached as Annexure S-2/C-1/3 and tentative GELO of switchyard shall be attached as Annexure-S-2/C-1/4. The compliance of HVPNL guidelines, CEA guidelines and other standard requirements while preparing detailed SLD and GELOs will be in the scope of vendor.	220 kV SF-6 based full indoor GIS switchgears of 11 bays comprising of breakers, isolators, all type of Current Transformers & Potential transformer including 0.2 S class dedicated CT/PT for metering. In addition to above switchyard shall have Earth switches, dis-connectors switches, CVTs, LA , wave trap & PLCC equipments. The lightning arresotrs (LA) will be required in following locations: a. Outdoor LA at the incoming point of 220 KV overhead lines.(both lines) b. GIS LA in outgoing of transformer bays (all eight transformer bays). The tentative SLD with above clarification of switchyard system shall be attached as Annexure S-2/C-1/3 and tentative GELO of switchyard shall be attached as Annexure-S-2/C-1/4. The compliance of HVPNL guidelines, CEA guidelines and other standard requirements while preparing detailed SLD and GELOs will be in the scope of vendor.



21	Point: 198 on Page 77 of 80 of Annexure-A of technical corrigendum-1.	Laying of concrete roads leading to switch yard (as per GELO; Annex-S-2/C-1/4) and Transformer yard in front of SS-28, distribution transformer area below walkway structure from main existing road including earth filling for road and beams if required. Existing drain needs to be taken care by development of RCC culvert concept alt all the approach roads. This approach road shall be suitable for movement of heavy equipments which will be required for new 220 KV GIS sub-station. The design, supply and construction of these approach roads shall be in the LSTK contractor's scope. The size of every approach road will be approximately 7.5 m X 10 m (Width X Length). Detailed CLO to be prepared and submitted by vendor in line with HVPNL specifications/ PWD specifications and other standards for approval of owner. During design, the most stringent standard references shall prevail.	Laying of concrete roads leading to switch yard (as per GELO; Annex-S-2/C-1/4) and Transformer yard in front of SS-28, distribution transformer area below walkway structure from main existing road including earth filling for road and beams if required. Existing drain needs to be taken care by development of RCC culvert concept alt all the approach roads. This approach road shall be suitable for movement of heavy equipments which will be required for new 220 KV GIS sub-station. The design, supply and construction of these approach roads shall be in the LSTK contractor's scope. The size of every approach road will be approximately 7.5 m X 10 m (Width X Length). Detailed CLO to be prepared and submitted by vendor in line with HVPNL specifications/ PWD specifications and other standards for approval of owner. During design, the most stringent standard references shall prevail. Preparation of new roads will be required for following areas: a. Internal GIS sub-station area roads as indicated in GELO b. Approach road to GIS sub-station area from existing adjacent roads. Concept of RCC culverts of proper strength shall be adopted for this purpose.
22	Point no.: 35 on Page 20 of 80 of Annexure-A of technical corrigendum-1	Cable trays shall be sized considering single layer of cables for power cables (HT or LT). For control or instrumentation cables maximum double layer per tray is acceptable.	Cable trays shall be sized considering single layer of cables for power cables (HT or LT). For control or instrumentation cables maximum double layer per tray is acceptable. In line with tender clause 24.8 on Page 84 of 1047, The G.I covers of minimum 2mm thickness to be provided for trays carrying control and signal cables.
23	Clause I(1) of chapter-8C/1 on Page: 743 of 1047.	Configuration – Chiller: 2 no. (one running, one stand by), AHU: 1 no. (or) OEM recommended configuration	Configuration – Chiller: 2 no. (one running, one stand by), AHU: 2 nos. (one running, one stand by) All motor driven auxiliaries shall also be redundant type with one operating and one standby concept.

24	Sl. No.:101 on Page 43 of 80 on Annexure-A of technical corrigendum-1.	The transformers shall be designed to have short circuit rating of five seconds (thermal) as per applicable IS/IEC standards. The thermal ability to withstand short circuit shall be judged by calculation to be supplied above in the tender. The dynamic ability to withstand short circuit shall be demonstrated by test / type test reports to be submitted. The dynamic short circuit withstand capacity shall be as per relevant IS/IEC standards. The dynamic ability to withstand short circuit shall be demonstrated by test as per applicable IEC standards in case testing facility is available in India other-wise calculations will be supplied along with contract drawing	The transformers shall be designed to have short circuit rating of five seconds (thermal) as per applicable IS/IEC standards. The thermal ability to withstand short circuit shall be judged by calculation which is to be supplied during detailed engineering. The dynamic short circuit withstand capacity shall be as per relevant IS/IEC standards. All required type test including short circuit capacities shall be demonstrated by any one of the following methods: - Submission of type test report of similar design (as per IEC- 60076) or higher rating and capacities) - By calculation based on IS/IEC standards. (specific to short circuit capacities.) - By executing the test as per IS/IEC standards (if above options are not available)
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25	Clause 10.1.1.2 on page 97 of 1047 of Section-C	220 kV SF-6 based full indoor GIS switchgears of 11 bays comprising of breakers, isolators, all type of Current Transformers & Potential transformer including 0.2 S class dedicated CT/PT for metering, In addition to above switchyard shall have Earth switches, dis-connectors switches, CVTs, LA , wave trap & PLCC equipments. The tentative SLD of switchyard system shall be attached as Annexure S-2/C-1/3 and tentative GELO of switchyard shall be attached as Annexure-S-2/C-1/4. The compliance of HVPNL guidelines, CEA guidelines and other standard requirements while preparing detailed SLD and GELOs will be in the scope of vendor.	220 kV SF-6 based full indoor GIS switchgears of 11 bays comprising of breakers, isolators, all type of Current Transformers & Potential transformer including 0.2 S class dedicated CT/PT for metering, In addition to above switchyard shall have Earth switches, dis-connectors switches, CVTs, LA , wave trap & PLCC equipments. The tentative SLD of switchyard system shall be attached as Annexure S-2/C-1/3 and tentative GELO of switchyard shall be attached as Annexure-S-2/C-1/4. The compliance of HVPNL guidelines, CEA guidelines and other standard requirements while preparing detailed SLD and GELOs will be in the scope of vendor. Supply and installation of all the PLCC component in sending end shall also be in the scope of LSTK contractor. All required material and services shall be arranged by LSTK contractor. In case the system is not ready for installation at sending end or HVPNL clearances are not available for installation, the sending end relays and accessories may be supplied at loosed items and same shall be considered by mechnicla completion for the subject item. However final commissioning of the line differential scheme shall be in the scope of LSTK contractor.
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26	Clause B on Page: 742 of Chapter-8C/1 of Section-C	The scope also includes all ducting, piping, insulation, cladding, AHU (Air handling unit), structural and support materials, CW (cooling water) (cooling water) tapings, steam line tapings, condensate line tapings, all kinds of valves, required cabling, Power distribution board, and construction of new room for AHU.	The scope also includes all ducting, piping, insulation, cladding, AHU (Air handling unit), structural and support materials, CW (cooling water) tapings, steam line tapings, condensate line tapings, instrument air tapping all kinds of valves, required cabling, Power distribution board, and construction of new room for AHU. Instrument air shall be tapped from the nearest instrument air header. All required design, development of tapping points, associated tubing pipings, valve, filters shall be in the scope of LSTK contractor including supply of materials. Instrument air pressure is normally in the range of 4-6 Kg/cm². All tap off points for steam, cooling water, condensate and instrument air shall be within the boundary limits of approximately 500 mtrs from new GIS building. Tap off points finalisation and its routing shall be done during detailed engineering. If required, LSTK bidder may carryout the site visits accordingly.
27	Clause 1.1.6.4 on Page 813 of 1047	LMS system DO & AO shall be suitable for control as per existing Turbine controllers, DAVR system of both GT & STG at PR and PNCP. All required information for proper integration/ data inputs of existing system from OEM (if required) shall be collected by LSTK contractor and same also be submitted to IOCL for information/ comments.	LMS system DO & AO shall be suitable for control as per existing Turbine controllers, DAVR system of both GT & STG at PR and PNCP. All required information for proper integration/ data inputs of existing system shall be provided by IOCL. The listing of all such informations, associated technical guidance and compilation of total data shall be in the scope of ~~per~~ contractor.

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28	Sl. No.: 44 on Page: 22 of 80 of Annexure-A of technical corrigendum-1	220 KV line shall have both distance relay and line differential relay as per protection philosophy on page 530 of 1047 of Section-C.	220 KV line shall have both distance relay and line differential relay as per protection philosophy on page 530 of 1047 of Section-C. on SECTION-2. Supply of relays and all its accessories of sending end shall also be in the scope of the ~~LSTK~~ contractor including its installation and commissioning. In case sending end system is not ready or HVPNL clearances are not available, the ~~LSTK~~ contractor shall supply the material in loose. In such case, the supply part shall be considered as mechanical completion only for the subject item. However final installation and commissioning will be in the scope of ~~LSTK~~ contractor as per availability of front.
29	Clause 25.8 on Page 85 of 1047 of Section-C	Metallic non current carrying parts of all electrical apparatus such as switchgears, motors, lighting / power panels, control panels, cable trays, terminal boxes, control stations, lighting fixtures, receptacles junction boxes etc.	Metallic non current carrying parts of all electrical apparatus such as switchgears, motors, lighting / power panels, control panels, cable trays, terminal boxes, control stations, lighting fixtures, receptacles junction boxes etc. All new trays power/control which are laid under LSTK scope of work shall have dedicated earthing system. New earth strips shall be laid along with new trays and shall be connected with the trays at regular intervals as per cable laying guidelines. These earth strips shall also be connected existing earthing network at regular interval if existing earthing network is not available, new earth pits shall be developed and shall be connected to the cable trays earthing system. All required materials, its design and installation is in the scope LSTK contractor.

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30	Clause no.: 9.1.6 on Page 95 of 1047 of Section-C	The GELO plan of complete 220 KV system shall be prepared by LSTK contractor and get approved from HVPNL prior to start of the job. All required co-ordination laisioning for GELO approval is in the scope of LSTK contractor. The GELO attached with tender are tentative in nature only. It is the responsibility of LSTK to ensure the bid preparation in line with the HVPNL guidelines.	The GELO plan of complete 220 KV system shall be prepared by LSTK contractor and get approved from HVPNL prior to start of the job. All required co-ordination for GELO approval is in the scope of LSTK contractor. The GELO attached with tender are tentative in nature only. It is the responsibility of LSTK to ensure the bid preparation in line with the HVPNL guidelines. The tentative GELO diagram proposed as on date is attached as Annex-S-2/C-1/17. Earlier Annex-S-2/C-1/4 to be ignored.
31	Clause 18.1 (note-1) on Page 389 of 1047 of Section-C.	Certain minimum requirements are indicated above for 220 KV GIS (Indoor) for guidance purpose only and minimum required. However, bidder shall design and accordingly may increase and/ or add any other room/ facility required for successful execution of the project for complete system requirement for 220KV indoor GIS.	Certain minimum requirements are indicated above for 220 KV GIS (Indoor) for guidance purpose only. The indicated carpet area is the Minimum required. Overall GIS building plot area is indicated S-2/C-1/17 and accordingly the layout plan of GIS building, equipment layout shall be developed in line with project requirements and applicable standards. The layout plan of GIS building provided in tender is indicative and minimum. Development of Detailed layout plan of all the equipments as per project requirements and applicable standards shall be responsinbility of LSTK contractor. Minimum carpet area is defined for specific rooms in tender specification. However, bidder shall design and accordingly may increase and/ or add any other room/ facility required for successful execution of the project for complete system requirement for 220KV indoor GIS.

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32	Sl. No.: 108 on Page 44 of 80 of Annexure-A of technical corrigendum-1.	The tentative bay widths & heights are given as 16600(width in mm) & 14500 (height in mm). Exact dimensions to be decided as per project requirement by LSTK contractor so that proper installation plot area with proper approaches from required sides. Tentative plot plan is also attached as Annexure- S-3/C-3/1 as reference only. The LSTK contractor to note the overall plot size is limited for complete ISBL work and as indicated in GELO attached as Annex-S-2/C-1/4. The exact equipment layout and plot plan shall be developed by LSTK contractor based on the overall plot size and tender specification.	The tentative bay dimensions are only indicative The available plot area as per GELO attached as Annex-S-2/C-1/17 to be referred.. Exact dimensions to be decided as per project requirements and applicable standards by LSTK contractor so that proper installation with proper approaches for maintenance purpose. The LSTK contractor to note the overall plot size is limited for complete ISBL work and as indicated in GELO attached as Annex-S-2/C-1/17. The exact equipment layout and plot plan shall be developed by LSTK contractor based on the overall plot size and tender specification.
33	Clause 10.1.2.15 on Page 105 of 1047 Sl. No.: 74 and 75 on Page no.: 31 of 80 of Annexure-A of technical corrigendum-1	The available space along with existing 132 KV switchyard to be used for new ISBL facility. The dismantling, removal, levelling, soil filing, scrap removal of existing structure on this plot like store building, any abandon foundations to be done by vendor. The shifting of disposable materials/ dismantled earth work to locations inside/outside the refinery premises shall be in the scope of vendor. Owner shall indicate the location of disposal to the vendor.	The available space along with existing 132 KV switchyard to be used for new ISBL facilities. The underground facilities like utility pipeline and electric cables may be present. LSTK contractor shall carry out the detailed site surveys as per the scope specified in general guidelines of civil works under Section-3 Chapter-3 of tender specifications. LSTK contractor shall also carry out manual pilot excavations as per directions of E-I-C for exact assessment of underground facilities at proposed GIS plot as well as other areas proposed for power evacuation facilities under the scope of this tender. The dismantling, removal, levelling, soil filing, scrap removal of existing structure on this plot like store building, any abandon foundations, pits to be done by LSTK contractor. The shifting of disposable materials/ dismantled earth work to locations inside the refinery premises within a distance of 15 KM shall be in the scope of vendor. Owner shall indicate the location of disposal to the vendor.  

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34	Clause 2.0 (bullet point:2 and 3) on Page 365 of 1047 of Section-C	Dismantling of existing structures, drain, piping work (above and over ground), disposal of debris, cleaning of site etc. Proper rerouting of cable trench/ product pipeline/sewer line / OWS line/manhole as per site requirement & instruction of EIC.	In case underground utility piping and electrical cables are available at the designated locations following methodology shall be adopted for dismantling and disposal. a. All kinds of excavation required for identification as well as for complete dismantling within the GIS plot area and area associated with the power evacuation cable route shall be in the scope of LSTK contractor. b. If underground utility pipelines and cables are abundant/not in use/non-functional, its complete dismantling and disposal shall be in the scope of LSTK contractor as per tender specifications. In case of any live cables or utility lines its rerouting is unsafe and not included in LSTK scope c. LSTK contractor shall carry out any modifications required in the foundation requirements of new ISBL facilities to accommodate existing piping and cable arrangement if instructed by E-I-C. However such modifications shall be in compliance with the scope of work, technical requirements specific to the equipment and standard references. Such modifications shall be identified during detailed engineering stage to avoid delay in executions and shall be the responsibility of LSTK contractor. d. In case of any existing waste/debris/scrap which is falling under hazardous category as per government regulations, then its dismantling, handling and disposal will be done by IOCL. Categorisation of waste will be approved by E-I-C based on applicable regulations and guidelines. In case of a new equipments or system under project scope having hazardous materials, its complete handling shall be in the scope of LSTK contractor.
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35	Clause 1.1 on Page 356 of 1047 of Section-C.	The scope of specification covers design, fabrication, supply, testing and erection of galvanised steel structure for gantry towers, latticed girders , equipment foundation structures, cable racks, trenches , bus duct, piping support, area lighting, installation of all auxiliary panel and other project specific requirements shall be in LSTK contractor's scope. All required materials shall be applicable IS standards. Complete structural work for commissioning of 33 KV power evacuation systems up to existing generation system of PR and PNCP is also in the vendors scope.	The scope of specification covers design, fabrication, supply, testing and erection of galvanised steel structure for gantry towers, latticed girders , equipment foundation structures, cable racks, trenches , bus duct, piping support, area lighting, installation of all auxiliary panel and other project specific requirements shall be in LSTK contractor's scope. All required materials shall be applicable IS standards. Complete structural work for commissioning of 33 KV power evacuation systems up to existing generation system of PR and PNCP is also in the vendors scope. The following existing overhead cable rack system shall be used for cable laying purpose with ensuring adequacy checks and provision of separate cable trays with supporting structures as per project requirements. a. Existing cable cum pipe rack connectivity between PR and PNCP. b. Existing control cable rack between SS-28 to PR control room. c. Existing power cable rack between SS-28 to SS-63. The details of existing flyover is attached as Annexure- S-2/C-1/12 and S-2/C-1/15 (Part-1 to Part-14)
36	Clause 1.1.8 on Page 508 of 1047 of Section-C	The system study done on the latest version of ETAP platform. The back-up files and modelling files to be submitted to IOCL post completion of studies.	The system study done on the latest version of ETAP or equivalent software platform. The back-up files and modelling files to be submitted to IOCL post completion of studies.



37	Clause 9.0 on Page 610 pof 1047 of Section-C	Single line to ground fault current: For HV cables to be supplied as per the design requirements for the project: a. Current value: (as per system kA (min) requirement) b. kA/Duration: a. to be decided as per project requirements.	Single line to ground fault current: For HV cables to be supplied as per the design requirements for the project: a. Current value: 25 KA or matching with earth fault current of proposed system. Fault level shall be justified by system study with inclusion of contribution of existing system. b. kA/Duration: 1 Second (Minimum) or as per project requirement
38	Clause 2.0 of Section-3 Chapter-18	The proposed Fault limiting device will be installed in parallel with the URT system of SS-63 at PR. The fault limiting device shall have The copper bridge (main current path) inside the insert of the limiter carries the continuous current in normal operating condition. In case of a fault current the main current path is immediately opened, triggered by the control unit. The short-circuit current commutates to a parallel fuse with high breaking capacity, which limits the short-circuit current during the first rise within less than a quarter cycle.	The proposed Fault limiting device will be installed in parallel with the URT system of SS-63 at PR. The existing URT rating is 33/33 KV; 37.5 MVA/50 MVA (ONAN/ONAF) and percentage impedance of 17.78 % @ 50 MVA base. The fault limiting device shall have The copper bridge (main current path) inside the insert of the limiter carries the continuous current in normal operating condition. In case of a fault current the main current path is immediately opened, triggered by the control unit. The short-circuit current commutates to a parallel fuse with high breaking capacity, which limits the short-circuit current during the first rise within less than a quarter cycle.
39	Clause 2.0 on Page 509 of 1047 of Section-C	SUPPLY OF TESTING EQUIPMENTS AS PER PROJECT REQUIREMENTS:	SUPPLY OF TESTING EQUIPMENTS AS PER PROJECT REQUIREMENTS: The corrected list of the testing equipments is attached as Annex-S-3/C-5/6. The scope of supply remains same in line with tender specification.

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40	Clause 10.1.1.9 on Page 98 of 1047 of Section-C	Complete 220 kV & 33 kV C & R Panels with remote monitoring HMI system. All required relay panels, ECS/ SCADA panels shall be installed in same 220 KV GIS switchgear building while remote HMI to be installed in existing control room of both PR and PNCP.	Complete 220 kV & 33 kV C & R Panels with remote monitoring HMI system. All required relay panels, ECS/ SCADA panels shall be installed in same 220 KV GIS switchgear building while remote HMI to be installed in existing control room of both PR and PNCP. The relay panel shall be of relay OEM or equivalent manufacturer with due approval of E-I-C.
41	Clause 5.2 of Section-3 Chapter-12 on Page no.; 892 of 1047 of Section-C	All motor feeders rated 75 KW and above shall be ACB fed.	In line with tender clause 1.2 on Page 887 of 1047 of Section-C. The motor of capacity more than 55 KW shall be breaker fed motor.
42	Clause 7.11 of Section-3 Chapter-12 on Page no.; 892 of 1047 of Section-C	The maximum height of the operating handle and switches shall not exceed 1900 mm and the minimum height not below 300 mm.	The maximum height of the operating handle and switches shall not exceed 1900 mm and the minimum height not below 300 mm or as per type tested design of approved OEMs as specified in Section-3 Chapter-17.
43	Clause 4.2 of Section-3 Chapter-18	Collection of all existing system data as required for fault limiting system design shall be in the scope of LSTK contractor.	Collection of all existing system data as required for fault limiting system design shall be in the scope of ~~LSTK~~ contractor. Basic information related with the existing system is attached as Annexure-S-3/C-18/1.

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44	Clause 34 on Page of Page 101 of 1247 of Section-C	Modification of existing ECS system of PR and PNCP for monitoring of proposed system and integration of load shedding scheme. Scope included supply of all materials, installation, laying and termination complete in all respect.	Modification of existing ECS system of PR and PNCP for monitoring of proposed system and integration of load shedding scheme. Comprehensive scope of ECS shall be followed as per Annexure-S-3/C-9/4.
45	Clause 177 on Page-70 of 80 on Annexure-A of Technical corrigendum-1	For 220 kV class enclosure shall be phase wise separate metallic type.	In line with Sl. No.: 121 of technical corrigendum-1, For 220 KV Class enclosure may be single phase encapsulated or three phase encapsulated type as per OEM design and architecture. However the offered design must be type tested in line with relevant IEC standard.
46	Sl. No.: 176 on Page 70 of 80 of technical corrigendum-1	To limit the effects of an internal arc the switch gear shall be suitably subdivided into individual arc and gas-proof compartments, preferably for i. Bus-bar together with bus-bar isolator and earthing switch ii. Circuit breaker iii. Line isolators and earthing switch, (Line, transformer) iv. Instrument transformers. v. Intermediate compartment	To limit the effects of an internal arc the switch gear shall be suitably subdivided into individual arc and gas-proof compartments, preferably for i. Bus-bar together with bus-bar isolator and earthing switch ii. Circuit breaker iii. Line isolators and earthing switch, (Line, transformer) iv. Instrument transformers. v. Intermediate compartment However specific to design of compartments, GIS OEM type tested designs are also accepted.

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47	Sl. No.: 173 on Page 70 of 80 of technical corrigendum-1	The bus bar system shall be sectionalized for each bay and contained in individual SF6 gas tight bus compartments to prevent contamination of the gas of the whole bus bar due to fault in one bay zone and refill lesser quantity of SF6 gas.	The bus bar system shall be sectionalized for each bay and contained in individual SF6 gas tight bus compartments to prevent contamination of the gas of the whole bus bar due to fault in one bay zone and refill lesser quantity of SF6 gas. However specific to design of compartments, GIS OEM type tested designs are also accepted.
48	Sl. No.: 194 on Page 75 of 80 of technical corrigendum-1	*** BCU unit shall be a part of LCC and SCAP shall be part of remote control & monitoring.	*** BCU unit shall be a part of ~~LCC~~ CRP and SCAP shall be part of remote control & monitoring.
49	Section-2/Part-A/Cl. no. 9.1.2/Pg no. 95 of 1047 of Section-C	220 KV GIS indoor switchgears with 11 bays including all its control, relay, monitoring facility inclusive of all accessories.	220 KV GIS indoor switchgears with 11 bays including all its control, relay, monitoring facility. The 11 bays are comprising of 2 line incomer bays, 1 bus-coupler bay, 8 Nos. of similar rating of Transformer bays complete in all respect. The spare 4 No. Transformer shall have all the GIS components, protection components, Local and Remote Control schemes, CT and PTs, metering, all remote operation and monitoring connectivities as per scope of work, so that any spare bays are in ready to use conditions for any future requirements. The outgoing of 4 Nos. of spare transformer bays shall be designed for termination of minimum 3 runs of single core 220 KV outgoing cables per phase. In psare transformer bay, only suitable cable termination/cable adopter box shall be provided so that in future cable termination can be done without any modification in GIS bays. Also the GIS installation shall be designed with the provision of space for extension of bays in either directions for minimum two numbers including its floor cutout arrangement. The building design, GIS system and switchgear floor designs shall be done accordingly.

Integration of new GIS system with existing ECS facility at both PR and PNCP -

- 1- Introduction – Presently Emerson make ECS system is used in Panipat refinery and ABB make ECS system is used at PNCP end for electrical system monitoring and Load shedding requirement. With the addition of grid facility, new GIS system components needs to be integrated with ECS system .
- 2- The ECS integration concept in ISBL scope of work shall be to provide all required IO for existing ECS system up-to intermediate marshalling box (MB) system . The major Scope of work under this head is as following:
 - a- Provision of all required IO signals, associated system hardware at GIS, LIB , UPS, Charger, LT distribution system for hook up with existing ECS system. All critical signals shall be redundant as listed in IO list in Table-1 and 2 of this chapter.
 - b- Design, fabrication, supply & installation of Suitable sized MB at both PR and PNCP. Location of MB in PR will be in GIS substation building and location of MB for PNCP will be in existing SS-9 building. The MB specific requirement is listed in part-3 of this document.
 - c- Design, engineering, supply , laying , termination of all control and signal cables as per standard design requirement shall be in the scope of ~~MB~~ contractor between source of signal to MB panel. **(CABLING NOT IN BIDDER'S SCOPE)***
 - d- Development of complete cable schedule and interconnection charts for IO signals from source to MB. Such documents shall be provided to IOCL for there use as required and instructed by EIC.
 - e- Scope of work is detailed below in two parts for modifications in existing ECS system for load shedding requirement –

Part 1- (work at PR- SS-28 end)-

- a- The listed IO of new Grid system (for all 11 bays) and associated system needs to be provided for ECS hook up. The IO list for ECS hook up at PR end is given in table-A
- b- One Marshalling box shall be provided in GIS substation for developing required connectivity with existing ECS system of PR .

Table-A

Sr no	Signal description	Source	Redundancy
1	220 KV all bays breaker ON status	~~220 KV GIS swgr~~ CRP	Yes (every signal shall be double). Only hard contacts/ Latched relay based contacts shall be provided
2	220 KV all bays breaker OFF status	~~220 KV GIS swgr~~ CRP	Yes (every signal shall be double) Only hard contacts/ Latched relay based contacts shall

*** HOWEVER IMB PANELS SHALL BE COMPLETE WITH ALL INTERNAL CABLING UPTO TERMINAL BLOCKS.**

			be provided
3	220 KV all bays all isolator ON status	~~220 KV GIS swgr~~ CRP	Yes (every signal shall be double) Only hard contacts/ Latched relay based contacts shall be provided
4	220 KV all bays all isolator Off status	~~220 KV GIS swgr~~ CRP	Yes (every signal shall be double) Only hard contacts/ Latched relay based contacts shall be provided
5	220 KV all bays breaker ON command	MB to GIS	No
6	220 KV all bays breaker Off command	MB to GIS	No
7	220 KV all bays all isolator ON command	MB to GIS	No
8	220 KV all bays all isolator Off command	MB to GIS	No
7	Running MW in 4-20 ma mode from transducer for all 11 bays of GIS system	~~220 KV GIS swgr~~ CRP	Yes. Every MW signal shall be double .
8	Running MVAR in 4-20 ma mode from transducer for all 11 bays of GIS system	~~220 KV GIS swgr~~ CRP	No
9	MWH /MVARH of all 11 bays of 220KV	~~220 KV GIS swgr~~ CRP	No
10	System frequency (both line and both bus)	~~220 KV GIS swgr~~ CRP	yes
11	System Voltage (both line and both bus)	~~220 KV GIS swgr~~ CRP	Yes
12	Trip status of all 220 kv breakers	~~220 KV GIS swgr~~ / CRP	No
13	Trip circuit supervision of both trip circuit for all breakers of 220KV GIS	~~220 KV GIS swgr~~ CRP	No
14	DC & AC supply supervision of	~~220 KV GIS swgr~~ CRP	No

	both section		
15	Alarms of GIS monitoring system- -All compartment gas pressure -Humidity & density monitoring alarm -Bus differential supervision	~~220 KV GIS swgr~~ / CRP	No
16	Power factor of both grid incomers in 4-20 mA mode.	~~220 KV GIS swgr~~ CRP	No
17	Monitoring of all relays healthiness (watchdog concept)	220 KV CRP	No
18	Monitoring of DC control supply of CRP	220KV CRP	No
19	Common alarms of incipient fault (WTI/OTI/PRV/Bucchohz/MOG) of all grid transformers	220 KV CRP	No
20	Monitoring of relay healthiness (watchdog) of all LIB breakers.	LIB at Ss-63	No
21	Monitoring of healthiness of cable differential relay of both LIB	LIB at Ss-63	No
22	Monitoring of Trip circuit supervision of both LIB	LIB at Ss-63	No
23	Monitoring of DC & AC control supply of both LIB	LIB at Ss-63	No
24	Both LIB ON status	LIB at Ss-63	No
25	Both LIB OFF status	LIB at Ss-63	No
26	Both LIB ON command	LIB at Ss-63	No
27	Both LIB OFF command	LIB at Ss-63	No
28	Running MW in 4-20 ma mode	LIB at Ss-63	No

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	from transducer for both LIB		
30	Running MVar in 4-20 ma mode from transducer for both LIB	LIB at Ss-63	No
31	Trip status of both LIB	LIB at Ss-63	No
32	Common alarm monitoring of all UPS/Chargers	220 KV GIS SS	No
33	Monitoring of Output voltage of all UPS in 4-20 mA concept	220 KV GIS SS	No
34	220KV Swg PMCC all breaker ON status	220 KV GIS SS	No
35	220KV Swg PMCC all breaker OFF status	220 KV GIS SS	No
36	220KV Swg PMCC all breaker ON command	220 KV GIS SS	No
37	220KV Swg PMCC all breaker OFF command	220 KV GIS SS	No
38	Monitoring of Trip circuit supervision of 220KV swg PMCC all breakers	220 KV GIS SS	No
39	Monitoring of DC & AC control supply of 220KV swg PMCC all PMCC breakers	220 KV GIS SS	No
40	Monitoring of DC & AC control supply of 220KV swg PMCC all breakers	220 KV GIS SS	No
41	Monitoring auto circuit supervision of 220Kv swg PMCC	220 KV GIS SS	No
42	Monitoring of temperature & humidity of 220 KV GIS substation room	220 KV GIS SS	No
43	Monitoring of healthiness & alarms of NIFP & HVWS system of all four grid	220 KV GIS SS	No

CND

	transformers		
44	Monitoring of status & alarms of fault limiting devices	SS-63	No

- c- All kind of hardware required in new 220 KV GIS system like contact multiplier, transducers shall be in the ~~18th~~ contractor scope including its supply, installation and commissioning.

Part 2- (work at PNCP SS-9 end)

- a- The listed IO of new Grid GIS incomers & 2 nos LIB panels and associated system needs to be provided for ECS hook up. The IO list for ECS hook up at PNCP end is given in table- B

Table- B

1	33 KV both breaker ON status	SS-9 GIS generation bus	Yes (every signal shall be double). Only hard contacts/ Latched relay based contacts shall be provided
2	33KV both breaker OFF status	SS-9 GIS generation bus	Yes (every signal shall be double) Only hard contacts/ Latched relay based contacts shall be provided
3	33KV both incomer ON status	SS-9 GIS generation bus	Yes (every signal shall be double) Only hard contacts/ Latched relay based contacts shall be provided
4	33KV both incomer isolators Off status	SS-9 GIS generation bus	Yes (every signal shall be double) Only hard contacts/ Latched relay based contacts shall be provided
5	33KV both breaker ON command	MB to SS-9 GIS generation bus	No
6	33KV both breaker Off command	MB to SS-9 GIS generation bus	No
7	33KV both breaker isolators ON command	MB to SS-9 GIS generation bus	No
8	33KV both breaker isolators Off command	MB to SS-9 GIS generation bus	No