

SI.No	SL	Description	Remarks_Long_Description	Unit	Quantity
A		<b>Supply Item - 400kV GIS as per enclosed SLD with Double Bus Bar scheme comprising of 1 GT Incomer, 1 ST Incomer, 2 Outgoing Tie line, Bus Coupler and Bus PT bays. (Items A1-A15)</b>	<p>The 400 KV SF6 gas insulated switch gear shall have double bus bar arrangement. The SF6 gas insulated switch gear (50 HZ) shall be of the indoor metal- enclosed type, comprising of following modules:- 1 GT Incomer, 1 ST Incomer, 2 Outgoing Tie line, Bus Coupler and Bus PT bays and scope for extension for future bays , one on each side of bus bar.</p> <p>The Switchgear shall be complete with all necessary terminal boxes, inspection window, SF6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring equipment and piping, support structures.</p> <p>Any other item required for completion of project and not covered above - Complete List to be provided by bidder along with unit prices.</p> <p>The scope of supply shall also include all erection and mounting hardware and interconnecting power and control cables between GIS to LCC and between LCC to LCC including cable tray, glands, lugs, ferrules etc.</p>	lot	1
1	A1	BusBar Modules	<p>One set of three single phase(isolated), 2000A, 40kA for 3 sec, SF6 gas-insulated metal enclosed bus bars, each comprising of :</p> <p>a) Bus bars enclosures running the length of the switch gear to inter connect each of the circuit breaker bay modules in double main bus system.</p> <p>b) Gas monitoring systems, pressure switches, telescopic enclosure etc. as required.</p> <p>c) Barriers (communicating , non-cimminating types )</p> <p>Length of bus bar to be indicated by bidder.</p>	Set	2
2	A2	400kV Voltage Transformer module (for Busbars)	<p>400kV, 40 kA for 3 sec, SF6 gas insulated Bus VT bay module connected to Main Bus Bars, each comprising of:</p> <p>a) Three nos. single phase Voltage transformers</p> <p>b) One set of 3x1-phase, 2000A, group operated Disconnector switches, complete with manual and motor driven operating mechanisms.</p> <p>c) One set of 3x1-phase, group operated safety grounding switches, complete with manual and motor driven operating mechanisms. (Suitable for Bus Bar Earthing Duty)</p> <p>d) ONE set of 3x1-phase, high speed fault make grounding switch, complete with individual operated manual and motor driven operating mechanisms.</p> <p>e) Gas monitoring devices, barriers, pressure switches, etc. as required.</p>	Set	2

Sl.No	SL	Description	Remarks_Long_Description	Unit	Quantity
3	A3	400kV SF6 GIS Line bay module	<p>400kV, 40KA for 3 second, SF6 gas-insulated metal enclosed Line feeder bay module each set comprising of :-</p> <p>a) ONE set of 2000A, 3x1-phase, SF6 insulated circuit breaker <b>with PIR</b>, complete with operating mechanism (suitable for 1&amp;3 phase auto reclose)</p> <p>b) TWO sets of 3x1-phase, 2000A, 3-core, multi ratio, current transformers as per single line diagram. (Core details shall be finalised at detail engg. stage)</p> <p>c) THREE sets of 3x1-phase, 2000A, group operated Disconnector switches, complete with manual and motor driven operating mechanisms.</p> <p>d) TWO set of 3x1-phase, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.</p> <p>e) ONE set of 3x1-phase, high speed fault make grounding switch, complete with individual operated manual and motor driven operating mechanisms.</p> <p>f) Gas monitoring system, pressure switches etc as required.</p> <p>g) Barrier cones, mechanism box and other items as required.</p>	Set	2
4	A4	400kV SF6 GIS Tie Line bay module	<p>400kV, 40KA for 3 second, SF6 gas-insulated metal enclosed Tie Line feeder bay module each set comprising of :-</p> <p>a) ONE set of 2000A, 3x1-phase, SF6 insulated circuit breaker , complete with operating mechanism (suitable for 1&amp;3 phase auto reclose)</p> <p>b) TWO sets of 3x1-phase, 2000A, 3-core, multi ratio, current transformers as per single line diagram. (Core details shall be finalised at detail engg. stage)</p> <p>c) THREE sets of 3x1-phase, 2000A, group operated Disconnector switches, complete with manual and motor driven operating mechanisms.</p> <p>d) TWO set of 3x1-phase, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.</p> <p>e) ONE set of 3x1-phase, high speed fault make grounding switch, complete with individual operated manual and motor driven operating mechanisms.</p> <p>f) Gas monitoring devices, pressure switches etc as required.</p> <p>g) Barrier cones, mechanism box and other items as required.</p>	Set	2

SI.No	SL	Description	Remarks_Long_Description	Unit	Quantity
5	A5	400kV SF6 Generator Transformer Bay module	<p>400kV, 40 kA for 3 sec, SF6 gas insulated GT feeder bay module each comprising of:-</p> <p>a) ONE set of 2000A, 3x1-phase, SF6 insulated circuit breaker, complete with operating mechanism (suitable for 1&amp;3 phase auto reclose)</p> <p>b) TWO sets of 3x1-phase, 2000A, 3-core, multi ratio, current transformers as per single line diagram. (Core details shall be finalised at detail engg. stage)</p> <p>c) Four sets of 3x1-phase, 2000A, group operated Disconnector switches, complete with manual and motor driven operating mechanisms.</p> <p>d) three set of 3x1-phase, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.</p> <p>e) ONE set of 3x1-phase, multi winding, Voltage Transformer as per single line diagram. (Winding details shall be finalised at detail engg. stage)</p> <p>g) Gas monitoring system, pressure switches etc as required.</p> <p>h) Barrier cones, mechanism box and other items as required.</p>	Set	1
6	A6	400kV SF6 GIS Station Transformer Bay module	<p>400kV, 40 kA for 3 sec, SF6 gas insulated ST feeder bay module each comprising of:-</p> <p>a) ONE set of 2000A, 3x1-phase, SF6 insulated circuit breaker, complete with operating mechanism (suitable for 1&amp;3 phase auto reclose)</p> <p>b) TWO sets of 3x1-phase, 2000A, 3-core, multi ratio, current transformers as per single line diagram. (Core details shall be finalised at detail engg. stage)</p> <p>c) Three sets of 3x1-phase, 2000A, group operated Disconnector switches, complete with manual and motor driven operating mechanisms.</p> <p>d) Three sets of 3x1-phase, group operated safety grounding switches, complete with manual and motor driven operating mechanisms. (If required, high speed fault make grounding switch to be provided)</p> <p>e) Gas monitoring devices, pressure switches etc as required.</p> <p>f) Barrier cones, mechanism box and other items as required.</p>	Set	1
7	A7	400kV SF6 GIS Bus Coupler bay module	<p>400kV, 40KA for 3 second, SF6 gas-insulated metal enclosed Bus-Coupler bay module comprising of:-</p> <p>a) ONE set of 2000A, 3x1-phase, SF6 insulated circuit breaker, complete with operating mechanism (suitable for 1&amp;3 phase auto reclose)</p> <p>b) TWO sets of 3x1-phase, 2000A, 3-core, multi ratio, current transformers as per single line diagram. (Core details shall be finalised at detail engg. stage)</p> <p>c) TWO sets of 3x1-phase, 2000A, group operated Disconnector switches, complete with manual and motor driven operating mechanisms.</p> <p>d) TWO sets of 3x1-phase, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.</p> <p>e) Gas monitoring devices, pressure switches etc as required.</p> <p>f) Barrier cones, mechanism box and other items as required.</p>	Set	1

Sl.No	SI	Description	Remarks_Long_Description	Unit	Quantity
8	A8	Bay Control Cabinet	Bay Control Cabinet for all bays : 1 GT Incomer, 1 ST Incomer, 2 Outgoing line, 2 Outgoing Tie line, Bus Coupler and Bus PT bays. , etc	Nos.	9
9	A9	400kV SF6 to Air Bushing	400kV, 2000A, 40 kA for 3 sec, 31mm/kV creepage, SF6 gas insulated SF6 to Air Bushing for Over head connection of Line/Tie Line/GT/ST with GIS.	Nos.	18
10	A10	400kV GIS duct from GIS GT/Tie Line/ST/Line Bays to SF6 to Air bushing	400kV, 2000A 40kA for 3 sec, SF6 gas insulated GIS duct shall be complete & comprising of:- a) Three Nos. single phase (isolated) SF6 ducts along with all accessories to connect 400kV GIS with 400kV side Lines, GTs, STs and Tie Lines. b) Gas monitoring devices, barriers, pressure switches, etc. as required.  Total length is equal to sum of single phase lengths of all GIS ducts and is to be calculated by the bidder as per the layout drg. enclosed. Estimated length to be indicated by the bidder alongwith layout drg & calculation sheet in the offer. Extra claim to be entertained only if there is change in layout drg. & for variation arising out of it is in excess of 120% of the length in submitted calculation.	lot	1
11	A11	First filling of SF6 gas plus extra for compensating losses for 10 % of total gas (Bidder to indicate quantity).	First filling of SF6 gas, and hydraulic fluid, if required for the equipment supplied plus an additional quantity sufficient for conducting all tests on equipment at site before placing it into successful operation plus expected gas loss during 20 years of operation. Additionally, 10 % of total quantity of SF6 gas shall also be supplied in non returnable cylinders.	Lot	1
12	A12	Supply of structure work for Installation of GIS including support structure for GIS ducts, SF6 to air bushings, supports, platforms, ladders, foundation bolts, embedded parts in floors etc., which are required for installation of GIS as per the specification. (The civil works will be done based on supplier design & drawings).	Bidder to indicate estimated weight in the bid (in MT) alongwith support documents & unit prices per MT in their offer. Bidder to quote in units as MT. Addition/deletion shall be on unit rate basis but only if there is any change in input.	Lot	1

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Sl.No	SL	Description	Remarks_Long_Description	Unit	Quantity
13	A13	Supply of Earthing material for GIS including High frequency earthing material. The quantity shall be estimated provided by bidder for above floor earthing connection.	Supply of Earthing Material and Erection of all Earthing connection for GIS to GIS and GIS to Earth Mesh on Floor shall be in bidder's scope. The quantity shall be estimated by the bidder, based on their design philosophy. Design philosophy shall be submitted alongwith the bid in line with section 2. Supply of Earthing Material and Erection of Earth mesh on floor shall be done by BHEL in supervision of manufacturer as per manufacturer's design. Only supply of MS Rod (40mm Dia for outdoor below ground earth mat) and GI Flat of 75x12mm or MS Rod as recommended by bidder (for earth mesh on floor) shall be in BHEL's scope. Any other earthing material if required shall be in bidder's scope of supply and erection.	Lot	1
14	A14	Consumables (with limited shelf life) required for GIS (Bidder to quote item wise with detailed BOQ for these consumables )	Consumables including grouting material having limited shelf life required during erection, testing and commissioning. It shall be supplied just before erection after confirmation from BHEL.(1 lot is for complete package).	Lot	1
15	A15	Consumables required for GIS (with unlimited shelf life) (Bidder to quote item wise with detailed BOQ for these consumables )		Lot	1
<b>B</b>		<b>Supply Item - Mandatory Maintenance equipment (B1 to B2)</b>		<b>lot</b>	<b>1</b>
16	B1	SF6 gas processing unit	As per clause 5.03.11 of section 2 (300 litre)	Nos	1
17	B2	Wheeled maintenance unit	As per clause 5.03.11 of section 2	Nos	1
<b>C</b>		<b>Supply Items - Mandatory spares (C1 to C14)</b>	These prices will also be used for addition/deletion/replacement.	Lot	1
18	C1	O-ring and Gasket - 2 set for each size		set	1
19	C2	Absorbent - in Kg (bidder to indicate)		Lot	1
20	C3	SF6 Gas - One Cylinder of 20 kg		No.	1
21	C4	Single Phase PT		No.	1
22	C5	Expansion Vent diaphragms- 5 % of total		Set	1

Sl.No	SL	Description	Remarks_Long_Description	Unit	Quantity
23	C6	Disconnecting Switch motor - One no. of each type		Set	1
24	C7	Earthing Switch motor - One no. of each type		Set	1
25	C8	Limit Switches - One no. of each type		Set	1
26	C9	Bus support Insulator - 5 % of total		Set	1
27	C10	Gas density switches - 5 % of total		Set	1
28	C11	Circuit Breaker Closing and opening Coil - Two no. of each type		Set	1
29	C12	Circuit Breaker contacts - One set of each type		Set	1
30	C13	Circuit Breaker Spring charge motor - One set of each type		Set	1
31	C14	Lamps, Fuses, MCB, Aux. Relays - 10 % of each type		Set	1
D		<b>Supply Item - Commissioning spares for testing &amp; commissioning of GIS till handing over</b>	Bidder to quote detailed BOQ alongwith unit price. Statup spares (also termed as commissioning spares ) are those spares which will be required during the startup and commissioning of the equipment/systems and until performance testing. It is the responsibility of tgh contractor to supply all necessary spares as required until the equipment/systems are handed over to the Purchaser (GSECL). An adequate stock of startup spares shall be made available at the site such that the startup and commissioning of the equipment /systems, performance testing and handing over the equipment/systems to the Purchaser can be carried out without hindrance or delays. Contractor shall furnish the list of startup and commissioning spares to be brought by them to ensure the smooth commissioning of plant.	lot	1

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Sl.No	SL	Description	Remarks_Long_Description	Unit	Quantity
E		<b>Supply Item - Tools &amp; tackle &amp; Testing Equipment (E1 to E12)</b>	Only special tools shall be in bidder's scope.  The following list (E1 to E11) is minimum to be supplied. Any special tools required is deemed to be included in scope.  Bidder to submit list of 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. EOT cranes shall be provided by BHEL, capacity of EOT crane to be recommended by bidder.  Bidder to furnish detailed BOQ for non-returnable Tools and Tackles along with unit prices to be handed over to ultimate customer.	Lot	1
32	E1	Portable gas leak detector		Nos.	1
33	E2	Hygrometer		Nos.	1
34	E3	Portable dust counter		Nos.	1
35	E4	Special gas mask for GIS maintenance		Nos.	5
36	E5	Vacuum meter		Nos.	1
37	E6	Digital contact resistance meter		Nos.	1
38	E7	Partial discharge measurement set		Set	1
39	E8	Mobile platform		Nos.	1
40	E9	Power operated insulation tester		Nos.	1
41	E10	Tong testers of suitable ranges		Nos.	1
42	E11	Contact resistance measuring set for micro ohms		Nos.	1
43	E12	Non -returnable tools & tackles	Bidder to submit detailed breakup	lot	1

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Sl.No	SL	Description	Remarks_Long_Description	Unit	Quantity
<b>F</b>		<b>Services: Supervision of Erection, commissioning &amp; site testing including earthing (F1 to F7)</b>	<b>GT, ST, Lines will be commissioned seperately at different stages.</b>	Lot	1
44	F1	Insulation co-ordination studies		Lot	1
45	F2	Site visit for unloading & verification of material at store	Store shall be provided by BHEL	Lot	1
46	F3	Supervision of Erection of GIS	Complete GIS including busbar, GT bays, Line bays, Tie Line Bays, bus coupler, bus PT etc.	Set	1
47	F4	Supervision of Erection of GIS Duct - GIS to SF6 to Air Bushings	1 set = 3x 1 phase GIS duct	Set	6
48	F5	Supervision of Erection of complete SF6 to Air Bushing		Set	18
49	F6	Testing & Commissioning of GIS	Complete GIS including busbar, GT bays, Line bays, Tie Line Bays, bus coupler, bus PT etc.	Set	1
50	F7	Final successful Testing of GIS including HV test kit	HV Test kit shall be arranged by the bidder on returnable basis. (GT, ST & Lines may be commissioned seperately.) Final testing as per IEC for complete GIS including busbar, GT bay, ST bay, Line bays, bus PT, Ducts, SF6 to Air Bushing etc.	Lot	1
<b>G</b>		<b>Services: Training (G1 to G2 )</b>		Lot	1
51	G1	Training for GIS to GSECL/BHEL engineers -Visit to manufacturer's works = 15 mandays	Lodging and boarding of Training participants shall be in bidder's scope.	Lot	1
52	G2	Training for GIS to GSECL/BHEL engineers - Operation and maintenance of Plant (GIS) at site = 15 mandays		Lot	1
<b>H</b>		<b>Any other item required for completion of project (H1 to H2 )</b>		Lot	1

SI.No	SL	Description	Remarks_Long_Description	Unit	Quantity
53	H1	Supply - Any other item required for completion of project and not covered in A tp E- Complete List to be provided by bidder along with unit prices.		Lot	1
54	H2	Services - Any other item required for completion of project and not covered in F&G - Complete List to be provided by bidder along with unit prices.		Lot	1
<b>I</b>		<b>Supply - Unit Prices of Individual Item/Equipment (I1 to I26)</b>	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 (Bay, Busbar etc). Quoting for unit prices is mandatory and shall be considered for evaluation.	Lot	1
55	<b>I1</b>	400kV, 2000A Circuit breaker (1 pole complete without enclosure without operating mechanism)		No	1
56	<b>I2</b>	400kV, 2000A Isolator (1 pole) without operating mechanism		No	1
57	<b>I3</b>	400 kV Maintenance Earthing switch without operating mechanism		No	1
58	<b>I4</b>	400kV High speed earth switch without operating mechanism		No	1
59	<b>I5</b>	400kV Current transformer (1 of each type)		No	1
60	<b>I6</b>	Operating Mechanism box for 400kV, 2000 A Circuit Breaker		No	1
61	<b>I7</b>	Operating Mechanism box for 400kV, 2000 A Isolator		No	1
62	<b>I8</b>	Operating mechanism for 400kV, Maintenance Earthing Switch		No	1

## Bill of quantities for 400 kV GIS (Section 1)

Bharat Heavy Electricals Limited  
 Project : 400kV GIS for 1x800 MW Wanakbori TPS Extn. Unit-8  
 Technical Specification for 400 kV GIS

Sl.No	SL	Description	Remarks_Long_Description	Unit	Quantity
63	I9	Operating Mechanism for 400kV, High Speed Earthing Switch		No	1
64	I10	Single Phase Bus bar (Any type)	Complete single phase 400kV, 2000A, 40 kA for 3s bus bar including Gas monitoring systems, barriers, pressure switches	m	1
65	I11	Conductor for Single phase Bus bar/ bus duct (any type )	Conductor for bus bar, bus duct, GIB, Interconnecting conductors of any type with interconnecting parts as required.	kg	10
66	I12	GIS metallic enclosure (any type)	Enclosure for bus bar, bus duct, GIB, straight cast enclosure etc with fixing hardware as required.	m	1
67	I13	Epoxy resin insulators for bus support with holes for gas flow (of each type and rating)	Bidder to inform details at tender stage	set	1
68	I14	Gas barrier insulators (of each type and rating)	Bidder to inform details at tender stage	set	1
69	I15	Density switch		no.	1
70	I16	Gas monitoring system devices	1 set = 1 no of each type	lot	1
71	I17	PD sensor		No.	1
72	I18	Optical indicator for CB, Isolator		No.	1
73	I19	Elbow /Angle / T-bends		No.	1
74	I20	Telescopic enclosure		No.	1
75	I21	Sleeve enclosure		No.	1
76	I22	Expansion joints for bellows		m	1
77	I23	cross tank		No.	1
78	I24	Services of manpower for erection per day (excl. travel time)		days	1

Bharat Heavy Electricals Limited  
 Project : 400kV GIS for 1x800 MW Wanakbori TPS Extn. Unit-8  
 Technical Specification for 400 kV GIS

Bill of quantities for 400 kV GIS (Section 1)

SI.No	SL	Description	Remarks_Long_Description	Unit	Quantity
79	I25	Services of manpower for Testing & commissioning per day (excl. travel time)		days	1
80	I26	Hiring charges of HV test kit	Additional HV test kit charges including charges of manpower, HV test kit, accessories & tools required for completion of HV test (Dielectric Test after installation of GIS). HV test kit charges include one or more bay at site.	lot	1

**Note:**

CT & VT details given in single line diagram are tentative and may change at contract stage. Changes to be incorporated by bidder without any cost and delivery implication.

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