

**ANNEXURE-I**

**BOQ for Erection Testing & Commissioning (ETC) Works for 400kV Switchyard**

Customer : POWERGRID CORPORATION OF INDIA LTD.

Project : 765kV/400kV S/S BHUJ POOL

<b>Note:</b>	This BOQ covers only ETC work for 400kV Switchyard <u>excluding unloading and storage</u> . Unloading and storage of all the material required for 765kV & 400kV Switchyard shall be covered in a separate BOQ (Annexure-II). For unloading and storage bidder is advised to refer BOQ (Annexure-II). It will be contractor's responsibility under BOQ (Annexure-II) to hand over mandatory spares (including spares for 765kV equipments) to customer at their store within project premise. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope (included in BOQ (Annexure-II)). ETC contractor of 765kV switchyard package (separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (all the project supply including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. Bidder shall quote only for ETC work in this BOQ. <b>prices for unloading, storage and shifting of material should be separately filled in BOQ (Annexure-II).</b>						
S.No.	Voltage (kV)	Type	Description	Unit	Total Qty	Unit Price	Total
<b>MAIN EQUIPMENTS</b>							
<b>400kV REACTOR</b>							
1.1	400 kV	125MVAR	125 MVAR, 3-Ph, Reactor alongwith Marshalling Kiosk, terminal connectors, accessories, insulating oil and online DGA and oil drying system. Work includes erection of all auxiliaries, viz turrets, bushings, terminal connectors, dry air circulation, filling of oil, oil filtration, Oil testing, laying of cable from Reactor auxiliaries to MK etc as required to <u>complete the installation of Reactor.</u>	Nos.	1	5,50,000	5,50,000
1.2			Dragging charges of above mentioned Reactor (1 No.) upto plinth	m	50	1,200	60,000
1.3			Complete dryout of transformer by N2 filling/ vaccuming/ purging and heating (if required) as per BHEL Bhopal procedure (Annexure-F)	Kg	100	2,000	2,00,000
<b>400kV EQUIPMENT</b>							
2	400 kV		400KV SF6, 3 Phase Circuit Breaker alongwith lattice type GI supporting structure, terminal connectors, Breaker Control Cabinets, ladder and interpole cabling . SF6 cylinders complete in all respect (Supervision of Erection, Testing and commissioning will be done by supplier. Supplier will bring Timing kit and Gas leak detector only. Necessary manpower support, tools, tackles and testing kit to be in scope of ETC contractor).				
2.1		CB	with PIR & with CSD	Nos.	4	45,000	1,80,000
2.2		CB	without PIR & with CSD	Nos.	3	45,000	1,35,000
2.3		CB	without PIR & without CSD	Nos.	0	40,000	
2.4		Cable	Special cabling between CB and Relay Panel in SPR for CSD	m	600	22	13,200
3	400 kV	HDB (Electrically ganged)	3 Ph, <b>Isolator</b> ,3150/2000A, motor operated complete with 9 nos. of400kV support insulators & terminal connectors without support structure				
3.1			- with one earth switch (motor/ manual operated)	Nos.	18	17,000	3,06,000
3.2			- with two earth switch (motor/ manual operated)	Nos.	2	17,000	34,000
4	400 kV	HDB (Electrically ganged)	1 Ph, <b>Isolator</b> , 3150/2000A, motor operated complete with 3 nos. of 400kV support insulators & terminal connectors without support structure				
4.1			- without earth switch	Nos.	5	6,000	30,000
4.2			- with one earth switch (motor operated)	Nos.	7	6,000	42,000
5	400 kV		1 Ph, <b>Current Transformer</b> complete with terminal connectors without support structure.	Nos.	21	8,000	1,68,000
6	400kV	0.5mH	Wave Trap pedestal mounted including 3 Nos. 400kV Post Insulators and Terminal connectors without structure	Nos.	0	9,500	
7	400 kV	Solidcore with corona ring	<b>Post Insulators</b> complete with corona ring & terminal connectors without support structure	Nos.	48	1,000	48,000
8	336 kV		1 Phase, Gapless type Metal Oxide <b>Surge Arrester</b> complete with surge counter, leakage current meter, insulating base, connecting cable and terminal connectors without support structure	Nos.	10	3,000	30,000
9	400 kV		1 Ph, <b>CVT</b> complete with terminal connector without support structure.	Nos.	6	8,000	48,000
10	<b>145 kV Equipments</b>						
10.1	145 kV	Single phase	SF6, 1 Phase <b>Circuit Breaker</b> alongwith lattice type GI supporting structure, terminal connectors, Breaker Control Cabinets, ladder and interpole cabling. (Supervision of Erection, Testing and commissioning will be done by supplier. Supplier will bring Timing kit and Gas leak detector only. Necessary manpower support, tools, tackles and testing kit to be in scope of ETC contractor).	Nos.	2	9,000	18,000

Project : 765kV/400kV S/S BHUJ POOL

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S.No.	Voltage (kV)	Type	Description	Unit	Total Qty	Unit Price	Total
10.2	145 kV	Solidcore	<b>Post Insulators</b> complete with terminal connectors without support structure	Nos.	4	900	3,600
11	<b>72.5 kV Equipments</b>						
11.1	72.5 kV		SF6, 3 Phase <b>Circuit Breaker</b> alongwith lattice type GI supporting structure, terminal connectors, Breaker Control Cabinets, ladder and interpole cabling. (Supervision of Erection, Testing and commissioning will be done by supplier. Supplier will bring Timing kit and Gas leak detector only. Necessary manpower support, tools, tackles and testing kit to be in scope of ETC contractor).	Nos.	1	5,000	5,000
11.2	72.5 kV		<b>1Ph CT</b> complete with terminal connectors without support structure		3	2,850	8,550
11.3	72.5 kV		<b>1Ph CVT</b> complete with terminal connectors without support structure		3	2,550	7,650
11.4	72.5 kV		3 Phase, HDB Isolator without earth switch (mechanically ganged motor operated) complete with 9 nos. of 72.5kV insulators & terminal connectors without support structure		1	4,500	4,500
11.5	72.5 kV	Solidcore	<b>Post Insulators</b> complete with terminal connectors without support structure	Nos.	9	3,150	28,350
12	<b>11kV Equipments</b>						
12.1	11 kV	HDB(Pedestal mounted or double pole structure)	3 Ph, <b>Isolator</b> , manual operated complete with 9 nos. of support insulators & terminal connectors without support structure				
			- without earth switch	Nos.	1	4,000	4,000
12.2	11kV	Surge Arrestor	1 Phase, Gapless type Metal Oxide <b>Surge Arrestor</b> complete with surge counter, leakage current meter, insulating base, connecting cable and terminal connectors but without support structure	Nos.	3	2,000	6,000
12.3	11 kV	HGF	1 Phase Horn Gap Fuse along with post insulators without support structure	Nos.	3	4,500	13,500
12.4	11 kV	Solidcore	<b>Post Insulators</b> complete with terminal connectors without support structure	Nos.	3	400	1,200
13	<b>LT TRANSFORMER</b>						
13.1	33kV/ 415V	Outdoor/800kV A	<b>LT Auxiliary Oil filled Transformers.</b> Work includes erection at plinth, erection of all auxiliaries, viz bushings, terminal connectors, filling of oil, oil filtration, oil testing, testing & Commissioning etc.	Nos.	1	18,000	18,000
13.2	11kV/ 415V	Outdoor/800kV A	<b>LT Auxiliary Oil filled Transformers.</b> Work includes erection at plinth, erection of all auxiliaries, viz bushings, terminal connectors, filling of oil, oil filtration, oil testing, testing & Commissioning etc.	Nos.	1	18,000	18,000
<b>CONTROL AND RELAY PANEL</b>							
14			<b>400 kV Control &amp; Relay Panels</b>				
			Supervision of testing and commissioning of relays in scope of panel supplier. Necessary manpower support, tools, tackles and testing equipment to be in scope of ETC contractor				
14.1			400kV Circuit Breaker Relay Panel with Auto reclose (1 set = 1 panel)	Set	4	4,500	18,000
14.2			400kV Circuit Breaker Relay Panel without Auto reclose (1 set = 1 panel)	Set	3	4,500	13,500
14.3			400kV Reactor Protection Panel (1 set = 2 panels)	Set	1	9,000	9,000
14.4			400kV Bus Bar Protection Panel(Duplicate Bus bar protection) (1 set = 5 panels)	Set	1	22,500	22,500
14.5			Panel mounted BCU for controlling & monitoring of Auxiliary System (1 set = 1 panel)	Set	1	4,500	4,500
15			<b>400 kV Control &amp; Relay Panels - Loose item</b>				
15.01			Common Equipment's : Time synchronization Equipment - GPS Clock, Display, Antenna with wiring.	Nos.	1	5,000	5,000
15.02			Station HMI (including necessary softwares ) ( 1set = 1 no)	Set	2	5,000	10,000

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S.No.	Voltage (kV)	Type	Description	Unit	Total Qty	Unit Price	Total
15.03			Industrial Grade Station Server(Main / Standby with necessary softwares) ( 1set = 1 no)	Set	4	1,000	4,000
15.04			Disturbance Recorder Work Station ( including necessary softwares) ( 1 set = 1 no)	Set	1	2,000	2,000
15.05			A4/A3 type colour Laser printer	No.	3	500	1,500
15.06			Dot matrix printer	No.	2	500	1,000
15.07			Inverter -working on station battery back-up.	No.	2	1,000	2,000
15.08			Bay level Ethernet switch (1 Set = 1 No)	Set	14	500	7,000
15.09			Station level Ethernet switch (1 Set = 1 No)	Set	2	500	1,000
15.10			Redundant gateway to RCC & RSCC along with cable (1 set = 1 no)	Set	1	2,000	2,000
<b>FO CABLE LAYING - Contractor's supplied GI Pipe</b>							
			SAS : Armoured Fibre Optic system Cable for SAS and Busbar protection ( to be laid in GI Pipe) ( Scope - Laying of the cables in the 25NB GI PIPE), SUPPLY OF GI PIPE (Powergrid accepted) shall also be in contractor's scope				
16		<b>Supply included</b>	Supply and Laying of 25 mm GI pipes( light grade) conduits alongwith socket, bend and joint on trench rack support . Cutting, threading, fixing of clamps sockets/ bends/joints where required etc. complete. Supply of required clamp for fixing GI conduits on Cable rack shall be in ETC contractor scope. (Payment will be made for the as erected pipe length). GI conduits shall be used for laying of fiber optic cables /sensor cables.	M	2000	225	4,50,000
17			Armoured FO cable along with connectors for SAS & Busbar Protection. The laying of network/optical cables cables shall be in the contractor scope. However, Optical cable will be laid under SAS supplier's supervision. Splicing and Termination shall be in SAS supplier's scope.). FO cable shall be laid in 25mm dia. GI pipes .	M	7000	15	1,05,000
<b>PLCC SYSTEM</b>							
18			<b>PLCC for 765/400KV BHUJ STATION</b>				
18.1			Coupling device(Phase to Phase)	Nos.	2	7,000	14,000
18.2			PLCC Panel-Carrier equipment (for speech + protection and speech +data) (Analogue type )	Nos.	3	7,000	21,000
18.3			PLCC Panel-Digital Protection coupler	Nos.	2	5,000	10,000
18.4			4 wire telephone instrument( Along with telephone wiring )	Nos.	6	300	1,800
18.5			5 Pair Telephone Cables, armoured ,0.5 sq. mm annealed copper conductor and petroleum jelly filled with polyethene outer jackets	m	1000	10	10,000
18.6			HF Cable	m	700	10	7,000
18.7			EPAX (24/8) with 24 numbers 2-wire telephone set. (excluding cable between EPAX and telephone sets)	Nos.	1	5,000	5,000
19			<b>Tele communication Equipment</b>				
19.1			Equipment Cabinets for SDH & PDH equipments	Nos	4	3,000	12,000
19.2			NMS ( For SDH Equipment & Multiplexer) ( Handling & Storage only)	Set	2	3,000	6,000
20			<b>LT AC &amp; DC SWITCHBOARDS</b>				
20.1			415V Main switchboard	Set	1	38,000	38,000
20.2			415V ACDB	Set	1	43,000	43,000
20.3			415V MLDB (alongwith 2 nos. 300 kVA lighting transformer)	Set	1	11,000	11,000
20.4			415V Emergency Lighting Board (alongwith 1 no. 100 kVA, lighting transformer)	Set	1	5,400	5,400
20.5			220V DCDB	Sets	2	10,000	20,000
20.6			48V DCDB	Sets	2	8,500	17,000
21			<b>BATTERY AND CHARGER</b>				
21.1	220 V	VRLA Battery Bank	<b>Battery Bank 1500Ah</b> including all accessories such as racks, interconnecting cables, connectors etc.	Sets	2	32,000	64,000

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S.No.	Voltage (kV)	Type	Description	Unit	Total Qty	Unit Price	Total
21.2	48 V	VRLA Battery Bank	<b>Battery Bank 1500Ah</b> including all accessories such as racks, interconnecting cables, connectors etc.	Sets	2	22,500	45,000
21.3	220 V	Battery charger	<b>Battery Charger 180A</b> (Float cum Boost )	Sets	2	6,000	12,000
21.4	48 V	Battery charger	<b>Battery Charger 180 A</b> (Float cum Boost )	Sets	2	6,000	12,000
<b>24 STRINGING HARDWARE</b>							
24.1	400 kV	Double Tension	400kV Double tension Polymer long rod insulator suitable for QUAD ACSR BERSIMIS / MOOSE conductor with / without turn <b>Buckle, subconductor spacing 450mm.</b>	set	168	2,500	4,20,000
24.5	400 kV	Double Tension	400kV Double tension Polymer long rod insulator suitable for TWIN ACSR BERSIMIS / MOOSE conductor with / without turn <b>Buckle with subconductor spacing 450mm.</b>	set	12	2,500	30,000
24.3	400 kV	Single Suspension	400kV Single suspension Polymer long rod insulator suitable for QUAD ACSR BERSIMIS / MOOSE conductor with straight / drop clamp, <b>subconductor spacing 450mm</b>	set	27	1,500	40,500
24.4	400 kV	Single Suspension	400kV Single suspension Polymer long rod insulator suitable for TWIN ACSR BERSIMIS / MOOSE conductor with straight / drop clamp, <b>subconductor spacing 450mm</b>	set	15	1,500	22,500
<b>25 BUS MATERIAL</b>							
Inclusive of fixing various types of clamps, connectors, spacers, corona rings, sleeves, aluminum welding, fixing of socket and bends,							
25.1	-	ACSR Bersimis	Conductor complete with Tee connectors for droppers to equipment connections, PG clamps for busbar jumpering, <b>Twin/Quad bundle spacers etc to complete.</b>	Km	18	60,000	10,80,000
25.2		4.5"	Al Tube (ETC of Al.Tube includes Aluminium welding and bending to be included. Welding sleeve tube will be supplied by BHEL.)	kM	0.75	3,40,000	2,55,000
25.3		3"	Al Tube (ETC of Al.Tube includes Aluminium welding and bending to be included. Welding sleeve tube will be supplied by BHEL.)	m	70	300	21,000
25.4	-	7/9 SWG Shield Wire	GI Stranded Shield wire including tension clamp, PG clamp and clamping on structure for down conductor, fixing/bolting with earth strip etc to complete.	Km	4	30,000	1,20,000
<b>26 Marshalling Kiosks &amp; Junction Boxes</b>							
26.1			Bay Marshalling Kiosks ( Outdoor, Floor mounted on cable trench)	Nos.	7	3,200	22,400
26.2			CT Junction Box (on CT structure)	Nos.	8	1,600	12,800
26.3			CVT Junction Box (on CVT structure/ on foundation)	Nos.	3	1,600	4,800
<b>CABLE LAYING WORKS</b>							
A. <b>Cabling</b> including laying, tagging , dressing, ferruling, lugging, ,soldering, tapping, jointing, crimping, termination, and drilling/ cutting holes in cable gland plates- laying can be either on trays, supports, underground, buried in ground or through GI/PVC pipe over/under ground, through wall etc. All erection materials viz. ferrules, copper lugs, cable ties / straps, Al. tags, markers, GI / PVC wall sleeves with rubber / nylon bushes and flexible steel conduits shall be supplied by bidder. <b>Glands shall be quoted separately.</b>							
<b>27 Control cables</b>							
27.1		PVC	2Cx2.5 sqmm Cu	Km	5.6	13,300	74,480
27.2		PVC	5Cx2.5 sqmm Cu	Km	17	13,300	2,26,100
27.3		PVC	7Cx2.5 sqmm Cu	Km	4	14,300	57,200
27.4		PVC	10Cx2.5 sqmm Cu	Km	4.5	14,300	64,350
27.5		PVC	14Cx2.5 sqmm Cu	Km	8	19,300	1,54,400
27.6		PVC	19Cx2.5 sqmm Cu	Km	4	21,300	85,200
27.6		PVC	27Cx2.5 sqmm Cu	Km	2	25,000	50,000
<b>28 Auxiliary Power cables</b>							
28.1		PVC	2Cx6 sqmm Al/Cu	Km	5.5	13,300	73,150
28.2		PVC	4Cx6 sqmm Al/Cu	Km	4	13,300	53,200
28.3		PVC	4Cx16 sqmm Al/Cu	Km	25	13,300	3,32,500
28.4		PVC	3.5Cx35 sqmm Al/Cu	Km	5	19,300	96,500
28.5		PVC	3.5Cx70 sqmm Al/Cu	Km	16	28,300	4,52,800
28.6		PVC	1Cx150 sqmm Al/Cu	Km	0.7	30,000	21,000
28.7		XLPE	3.5Cx300 sqmm Al/Cu	Km	3	65,000	1,95,000
28.8		XLPE	1Cx630 sqmm Al/Cu	Km	3	75,000	2,25,000

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S.No.	Voltage (kV)	Type	Description	Unit	Total Qty	Unit Price	Total
<b>CABLE GLAND</b>			<b>CONTRACTOR'S SUPPLY</b>				
29			Supply & installation - Tin/ Nickel, Nichel/chromium - Plated (coating thickness not less than 10 microns) Powergrid approved / Sunil & Co. / Arup/ Comet / QPIE make brass <b>cable glands</b> , double compression heavy-duty type complete with necessary armour clamp & tapered washer etc for the following cables (Bidder's Scope is to supply and fixing) Qty may vary by ±50%				
29.01		PVC/ XLPE	2Cx2.5 sqmm Cu	Nos.	130	200	26,000
29.02		PVC/ XLPE	5Cx2.5 sqmm Cu	Nos.	425	200	85,000
29.03		PVC/ XLPE	7Cx2.5 sqmm Cu	Nos.	170	240	40,800
29.04		PVC/ XLPE	10Cx2.5 sqmm Cu	Nos.	85	270	22,950
29.05		PVC/ XLPE	14Cx2.5 sqmm Cu	Nos.	300	300	90,000
29.06		PVC/ XLPE	19Cx2.5 sqmm Cu	Nos.	130	325	42,250
29.07		PVC/ XLPE	27Cx2.5 sqmm Cu	Nos.	130	375	48,750
29.08		PVC/ XLPE	2Cx6 sqmm Al/Cu	Nos.	85	200	17,000
29.09		PVC/ XLPE	4Cx6 sqmm Al/Cu	Nos.	14	275	3,850
29.10		PVC/ XLPE	4Cx16 sqmm Al/Cu	Nos.	170	300	51,000
29.11		PVC/ XLPE	3.5Cx35 sqmm Al/Cu	Nos.	17	350	5,950
29.12		PVC/ XLPE	3.5Cx70 sqmm Al/Cu	Nos.	50	400	20,000
29.13		PVC/ XLPE	1Cx150 sqmm Al/Cu	Nos.	10	430	4,300
29.14		PVC/ XLPE	3.5Cx300 sqmm Al/Cu	Nos.	16	3,100	49,600
29.15		PVC/ XLPE	1Cx630 sqmm Al/Cu	Nos.	7	500	3,500
<b>HT CABLE</b>							
30		11kV, XLPE	1Cx185 mm <sup>2</sup> (Aluminium Conductor) XLPE HT cables along with lugs, cable glands to be laid in burried trench , all civil activities such as excavation, supply and laying of sand, bricks etc. shall be in contractor's scope. Termination kit/staright joint shall be provided by BHEL . All other material like lugs, glands, tripod clamps etc. shall be arranged by contractor (Termination of cable shall be done by termination kit supplier)	Mtrs	2000	160	3,20,000
<b>STEEL STRUCTURES</b>							
31.1			Galvanised steel Lattice Structures including hardwares for Towers, beams & equipment support	MT	500	4,200	21,00,000
31.2			Galvanised steel Pipe Structures including hardwares for equipment support	MT	55	3,500	1,92,500
31.3			Double pole lattice structure	MT	4	4,200	16,800
<b>Cable Trench Materials</b>							
32			<b>Cable Rack</b> work includes welding and fabrication of cable racks of mild steel angles( 50x50x6 mm suplied by BHEL) & painted racks (paint suply in scope of bidder) on inserts of trench walls in trenches in switchyard and control room. Cable rack assembly will be of 2/3/4 tier.	MT	20	13,500	2,70,000
33			Laying of 100/110NB PVC pipe at a depth of 300mm including excavation, backfilling, making and repairing of walls in trenches, cutting, threading, fixing of sockets/ bends where required etc. complete. Both ends of PVC pipe shall be closed . (Payment will be made for the as erected pipe length)	Meter	3000	90	2,70,000
34			Laying of 50/65 NB PVC pipe at a depth of 300mm including excavation, backfilling, making and repairing of walls in trenches, cutting, threading, fixing of sockets/ bends where required etc. complete. Both ends of PVC pipe shall be closed . (Payment will be made for the as erected pipe length)	Meter	3000	75	2,25,000
35			Laying of <b>Cable trays</b> : including bends, tees, elbow, reducers, stiffeners coupler plates, bolting to racks, structure etc. to complete. Scope of minor fabrication is also involved.				
35.1			100 to 150 mm wide, 2.5 M long Perforated type	Meter	300	40	12,000
35.2			100 to 750 mm wide, 2.5 M long Ladder type	Meter	150	30	4,500

Project : 765kV/400kV S/S BHUJ POOL

<b>Note:</b>	This BOQ covers only <b>ETC work for 400kV Switchyard excluding unloading and storage</b> . Unloading and storage of all the material required for 765kV & 400kV Switchyard shall be covered in a separate BOQ (Annexure-II). For unloading and storage bidder is advised to refer BOQ (Annexure-II). It will be contractor's responsibility under BOQ (Annexure-II) to hand over mandatory spares (including spares for 765kV equipments) to customer at their store within project premise. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope (included in BOQ (Annexure-II)). ETC contractor of 765kV switchyard package (separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (all the project supply including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. Bidder shall quote only for ETC work in this BOQ, <b>prices for unloading, storage and shifting of material should be separately filled in BOQ (Annexure-II)</b> .						
S.No.	Voltage (kV)	Type	Description	Unit	Total Qty	Unit Price	Total
<b>Earthing work</b>							
36			<b>Earthing material-</b> The earthing includes earthing of all switchyard equipment, towers, pipe structure, cable trenches, fence, pipe electrode for LA, CVT, neutral of transformer & at interconnections of other grids, Control room equipments using necessary Connectors for earthing flats. Earthing clamping shall be carried out by ETC contractor. GS strip including cutting, bending, welding with 40 mm dia MS rod riser/earth strip, applying zinc rich paint, clamping to structure/building wall etc. to complete. Hardware required for connecting flat on pads of structure & equipment included in scope. The Earthing of equipments, Auxiliary Earthmats under Iso/ ES/ CB MOM boxes shall be carried out as per Powergrid standard earthing drawing.				
36.1			75 x 12 mm GI Flat	kM	3	70,000	2,10,000
36.2			50 x 6 mm GI Flat	kM	2	55,000	1,10,000
36.3			50 x 6 mm MS Flat	kM	2	55,000	1,10,000
36.4			40NB Pipe electrode	Nos.	4	8,000	32,000
36.5			40mm dia MS Rod for equipment risers	MT	12	12,000	1,44,000
<b>Miscellaneous</b>							
37		SUPPLY INCLUDED	SUPPLY AND INSTALLATION OF SIMS 100, ISMC 50 for Panel Supports	MT	1	72,000	72,000
38		SUPPLY INCLUDED	SUPPLY AND INSTALLATION OF "STANDARD BAY NAME PLATE" as per drawing number C/ENG/STD/BAY NAME PLATE	Nos.	8	1,000	8,000
<b>Total (Rs.)</b>							<b>117,90,380</b>
<b>Following also forms the scope of ETC work in addition to above, but not limited to this.</b>							
1	<b>Bidders to quote a percentage above/ below/ at par the item rate mentioned in the BOQ. The quoted percentage shall be applicable uniformly on all item rates of BOQ. The Percentage to be quoted in price schedule format attached with this BOQ.</b>						
2	Erection, Installation, pre-commissioning test and commissioning tests (As per BHEL/Powergrid FQP) are included in the scope.						
3	All the drawings and documents as per Annexure-1 shall be followed for ETC work.						
4	Annexure- 2 (Switchyard Erection guidelines) shall be followed for ETC work.						
5	Minor Civil works such as modification of civil foundations, making holes in the trenches/ control room building, grouting, fixing of trench material will be in the scope of ETC contractor.						
6	Removal of gravel, if gravelling is done, for connection of Equipment earthing strip to the existing mat (wherever earthing mat is already laid), and after completion of earthing , contractor should place the gravel to bring it in original shape.						
7	The quantities given in items mentioned above may undergo a change to any extent.						
8	Quoted rates are deemed to be inclusive of miscellaneous works viz erection of clamps and connectors.						
9	All paint , welding electrodes & other consumable by contract supplies shall be part of ETC works. Paint/welding electrode make etc. is subject to BHEL/CUSTOMER site incharge approval.						
10	Equipment erection (say Isolator ) means complete erection, metallic, post insulator, connectors (expansion/rigid tubular for AI.Tube / single/double/quadruple conductor), connection to the next in line (if connected to overhead busbar or droppers) including PG clamps/Tee connectors etc. This will be clear from the enclosed electrical layout drawings.						
11	Equipment and tower erection would include supply and erection of miscellaneous items , viz Phase colour discs , labels painting of equipments , phase colour painting , phase marking , bay identification board , danger plates , rubber mats , device number marking on the equipment, keyboard etc as per site requirements. Supply & Mounting of phase color discs & Danger plates shall be as per IS-2551; 1982 & IS 5; 1978.						
12	Welding of Aluminium tubes ( supply of welding sleeve excluded) as per Annexure-3 is in ETC contractor's scope and joints shall be tested by radiography. Welding and Bending machines and any other equipment will be in ETC Contractor scope.						
13	Completed ETC package is under the scope of bidder. All TNP including oil filtrating machine, cranes etc. required to complete the job shall be provided by bidder only.						
14	Cable racks and supports shall be painted after installation with two coats of metal primer (comprising of red oxide and zinc chromate in a synthetic medium) followed by two finishing coats of aluminium paint. The red oxide and zinc chromate shall conform to IS:2074. Supply of paint under bidder's scope.						
15	Testing instruments (dully calibrated) have to be arranged by ETC Contractor at it's own cost ( List is only provided for information , if any other instrument not mentioned below but required for successful completion of ETC work shall be in ETC contractor's scope) , (However OMICRON or equivalent kit for Numerical relay testing shall be arranged by BHEL.)						
15.1	DCRM (OPERATIONAL ANALYSER )						
15.2	Contact Resistance Measurement kit (CRM)						
15.3	Capacitance and Tan delta measurement Kit						

**Project : 765kV/400kV S/S BHUJ POOL**

<b>Note:</b>	This BOQ covers only <b>ETC work for 400kV Switchyard excluding unloading and storage</b> .Unloading and storage of all the material required for 765kV & 400kV Switchyard shall be covered in a separate BOQ (Annexure-II). For unloading and storage bidder is advised to refer BOQ (Annexure-II). It will be contractor's responsibility under BOQ (Annexure-II) to hand over mandatory spares (including spares for 765kV equipments) to customer at their store within project premise. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope (included in BOQ (Annexure-II)). ETC contractor of 765kV switchyard package (separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (all the project supply including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. Bidder shall quote only for ETC work in this BOQ, <b>prices for unloading, storage and shifting of material should be separately filled in BOQ (Annexure-II)</b> .							
S.No.	Voltage (kV)	Type	Description	Unit	Total Qty	Unit Price	Total	
15.4			Dew Point Measurement kit					
15.5			5kV/1kV Megger					
15.6			Primary current Injection Kit					
15.7			Secondary current/Voltage Injection kit					
15.8			1Ph Variac					
15.9			Multimeters					
15.10			Clamp on meter					
15.11			Relay test kit					
16			The scope of supply items as mentioned in above BOQ are tentative . Items shall be supply by contractor as per exact site requirements only.					
17			For scope of supply items in ETC contractor scope following should be followed . (1)The approval of makes shall be obtained from BHEL/Customer . (2)Drawings and MQP shall be submitted for approval in line with specification and relevant IS. (3) Quality -Inspection & dispatch clearance shall be given by BHEL/Customer.					

**Annexure-II**

**BILL OF QUANTITY FOR UNLOADING & STORAGE OF 765/400KV EQUIPMENTS AT BHUJ**

**Project : 765kV/400/220kV S/S BHUJ POOL**

**Customer : POWERGRID CORPORATION OF INDIA LTD.**

<b>Note</b>	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.						
	1	2	3	4	5	6	7
<b>Sl. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
		<b>765kV Equipments</b>					
<b>1.0</b>		<b>765kV CB</b>					
1.1	3 Phase	765KV SF6, 3 Phase Circuit Breaker alongwith lattice type Gi supporting structure, terminal connectors, Breaker Control Cabinets, ladder and interpole cables , SF6 gas cylinders with/without CSD including accessories etc.	Sets	10	3,600.00	36,000.00	
1.2	1 Phase	765KV SF6, 1 Phase Circuit Breaker alongwith lattice type Gi supporting structure, terminal connectors, Breaker Control Cabinets, ladder and interpole cables , SF6 gas cylinders with/without CSD including accessories etc.	Sets	1	1,200.00	1,200.00	
2.0	3 Phase	<b>765KV Isolator knee type</b> , motor operated Isolator and earth switch, electrically ganged, complete with 6 nos. of support insulators & terminal connectors without support structure (with 3 Nos. operating rod insulator)					
2.1		- with one earth switch (motor operated)	Sets	17	1,800.00	30,600.00	
2.2		- with two earth switch (motor operated)	Sets	2	1,800.00	3,600.00	
3.0	1 Phase	<b>765KV Isolator knee type single phase</b> , motor operated Isolator and earth switch electrically ganged complete with 2 nos. of support insulators & terminal connectors without support structure (with one No. Operating Rod insulator )					
3.1		- without earth switch	Nos.	12	1,200.00	14,400.00	
3.2		- with one earth switch (motor operated)	Nos.	33	1,200.00	39,600.00	

Project : 765kV/400/220kV S/S BHUJ POOL

Customer : POWERGRID CORPORATION OF INDIA LTD.

1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>
		Note: 624kV LA, 765kV CT or 765kV CVT may or may not be despatched in container by the manufacturers, it will be ETC contractor's responsibility to unload container and then unload equipments from the container. No additional price for unloading shall be payable.				
4.0		<b>624kV LA</b>				
		1 Phase, Gapless type Metal Oxide <b>Surge Arrester</b> complete with surge counter, leakage current meter, insulating base, connecting cable/strip and terminal connectors. Without support structure	Nos.	24	1,500.00	36,000.00
5.0		<b>765kV CT</b>				
	1 Phase	<b>Current Transformer</b> complete with terminal connectors without support structure.	Nos.	24	1,800.00	43,200.00
6.0		<b>765kV CVT</b>				
	1 Phase	<b>Capacitive Voltage Transformer</b> complete with terminal connectors without support structure.	Nos.	12	1,800.00	21,600.00
7.0		<b>765kV Post Insulators</b>				
		Bus support Insulators (Solid core Post insulator) with corona ring complete with terminal connectors without support structure.	Nos.	70	300.00	21,000.00
8.0		<b>765kV Wave Trap</b>				
		Wave Trap pedestal mounted including 3 Nos. 765kV Post Insulators and Terminal connectors, without support structure	Nos.	4	2,300.00	9,200.00
		<b>400kV Equipments</b>				
		<b>400kV REACTOR</b>				

**Project : 765kV/400/220kV S/S BHUJ POOL**

**Customer : POWERGRID CORPORATION OF INDIA LTD.**

<b>Note</b>	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.						
	1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
9.0	3 Phase	125MVAR Bus Reactor 3Phase 400kV , with Oil (supplied in separate drums), all auxiliaries, viz bushings, radiator assembly, MB with its cables, terminal connectors. On line DGA - Dissolved multi Gas and moisture analyser and On line Insulating Oil Drying System etc to complete.	Nos.	1	1,50,000.00	1,50,000.00	
10.0		<b>400kV CIRCUIT BREAKER</b>					
10.1	with PIR	SF6, 3 Phase Circuit Breaker with PIR alongwith lattice type GI supporting structure, terminal connectors, Breaker Control Cabinets, ladder , interpole cabling ,SF6 Gas Cylinders and all accessories	Nos.	4	2,500.00	10,000.00	
10.2	without PIR	SF6, 3 Phase Circuit Breaker without PIR alongwith lattice type GS supporting structure, terminal connectors, Breaker Control Cabinets, ladder ,interpole cabling ,SF6 Gas Cylinder and all accessories	Nos.	3	2,500.00	7,500.00	
		<b>400kV ISOLATOR (HDB), 3 Ph</b>					
11.0	3 Phase	3 Ph, <b>Isolator</b> , motor operated complete with 9 nos. of400kV support insulators & terminal connectors without support structure					
11.1		- with one earth switch (motor/ manual operated)	Set	18	1,200.00	21,600.00	
11.2		- with two earth switch (motor/ manual operated)	Set	2	1,200.00	2,400.00	
		<b>400kV ISOLATOR (HDB), 1 Ph</b>					
12.0	1 Phase	1 Ph, <b>Isolator</b> , motor operated complete with 3 nos. of 400kV support insulators & terminal connectors without support structure					
12.1		- without earth switch	Nos.	5	500.00	2,500.00	
12.2		- with one earth switch (motor operated)	Nos.	7	500.00	3,500.00	
13.0		<b>400kV CT</b>					
		<b>1 Ph, Current Transformer ( 3000 A) complete with terminal connectors without support structure.</b>	Nos.	21	500.00	10,500.00	

Project : 765kV/400/220kV S/S BHUJ POOL

Customer : POWERGRID CORPORATION OF INDIA LTD.

<b>Note</b>	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.						
	1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
14.0		<b>400kV CVT</b>					
		1 Ph, CVT complete with terminal connector without support structure.	Nos.	6	500.00	3,000.00	
15.0		<b>336kV LA</b>					
		1 Phase, Gapless type Metal Oxide Surge Arrester complete with surge counter, leakage current meter, insulating base, connecting cable and terminal connectors without support structure	Nos.	10	500.00	5,000.00	
16.0		<b>400kV POST INSULATORS</b>					
		Post Insulators complete with corona ring & terminal connectors without support structure	Nos.	48	200.00	9,600.00	
17.0		<b>400kV WAVE TRAP</b>					
		Wave Trap, pedestal mounted including 3 Nos. 400 kV Post Insulators and Terminal connectors, without support structure	Set	0	1,000.00		
18.0		<b>145 kV Equipments</b>					
18.1	1 Phase	SF6, 1 Phase Circuit Breaker with PIR alongwith lattice type GI supporting structure, terminal connectors, Breaker Control Cabinets, ladder , interpole cabling ,SF6 Gas Cylinders and all accessories	Set	2	1,200.00	2,400.00	
18.2		Post Insulators complete with terminal connectors without support structure	Nos.	4	100.00	400.00	
19.0		<b>72.5 kV &amp; 11 kV EQUIPMENTS</b>					
19.01	3 Phase	SF6 Circuit Breaker alongwith lattice type GI supporting structure, terminal connectors, Breaker Control Cabinets, ladder , interpole cabling, SF6 Gas Cylinders and all accessories	Nos.	1	1,000	1,000.00	

Project : 765kV/400/220kV S/S BHUJ POOL

Customer : POWERGRID CORPORATION OF INDIA LTD.

Note	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.					
	1	2	3	4	5	6
SI. No.		Item Description	Unit	Qty	Unit Rate	Total Amount
19.02	1 Phase	72.5 kV CT complete with terminal connectors without support structure.	Nos.	3	200	600.00
19.03	1 Phase	72.5kV CVT complete with terminal connectors without support structure.	Nos.	3	200	600.00
19.04	3 Phase	72.5kV Isolator, motor operated complete with 9 nos. of 72.5kV support insulators & terminal connectors without support structure	Nos.	1	500	500.00
19.05		72.5kV Post Insulators complete with terminal connectors without support structure	Nos.	9	200	1,800.00
19.06	3 Phase	11kV Isolator (HDB), manual operated complete with 9 nos. of support insulators & terminal connectors without support structure - without earth switch	SET	1	1,000	1,000.00
19.07	1 Phase	09kV Gapless type Metal Oxide Surge Arrester complete with surge counter, leakage current meter, insulating base, connecting cable and terminal connectors but without support structure	Nos.	3	400	1,200.00
19.08	1 Phase	11kV Horn Gap Fuse along with post insulators without support structure	Nos.	3	500	1,500.00
19.09		11kV Post Insulators complete with terminal connectors without support structure	Nos.	3	150	450.00
		<b>LT TRANSFORMER (OUTDOOR OIL FILLED)</b>				
20.1		800kVA, 33/0.433kV LT Transformer including oil drums and all accessories	Nos.	1	2,000	2,000.00
20.2		800kVA, 11/0.433kV LT Transformer including oil drums and all accessories	Nos.	1	2,000	2,000.00
21.0		<b>Structure Material (including fixing hardware, foundation bolts etc.)</b>				
21.1		Lattice Structure	MT	2100	300.00	6,30,000.00
21.2		Pipe Structure	MT	60	300.00	18,000.00
21.3		40mm MS ROD	MT	24	300.00	7,200.00
21.4		50x50x6 MS Angle	MT	40	300.00	12,000.00

Project : 765kV/400/220kV S/S BHUJ POOL

Customer : POWERGRID CORPORATION OF INDIA LTD.

<b>Note</b>	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.						
	1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
21.5		50X6 MS Flat	KM	4	1,000.00	4,000.00	
21.6		75 x 12 mm GI Flat	kM	10	1,000.00	10,000.00	
21.7		50 x 6 mm GI Flat	kM	4.5	1,000.00	4,500.00	
<b>22.0</b>		<b>PVC PIPE</b>					
22.1		PVC pipe, 50/ 63 NB including socket, tee and bends	kM	10	2,000.00	20,000.00	
22.2		PVC Pipe, 100/ 110NB including socket, tee and bends	kM	8	2,000.00	16,000.00	
<b>23.0</b>		<b>BUS Material</b>					
23.1		GI Stranded Shield wire including tension clamp, PG clamp and clamping on structure for down conductor, fixing/bolting materials etc	Km	9	1,000.00	9,000.00	
23.2		ACSR BERSIMIS Conductor complete with Tee connectors for droppers to equipment connections, PG clamps for busbar jumpering, Twin/Quad bundle spacers etc to complete.	Km	18	1,000.00	18,000.00	
23.3		AAAC BULL Conductor complete with Tee connectors for droppers to equipment connections, PG clamps for busbar jumpering, Twin/Quad bundle spacers etc to complete.	Km	31	1,000.00	31,000.00	
23.4		4.5 inch Al Tube includeing corona bells, Aluminium . Welding sleeves etc.	kM	2.75	5,000.00	13,750.00	
23.4		3 inch Al Tube includeing corona bells, Aluminium . Welding sleeves etc.	kM	0.07	5,000.00	350.00	
<b>24.0</b>		<b>String Insulators and hardware</b>					
		Inclusive of fixing various types of clamps, connectors, spacers, corona rings, sleeves, aluminum welding, fixing of socket and bends,					
24.1		765kV Double tension Polymer long Rod Insulator suitable for quad AAC Bull conductor with / without turn Buckle. Subconductor spacing 450mm	set	126	500.00	63,000.00	

Project : 765kV/400/220kV S/S BHUJ POOL

Customer : POWERGRID CORPORATION OF INDIA LTD.

<b>Note</b>	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.						
	1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
24.2		765kV Single suspension Polymer long Rod Insulator suitable for quad AAC Bull conductor with straight / drop clamp. Subconductor spacing 450mm	set	69	500.00	34,500.00	
24.3		765kV Guy wire arrangement in complete including 2 No 765kV Polymer long rod insulator(as per enclosed sketch)	set	5	250.00	1,250.00	
24.4		400kV Double tension Polymer long rod insulator suitable for QUAD ACSR BERSIMIS / MOOSE conductor with / without turn Buckle, subconductor spacing 450mm.	set	168	500.00	84,000.00	
24.5		400kV Double tension Polymer long rod insulator suitable for TWIN ACSR BERSIMIS / MOOSE conductor with / without turn Buckle with subconductor spacing 450mm.	set	12	500.00	6,000.00	
24.6		400kV Single suspension Polymer long rod insulator suitable for QUAD ACSR BERSIMIS / MOOSE conductor with straight / drop clamp, subconductor spacing 450mm	set	27	500.00	13,500.00	
24.7		400kV Single suspension Polymer long rod insulator suitable for TWIN ACSR BERSIMIS / MOOSE conductor with straight / drop clamp, subconductor spacing 450mm	set	15	500.00	7,500.00	
		<b>LT AC &amp; DC PANELS</b>					
25.0		415V Main switchboard	Set	1	7,000.00	7,000.00	
26.0		415V ACDB	Set	1	4,500.00	4,500.00	
27.0		415V MLDB (alongwith 2 nos. 300 kVA lighting transformer)	Set	1	2,000.00	2,000.00	
28.0		415V Emergency Lighting Board (alongwith 1 no. 100 kVA, lighting transformer)	Set	1	1,000.00	1,000.00	
29.0		220V DCDB	Sets	2	1,000.00	2,000.00	
30.0		48V DCDB	Sets	2	1,000.00	2,000.00	
		<b>Battery Banks and Battery Chargers</b>					
31.0		220V, 1500Ah Battery Bank including all accessories	Sets	2	7,000.00	14,000.00	

**Project : 765kV/400/220kV S/S BHUJ POOL**

**Customer : POWERGRID CORPORATION OF INDIA LTD.**

<b>Note</b>	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.						
	1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
32.0		48V , 1500Ah Battery Bank including all accessories	Sets	2	5,500.00	11,000.00	
33.0		220V, 180A Battery Charger (Float cum Boost )	Sets	2	450.00	900.00	
34.0		48V, 180A Battery Charger (Float cum Boost )	Sets	2	450.00	900.00	
<b>35.0</b>		<b>Air Conditioning System</b>					
35.1		Split AC unit of 2 Tr capacity	Nos.	20	100.00	2,000.00	
35.2		Free cooling AC unit of 2 Tr capacity	Nos.	6	200.00	1,200.00	
35.3		Free cooling AC unit of 3 Tr capacity	Nos.	6	200.00	1,200.00	
		<b>Cables</b>					
36.0		Control cables (PVC)					
36.1		2Cx2.5 sqmm Cu	Km	64.6	700.00	45,220.00	
36.2		5Cx2.5 sqmm Cu	Km	57	700.00	39,900.00	
36.3		7Cx2.5 sqmm Cu	Km	19.5	700.00	13,650.00	
36.4		10Cx2.5 sqmm Cu	Km	52	700.00	36,400.00	
36.5		14Cx2.5 sqmm Cu	Km	48.5	700.00	33,950.00	
36.6		19Cx2.5 sqmm Cu	Km	21	700.00	14,700.00	
36.6		27Cx2.5 sqmm Cu	Km	19	700.00	13,300.00	
<b>37.0</b>		<b>Aux. Power Cable</b>					
37.1		2Cx6 sqmm Al/Cu	Km	11	700.00	7,700.00	
37.2		4Cx6 sqmm Al/Cu	Km	14.5	700.00	10,150.00	
37.3		4Cx16 sqmm Al/Cu	Km	45	700.00	31,500.00	
37.4		3.5Cx35 sqmm Al/Cu	Km	6.5	700.00	4,550.00	
37.5		3.5Cx70 sqmm Al/Cu	Km	25	700.00	17,500.00	
37.6		1Cx150 sqmm Al/Cu	Km	0.7	1,000.00	700.00	
37.7		3.5Cx300 sqmm Al/Cu	Km	3	2,000.00	6,000.00	
37.7		1Cx630 sqmm Al/Cu	Km	3	4,000.00	12,000.00	
<b>38.0</b>		<b>11KV Cable</b>					
38.1		1Cx185 mm <sup>2</sup> (Aluminium Conductor) XLPE Cable including termination kit	km	2	1,000.00	2,000.00	
<b>39.0</b>		<b>Cable Trays</b>					
39.1		100 to 150 mm wide, 2.5 M long Perforated type	m	800	12.50	10,000.00	
39.2		100 to 750 mm wide, 2.5 M long Ladder type	m	250	12.50	3,125.00	

Project : 765kV/400/220kV S/S BHUJ POOL

Customer : POWERGRID CORPORATION OF INDIA LTD.

Note	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.						
	1	2	3	4	5	6	7
SI. No.		Item Description	Unit	Qty	Unit Rate	Total Amount	
40.0		<b>Marshalling Kiosks &amp; CT / CVT Junction Boxes</b>					
40.1		Bay Marshalling Kiosks ( Outdoor, Floor mounted on cable trench)	Nos.	13	700.00	9,100.00	
40.2		CT Junction Box (on CT structure)	Nos.	16	700.00	11,200.00	
40.3		CVT Junction Box (on CVT structure/ on foundation)	Nos.	7	700.00	4,900.00	
41.0		<b>765 kV Control &amp; Relay Panels :</b>					
41.01		765kV Circuit Breaker Relay Panel with Auto reclose (1 set = 1 panel)	Set	5	500.00	2,500.00	
41.02		765kV Circuit Breaker Relay Panel without Auto reclose (1 set = 1 panel)	Set	5	500.00	2,500.00	
41.03		765kV Line Protection Panel (1 set = 2 panels)	Set	2	1,000.00	2,000.00	
41.04		Transformer Protection Panel (For both HV & MV side) (1 set = 2 panels)	Set	2	1,000.00	2,000.00	
41.05		765kV Reactor Protection Panel (1 set = 2 panels)	Set	3	1,000.00	3,000.00	
41.06		765kV Busbar Protection Panel (1 set = 4 panels)	Set	1	2,000.00	2,000.00	
42.0		<b>400 kV Control &amp; Relay Panels</b>					
		Supervision of testing and commissioning of relays in scope of panel supplier. Necessary manpower support, tools, tackles and testing equipment to be in scope of ETC contractor					
42.01		400kV Circuit Breaker Relay Panel with Auto reclose (1 set = 1 panel)	Set	4	500	2,000.00	
42.02		400kV Circuit Breaker Relay Panel without Auto reclose (1 set = 1 panel)	Set	3	500	1,500.00	
42.03		400kV Reactor Protection Panel (1 set = 2 panels)	Set	1	1,000	1,000.00	
42.04		400kV Bus Bar Protection Panel(Duplicate Bus bar protection) (1 set = 5 panels)	Set	1	2,500	2,500.00	
42.05		Panel mounted BCU for controlling & monitoring of Auxiliary System (1 set = 1 panel)	Set	1	500	500.00	
		<b>400 kV Control &amp; Relay Panels - Loose item</b>					
42.07		Common Equipments : Time synchronization Equipment - GPS Clock, Display, Antenna with wiring.	Nos.	1	500	500.00	

**Project : 765kV/400/220kV S/S BHUJ POOL**

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<b>Note</b>	This BOQ covers unloading, storage of equipments/materials and handing over of mandatory spares to customer for 400 kV switchyard at Bhuj. Unloading and storage of 765kV Equipments and material to be used in 765kV Switchyard is also covered under present scope. ETC contractor of 765kV switchyard package(separate contract) shall ask in writing for issuance of items/material required for 765kV Switchyard. All arrangement for Lifting and shifting of 765kV equipments/ items (for 765kV Switchyard) from the storage area to erection site shall be in the scope of the another contractor (765kV Package). Responsibility of keeping all equipment (including 765kV Equipments and items) in safe and proper condition shall be in the scope of contractor of this package. It will also be contractor's responsibility to hand over mandatory spares(including spares for 765kV equipments) to customer. Bidder shall quote only for unloading, storage and handing over of equipments/materials and mandatory spares to customer.						
	1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
42.08		Station HMI (including necessary softwares ) ( 1set = 1 no)	Set	2	500	1,000.00	
42.09		Industrial Grade Station Server(Main / Standby with necessary softwares) ( 1set = 1 no)	Set	4	500	2,000.00	
42.10		Disturbance Recorder Work Station ( including necessary softwares) ( 1 set = 1 no)	Set	1	500	500.00	
42.11		A4/A3 type colour Laser printer	No.	3	100	300.00	
42.12		Dot matrix printer	No.	2	100	200.00	
42.13		Inverter -working on station battery back-up.	No.	2	100	200.00	
42.14		Bay level Ethernet switch (1 Set = 1 No)	Set	14	100	1,400.00	
42.15		Station level Ethernet switch (1 Set = 1 No)	Set	2	100	200.00	
42.16		Redundant gateway to RCC & RSCC along with cable (1 set = 1 no)	Set	1	100	100.00	
42.17		SAS : Armoured Fibre Optic system Cable for SAS	m	7000	1	7,000.00	
43.0		<b>PLCC</b>					
		<b>PLCC for BHUJ SUBSTATION</b>					
43.1		Coupling device(Phase to Phase)	Nos.	2	500	1,000.00	
43.2		PLCC Panel -Carrier equipment (for speech + protection and speech +data) (Analogue type )	Nos.	3	500	1,500.00	
43.4		PLCC Panel -Digital Protection coupler	Nos.	2	500	1,000.00	
43.5		4 wire telephone instrument( Along with telephone wiring )	Nos.	2	50	100.00	
43.6		5 Pair Telephone Cables, armoured ,0.5 sq. mm annealed copper conductor and petroleum jelly filled with polyethene outer jackets	m	1000	2	2,000.00	
43.7		Testing & maintenance equipment(print test kit only) ( Handling & Storage only)	Set	1	500	500.00	
43.8		HF Cable	m	700	2	1,400.00	
43.8		EPAX (24/8) with 24 number 2-wire telephone set	Nos.	1	1,000	1,000.00	
45.0		<b>Tele Communication Equipment</b>					
45.1		Equipment Cabinets for SDH & PDH equipments	Nos	4	500	2,000.00	
45.3		NMS ( For SDH Equipment & Multiplexer)	Set	2	500	1,000.00	
45.4		Loose items for telecommunication system	Lot	1			

**Project : 765kV/400/220kV S/S BHUJ POOL**

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	1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
		<b>Watch and Ward - Material Security</b>					
46.0		Watch and ward of stored / erected material at project site and storage area or any other locations as per instruction of site in charge. (round the clock security by authorised service agency consisting of armed guard)	Months	15	40,000.00	6,00,000.00	
47		<b>DG Set along with Control panel (500 kVA) - Unloading, storage of DG set and its shifting from storage area to DG set foundation</b>	No	1	3,000.00	3,000.00	
48	<b>Spares</b>	<b>MANDATORY SPARES FOR SUBSTATION EQUIPMENT AS PER ANNEXURE - 3.1</b>					
A	Spares	765 kV SF6 Circuit Breaker	Set	1	9,500	9,500.00	
B	Spares	420kV, 125Mvar Bus Reactor	Set	1	52,800	52,800.00	
C	Spares	3000A, 765kV, 6 core Current Transformer (1-Ph) complete in all respect including terminal connectors	Set	1	2,000	2,000.00	
D	Spares	765kV, 8800pf CVT (1-Ph) complete in all respects including terminal connector	Set	1	2,000	2,000.00	
E	Spares	624kV Surge Arrester	Set	1	3,000	3,000.00	
F1	Spares	765 kV Isolator- 3150A	Set	1	4,600	4,600.00	
F2	Spares	765 kV Isolator- 2000A	Set	1	4,600	4,600.00	
G	Spares	400kV SF6 Circuit Breaker - one complete poles with PIR and one pole without PIR and loose spares	Set	1	11,500	11,500.00	
H	Spares	3000A, 400kV, 6 core Current Transformer (1-Ph) complete in all respect including terminal connectors	Set	1	2,000	2,000.00	
I	Spares	400kV, 4400pf CVT (1-Ph) complete in all respects including terminal connector	Set	1	2,000	2,000.00	
J	Spares	336kV Surge Arrester	Set	1	3,500	3,500.00	
K1	Spares	400kV Isolator - 3150A	Set	1	3,700	3,700.00	
K2	Spares	400kV Isolator - 2000A	Set	1	3,700	3,700.00	
Q	Spares	Bus Post Insulator	Set	1	1,400	1,400.00	

**Project : 765kV/400/220kV S/S BHUJ POOL**

**Customer : POWERGRID CORPORATION OF INDIA LTD.**

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	1	2	3	4	5	6	7
<b>SI. No.</b>		<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Rate</b>	<b>Total Amount</b>	
R	Spares	Relay and Protection system - Line Protection, Transformer Protection, Reactor Protection Panel spares & common spares	Set	1	4,000	4,000.00	
S	Spares	Substation Automation / SCADA system	Set	1	1,000	1,000.00	
T	Spares	PLCC, DPC & EPAX Spares	Set	1	1,400	1,400.00	
U	Spares	Fire protection System - Deluge valve only	Set	1	500	500.00	
V	Spares	220V Battery Charger	Set	1	2,000	2,000.00	
W	Spares	50V Battery Charger	Set	1	6,800	6,800.00	
X	Spares	DG SETS : Self starter assembly & AVR	Set	1	2,000	2,000.00	
Y	Spares	Telecommunication equipments	Set	1	8,000	8,000.00	
		<b>Total (Rs.)</b>				<b>26,59,645</b>	
<b>Notes</b>							
1	<b>Bidders to quote a percentage above/ below/ at par the item rate mentioned in the BOQ. The quoted percentage shall be applicable uniformly on all item rates of BOQ. The Percentage to be quoted in price schedule format attached with this BOQ.</b>						
2	Loading / Unloading, verification, handling, proper storage of all materials and handing over of mandatory spares are included in the scope.						
3	The quantities given in items mentioned above may undergo a change to any extent.						
	All Tools and Plants required for above works have to be arranged by bidder only.						

**TRANSMISSION BUSINESS GROUP  
(SUB- CONTRACTS MANAGEMENT)  
TBG – NOIDA**

**PRICE SCHEDULE FORMAT**

**(ANNEXURE-III)**

**SUB: RECEIPT OF EQUIPMENT/ MATERIAL AT SITE, UNLOADING, INSPECTION, VERIFICATION, STORAGE, UP-KEEPING DURING STORAGE, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF 400KV SUBSTATION AT BHUJ IN GUJARAT (PKG-II).**

(a) I/ We hereby agree to execute the above work at ----- % (in figure) ----- (in words) Above/ Below/At Par the rates of items given in BOQ (Annexure-I & Annexure-II) of subject tender.

**NOTE:**

1. In this annexure the tenderer shall quote a percentage above or below or at par the rates shown in the BOQ (Annexure-I & Annexure-II). The percentage quoted shall be clearly written both in words and figures In case of discrepancy in rates in figure and words, the minimum will be taken into account by BHEL.
2. The quoted percentage will apply to the individual items of BOQ (Annexure-I & II) uniformly.

Date:

Place

Signature of tenderer

Name & Designation of authorized person(s) with seal

#### ANNEXURE-IV

**SUMMARY OF PRICES FOR RECEIPT OF EQUIPMENT/ MATERIAL AT SITE, UNLOADING, INSPECTION, VERIFICATION, STORAGE, UP-KEEPING DURING STORAGE, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF 400KV SUBSTATION AT BHUJ IN GUJARAT (PKG-II)**

SI No.	Description	Amount (Rs.)
1	Total Amount for ETC works of 400kv switchyard at Bhuj (Annexure-I)	117,90,380.00
2	Total Amount for Unloading & Storage for 765kv & 400kv switchyard at Banaskantha (Annexure-II)	26,59,645.00
3	Total Amount (Annexure-I + Annexure-II) (1+2)	144,50,025.00
4	Value of percentage above/below/at par (As indicated in Price Schedule Format, Annexure - III) applicable to the total amount of BOQ (Annexure-I + Annexure-II)	.....% above/below/ at par
5	<b>Total amount of BOQ after consideration of percentage above/below/ at par.</b>	