

ANNEXURE-I

BOQ for Erection Testing & Commissioning (ETC) Works (Rev 02)

Project :- 400 kV Switchyard at 4X270MW Bhadradi TPS, Units 1 to 4 (4x270MW)

Customer :- Telangana State Power Generation Corp. Ltd. (TSGENCO)

Consultant :- Desein Private Limited

S.No.	Voltage Class	Type	Description	Unit	Qty	Unit Rate	Total
ETC BOQ (PART-I) (Location - Bhadradi)							
	MAIN EQUIPMENTS						
1.1a	400 kV	125MVar	125MVar, 3-Ph Reactor complete in all respect alongwith Radiator Bank and its cooling arrangement, Conservator, Cooler Control Cabinet/Marshalling Kiosk, accessories and insulating oil. Work includes erection of all auxiliaries viz turrets, bushings, terminal connectors, associated earthing works (excluding riser connections to main earthmat), laying of cable from Reactor auxiliaries to MK, Oil filtration , filling of oil, hot oil circulation, Oil testing etc as required to complete the installation of 125MVar reactor (Supervision of unloading, Erection, Testing and commissioning will be done by OEM) Note:- 1) Charges for Oil filtration, filling of oil, hot oil circulation etc for first time commissioning of Reactor are deemed to be covered in this line item. 2) Charges for testing of oil supplied in drums are covered separately under item no. 1.4 below.	Nos.	1	5,91,262.00	5,91,262.00
1.1b			Dragging/shifting charges of main tank of above mentioned Reactor (1 No.) upto plinth	m	50	1,013.59	50,679.60
1.2			N2 Cylinders for complete dryout of Reactor by vaccuming/ N2 filling/ purging and heating (if required)	Kg	100	1,689.32	1,68,932.00
1.3			Oil Testing (BDV, ppm, Resistivity & Tan delta etc) for oil supplied in drums (if required)	No. of Samples	5	7,000.00	35,000.00
1.4			Oil filtration charges (if required) This item is executed only if re-filtration of Transformer/Reactor oil is required.	kl	1	1,663	1,662.50
2	11kV/ 415V	Indoor	(500/630/800 kVA) LT Auxillary dry type Transformer. Work includes (placement inside Cable Spreader Room) erection of all auxiliaries, viz bushings, cable boxes etc.	Nos.	2	16,893.20	33,786.40
3	400 kV	With/Without PIR	SF6, 3 Phase Circuit Breaker alongwith lattice type GS 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.	21	35,898.05	7,53,859.05
4	400 kV	HCB (Mechanically ganged)	3 Ph, Isolator , motor/ manual operated complete with 6 nos. of support insulators & terminal connectors without support structure			-	-
4.1			- with one earth switch (motor/ manual operated)	Nos.	64	15,372.81	9,83,859.97
4.2			- with two earth switch (motor/ manual operated)	Nos.	2	15,372.81	30,745.62
5	400 kV	Upto 3000 A	1 Ph, Current Transformer (3000 A), live/dead tank complete with terminal connectors without support structure.	Nos.	123	7,179.61	8,83,092.03
6	400 kV		1 Ph, CVT complete with terminal connector without support structure.	Nos.	60	7,179.61	4,30,776.60
7	360 kV		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.	42	2,956.31	1,24,165.02
8	400 kV	Solidcore with corona ring	Post Insulators complete with corona ring & terminal connectors without support structure			-	-
8.1			low level (upto 8 m height from plinth)	Nos.	198	1,013.59	2,00,691.22
8.2			High level (above 8 m to 12.5 m height from plinth)	Nos.	3	1,435.92	4,307.77
9	BUS BAR MATERIALS					-	-
9.1	Stringing hardware					-	-
9.1.1	400 kV	Double Tension	Tension insulator string with double/single anchoring point, string comprising 2X25 nos. disc with hardware set with all accessories including tension clamp with/ without Turn Buckle set suitable for twin/quad conductor.	Set	144	2,533.98	3,64,893.12
9.1.2	400 kV	Single Suspension	Suspension insulator string comprising 1X25 nos. disc with hardware set with all accessories including drop/through type suspension clamp suitable for twin/quad conductor.	Set	54	1,689.32	91,223.28
9.2	-	ACSR Moose/Bersimis	Conductor complete with Tee connectors for droppers to equipment connections, PG clamps for busbar jumpering, Twin/Quad bundle rigid/ flexible spacers etc to complete.	Km	24	51,524.26	12,36,582.24
9.3		4.5"	Al Tube (ETC of Al.Tube includes Aluminium welding and bending to be included. Welding sleeve tube will be supplied by BHEL.)	m	2833	291.41	8,25,558.01

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Customer :- Telangana State Power Generation Corp. Ltd. (TSGENCO)

Consultant :- Desein Private Limited

S.No.	Voltage Class	Type	Description	Unit	Qty	Unit Rate	Total
9.4.1	-	7/9 SWG OR 7/8SWG	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	3.5	26,184.46	91,645.61
9.4.2	-	7/9 SWG OR 7/8SWG	GI Stranded Shield wire (Bidder's Scope is to supply Shield Wire (Customer accepted) only. ETC is covered under item no. 9.4.1)	Km	3.5	45,000.00	1,57,500.00
ENGINEERED ITEMS						-	-
10			Cabling including laying, tagging, dressing, ferruling, lugging, soldering, tapping, jointing, crimping, termination and drilling/cutting holes in cable gland plates, ETC of glands - laying can be either on trays, supports, underground (buried in ground or through GI/PVC pipe), over 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. Supply rates of Glands shall be quoted separately under 11.			-	-
10.1			Control cables			-	-
10.1.1		HRPVC	5Cx2.5 sqmm Cu	m	31000	11.83	3,66,582.44
10.1.2		HRPVC	7Cx2.5 sqmm Cu	m	11000	12.67	1,39,368.90
10.1.3		HRPVC	9Cx2.5 sqmm Cu	m	67000	12.67	8,48,883.30
10.1.4		HRPVC	12Cx2.5 sqmm Cu	m	26000	16.89	4,39,223.20
10.1.5		HRPVC	20Cx2.5 sqmm Cu	m	42000	18.58	7,80,465.84
10.2			Auxiliary Power cables			-	-
10.2.1		HRPVC	2Cx2.5 sqmm Al/Cu	m	10000	11.83	1,18,252.40
10.2.2		XLPE	2Cx16 sqmm Al/Cu	m	11000	11.83	1,30,077.64
10.2.3		XLPE	4Cx16 sqmm Al/Cu	m	7000	11.83	82,776.68
10.2.4		XLPE	4Cx35 sqmm Al/Cu	m	3000	16.89	50,679.60
10.2.5		XLPE	3.5Cx70 sqmm Al/Cu	m	10000	24.50	2,44,951.40
10.2.6		XLPE	3.5Cx95 sqmm Al/Cu	m	3000	30.83	92,490.27
10.2.7		XLPE	3.5Cx185 sqmm Al/Cu	m	1500	39.70	59,548.53
10.2.8		XLPE	3.5Cx300 sqmm Al/Cu	m	200	56.59	11,318.44
10.2.9		XLPE	1Cx630 sqmm Al/Cu	m	4600	66.73	3,06,949.44
10.3			Fire survival cables			-	-
10.3.1		EPR	1C x 70 sq mm EPR/ Cu. FS Power Cable	m	1000	13.51	13,514.56
11			Tin - Plated brass cable glands, double compression heavy-duty type complete with necessary armour clamp & tapered washer etc for the following cables (Bidder's Scope is to supply only & ETC is covered under item no. 10) Overall Qty may vary by ±50% (Cable glands to be procured from TSGENCO approved Vendors)			-	-
11.1			Control cables			-	-
11.1.1		HRPVC	5Cx2.5 sqmm Cu	No.	672	168.93	1,13,522.30
11.1.2		HRPVC	7Cx2.5 sqmm Cu	No.	240	202.72	48,652.42
11.1.3		HRPVC	9Cx2.5 sqmm Cu	No.	2004	228.06	4,57,028.63
11.1.4		HRPVC	12Cx2.5 sqmm Cu	No.	436	253.40	1,10,481.53
11.1.5		HRPVC	20Cx2.5 sqmm Cu	No.	504	274.51	1,38,355.31
11.2			Auxiliary Power cables			-	-
11.2.1		HRPVC	2Cx2.5 sqmm Al/Cu	No.	270	168.93	45,611.64
11.2.2		XLPE	2Cx16 sqmm Al/Cu	No.	240	232.28	55,747.56
11.2.3		XLPE	4Cx16 sqmm Al/Cu	No.	200	253.40	50,679.60
11.2.4		XLPE	4Cx35 sqmm Al/Cu	No.	50	295.63	14,781.55
11.2.5		XLPE	3.5Cx70 sqmm Al/Cu	No.	150	337.86	50,679.60
11.2.6		XLPE	3.5Cx95 sqmm Al/Cu	No.	12	380.10	4,561.16
11.2.7		XLPE	3.5Cx185 sqmm Al/Cu	No.	14	422.33	5,912.62
11.2.8		XLPE	3.5Cx300 sqmm Al/Cu	No.	15	2,618.45	39,276.69
11.2.9		XLPE	1Cx630 sqmm Al/Cu	No.	44	422.33	18,582.52
11.3			Fire survival cables			-	-
11.3.1		EPR	1C x 70 sq mm EPR/ Cu. FS Power Cable	No.	40	295.63	11,825.24
12			Marshalling Kiosks & CT / CVT Junction Boxes			-	-
12.1			Bay Marshalling Kiosks (Outdoor, Floor mounted on cable trench)	Nos.	18	3,294.17	59,295.13
12.2			CT Junction Box (on CT structure)	Nos.	24	1,942.72	46,625.23
12.3			CVT Junction Box (on CVT structure)	Nos.	7	1,942.72	13,599.03
13			Laying of Cable trays : including bends, tees, elbow, reducers, stiffeners coupler plates, bolting to racks, structure etc. to complete.			-	-
13.1			150 to 750 mm wide, 2.5 M long Ladder type	Nos.	2250	89.75	2,01,926.53
13.2			100 to 750 mm wide, 2.5 M long Perforated type	Nos.	50	110.86	5,543.08
14			Cable Rack work includes welding of galvanised steel racks on inserts of trench walls in trenches in switchyard and control room. Cable rack assembly will be of 2/3/4 tier.	MT	15	3,500.00	52,500.00

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S.No.	Voltage Class	Type	Description	Unit	Qty	Unit Rate	Total
15			Under-hung & Wall mounted Cable Rack work includes welding of assembly on embedded plates/ inserts in ceiling/ walls in cable vault. Cable rack assembly will be of 2/3/4 tier.	MT	2	3,500.00	7,000.00
16			Laying of PVC conduits 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. <u>Both ends of PVC conduits shall be closed by plastering.</u> (Payment will be made for the as erected pipe length)			-	-
16.1			PVC pipe, 50/63 NB	m	100	40.00	4,000.00
16.2			PVC Pipe, 100/110 NB	m	200	50.00	10,000.00
17.1			Laying of GI conduits 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. <u>Both ends of GI conduits shall be closed by plastering.</u> (Payment will be made for the as erected pipe length)			-	-
17.1a			GI pipe, 50/63 NB	m	2600	40.00	1,04,000.00
17.2b			GI Pipe, 100/110 NB	m	5400	50.00	2,70,000.00
17.2			Fixing of GI Pipes on Lattice/ Pipe Stucture including clamping, fixing of sockets/ bends as required etc. complete. Both ends of GI Pipes shall be closed by plastering. (Payment will be made for the as erected pipe length)			-	-
17.2a			50 mm dia	m	250	40.00	10,000.00
17.2b			100 mm dia	m	500	50.00	25,000.00
18			Laying of 30mm HDPE Pipes in Trenches including cutting, threading, fixing of sockets/ bends/TEEs where required etc. complete. Both ends of conduits shall be closed by plastering. (Payment will be made for the as erected pipe length) (Supply of HDPE Pipe (Customer accepted) alongwith accessories is in Contractor's scope)	m	7000	100.00	7,00,000.00
19			Earthing material- The earthing includes earthing of all switchyard equipment, towers, lattice/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 TB-4-380-316-010.			-	-
19.1			75 x 12/ 75 x 10 mm GI Flat	m	6850	59.97	4,10,800.39
19.2			50 x 10/ 50 x 6 mm GI Flat	m	3400	47.30	1,60,823.26
19.3			40 mm Dia MS Rod	MT	1	10,389.32	10,389.32
20			Galvanised steel Lattice Structures including hardwares for Towers, beams & equipment support	MT	700	3,800.97	26,60,679.00
			CONTROL EQUIPMENT			-	-
21			Main 415V ACDB with 2/3/4 incomers	Set	1	38,009.70	38,009.70
22.1			220V DCDB with 2 incomers from battery charger	No.	1	9,291.26	9,291.26
22.2			48V DCDB with 2 incomers from battery charger	No.	1	8,024.27	8,024.27
23.1	220 V	Lead Acid Plante	Battery Bank including all accessories	Nos.	2	32,941.74	65,883.48
23.2	48 V	Lead Acid Plante	Battery Bank including all accessories	Nos.	2	23,650.48	47,300.96
24.1	220 V		Battery Charger for Battery Bank	Nos.	2	5,448.06	10,896.11
24.2	48 V		Battery Charger for Battery Bank	Nos.	2	5,448.06	10,896.11
25			AC kiosk (Air conditioned kiosk) of Approx. dimension upto Size L x B x H (7m x 3m x 3m) and made of sandwich insulated panels with Poly Urethane Foam (PUF) as filler material between polyester pre-coated cold rolled steel. [Only unloading, storage and handling between store & erection place at site has to be considered]	Nos.	7	12,000.00	84,000.00
26			61850 Based Sub station Automation system in AC Kiosk (400kV S/Y)/ Control building (Testing and commissioning of numerical relays/BCU/Energy Meters/SAS equipments in scope of respective equipment supplier. Necessary manpower support for numerical device testing, arranging tools, tackles and testing equipments is in scope of ETC contractor)			-	-
26.1			Common control panel (1 set = 1 panel)	Set	1	4,223.30	4,223.30
26.2			Bus Reactor Relay Panel (BRRP) (1 set = 2 panel)	Set	1	8,446.60	8,446.60

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S.No.	Voltage Class	Type	Description	Unit	Qty	Unit Rate	Total
26.3			Tie Relay Panel (TRP) (1 set = 1 panel)	Sets	6	4,223.30	25,339.80
26.4			GT Relay Panel (GTRP) (1 set = 1 panel)	Sets	4	4,223.30	16,893.20
26.5			ST Relay Panel (STRPA & STRPB) (1 set = 2 panel)	Sets	2	8,446.60	16,893.20
26.6			Line Relay Panel (LRPA & LRPB) (1 set = 2 panel)	Sets	5	8,446.60	42,233.00
26.7			Busbar Relay Panel (BBRP) (1 set = 1 panel)	Set	1	4,223.30	4,223.30
26.8			Islanding panel (ISRPA & ISRPB) (1 set = 2 panel)	Set	1	8,446.60	8,446.60
26.9			Synchronising trolley	No.	1	-	-
26.10			Backup control panel (1 set = 1 panel)	Sets	6	4,223.30	25,339.80
26.11			Bay Control Unit panel (1 set = 1 panel)	Sets	12	4,223.30	50,679.60
26.12			Networking Panel (1 set = 1 panel)	Sets	3	4,223.30	12,669.90
26.13a			Indoor Metering Panel (1 set = 1 panel) in Control Building	Sets	2	4,223.30	8,446.60
26.13b			Outdoor Metering Panel (1 set = 1 panel) in 400kV S/Y	Sets	11	4,223.30	46,456.30
26.14			Operator work station (OWS)	Sets	5	12,000.00	60,000.00
26.15			Engineering work station (EWS) cum Disturbance Recorder (DR)	Set	1	12,000.00	12,000.00
26.16			67" Large video screen (LVS)	Sets	2	8,000.00	16,000.00
26.17			LVS Display controller	Set	1	350.00	350.00
26.18			Server	Sets	2	1,266.99	2,533.98
26.19			Dot matrix printer (DMP)	No.	1	506.80	506.80
26.20			A3 Laser color Printer	No.	1	506.80	506.80
26.21			UPS	No.	1	3,500.00	3,500.00
26.22			Time Synchronizing equipment (GPS) – complete in all respects including antenna, all cables, processing equipment etc.	No.	1	4,645.63	4,645.63
26.23			Handling & installation of furniture required in switchyard control room & Power house control room for OWS, printer, servers etc.	Lot	1	6,000.00	6,000.00
26.24			Armoured Fibre Optics cable for SAS, Busbar protection and OLTE (to be laid in HDPE pipe in trench)	m	15000	13.51	2,02,718.40
27			OLTE Equipment				
27.1			Equipments cabinet : Base Equipment (Common cards, Cross-connect/control cards, Optical base card, Power supply cards, power cabling, other hardware & accessories including sub-racks, patch cords, DDF etc. fully equipped including interface cards and Tributary cards and equipment Cabinet) (Testing and commissioning of OLTE equipments in scope of OLTE supplier; Necessary manpower support for OLTE testing, arranging tools and tackles is in scope of ETC contractor)	No	2	2,956.31	5,912.62
27.2			Craft terminal (only unloading, storage and handing over)	Set	1	2,956.31	2,956.31
28			Supplying Rubber mats (Class-A suitable for 1.1 kV as per IS: 15652) and laying in front of Panels	SQ. M	300	1,250.00	3,75,000.00
29			Panel Supporting Angles / Channel etc on cable trench in Control Room & Bay Control Room, Vertical support for cables etc (Including Supply) .	MT	1	60,815.52	60,815.52
30			Structural Steel Work welded in built up sections like angles, channels & framed work etc including providing cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete	MT	1	3,500.00	3,500.00
31			Installing terminal connector wherever equipment installation is not in scope of contractor. Connectors shall be provided by BHEL. Any other ETC work related to equipment below is not in the scope of this BOQ.	Nos. of Connectors		-	-
31.1			400 KV GT	Nos.	12	220.00	2,640.00
31.2			400 KV ST/FGD ST	Nos.	6	220.00	1,320.00
32.1			Installation of Fire-Proof Sealing System (as per specification enclosed at Annexure-B). The work includes supply of the material.	sq.m	20	1,500.00	30,000.00
32.2			Installation of Fire Protection Coating System (as per specification enclosed at Annexure-B). The work includes supply of the material.	sq.m	20	1,500.00	30,000.00
33			Unloading, storage & handing over of Essential/ Mandatory spares/ Maintenance equipments to Customer as per Annexure-A .	Lot	1	65,000.00	65,000.00
34.1			Supply & ETC of TSGENCO approved make 2 HP Automatic Start/ Stop type Centrifugal pump and accessories for sump pit	Lot	1	9,500.00	9,500.00
34.2			Supply & ETC of TSGENCO approved make 0.5 HP Automatic Start/ Stop type Centrifugal pump and accessories for sump pit	Lot	2	6,000.00	12,000.00
35			Supply & Mounting of Phase Color Discs, Danger Plate and Identification Plates for bays & Equipments as per IS:2551; 1982 & IS:5; 1978.	Lot	1	1,05,000.00	1,05,000.00

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S.No.	Voltage Class	Type	Description	Unit	Qty	Unit Rate	Total
36			Supply & fixing of Equipment fixing hardware. Brief specification is as follows - 1. Bolts - Class 5.6 of IS:1367 (part 3) - 1991 (M12-M33, 30-145mm lg. & fully threaded). 2. Nuts - Class 5 of IS:1367 (part 6) - 1980. 3. Plain Washers - A type conforming to IS: 2016-1967. 4. Spring Washer - Type B of IS: 3063-1972	kg	500	121.62	60,810.75
37			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	12	33,786.40	4,05,436.80
ETC BOQ (PART-II) (Location - Kothagudem)							
	MAIN EQUIPMENTS						
1.1a	400 kV	125MVAR	125MVAR, 3-Ph Reactor complete in all respect alongwith Radiator Bank and its cooling arrangement, Conservator, Cooler Control Cabinet/Marshalling Kiosk, accessories and insulating oil. Work includes erection of all auxiliaries viz turrets, bushings, terminal connectors, associated earthing works (excluding riser connections to main earthmat), laying of cable from Reactor auxiliaries to MK, Oil filtration , filling of oil, hot oil circulation, Oil testing etc as required to complete the installation of 125MVAR reactor (Supervision of unloading, Erection, Testing and commissioning will be done by OEM) Note:- 1) Charges for Oil filtration, filling of oil, hot oil circulation etc for first time commissioning of Reactor are deemed to be covered in this line item. 2) Charges for testing of oil supplied in drums are covered separately under item no. 1.4 below.	Nos.	1	5,91,262.00	5,91,262.00
1.1b			Dragging/shifting charges of main tank of above mentioned Reactor (1 No.) upto plinth	m	50	1,013.59	50,679.60
1.2			N2 Cylinders for complete dryout of Reactor by vaccuming/ N2 filling/ purging and heating (if required)	Kg	100	1,689.32	1,68,932.00
1.3			Oil Testing (BDV, ppm, Resistivity & Tan delta etc) for oil supplied in drums (if required)	No. of Samples	5	7,000.00	35,000.00
1.4			Oil filtration charges (if required) This item is executed only if re-filtration of Transformer/Reactor oil is required.	kl	1	1,662.50	1,662.50
			Total Amount (Rs.)				195,33,966.83
Following also forms the scope of ETC work in addition to above, but not limited to this.							
1	Loading / Unloading, verification, handling, shifting to & from stores, proper storage, assembly, installation, pre-commissioning test and commissioning tests (As per Customer/BHEL FQP) are included in the scope. Necessary skilled electrician & labour to be provided by ETC contractor to OEM during testing & commissioning.						
2	All the drawings and documents as per Annexure-1 shall be followed for ETC work.						
3	Annexure- 2 (Switchyard Erection guidelines) shall be followed for ETC work.						
4	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.						
5	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.						
6	The quantities given in items mentioned above may undergo a change to any extent.						
7	Quoted rates are deemed to be inclusive of miscellaneous works viz erection of clamps and connectors.						
8	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.						
9	Equipment erection (say Isolator) means complete erection, metallics, post insulator, connectors (expansion/rigid tubular for Al.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.						
10	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.						
11	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.						
12	Completere ETC package is under the scope of bidder. All TNP including oil filtering machine, cranes etc. required to complete the job shall be provided by bidder only.						
13	Supervision of erection, Testing & commissioning of one no. Isolator of each type shall be done by supplier. Necessary manpower support, tools, tackles etc shall be in the scope of ETC contractor.						

ANNEXURE-I

BOQ for Erection Testing & Commissioning (ETC) Works (Rev 02)

Project :- 400 kV Switchyard at 4X270MW Bhadradi TPS, Units 1 to 4 (4x270MW)

Customer :- Telangana State Power Generation Corp. Ltd. (TSGENCO)

Consultant :- Desein Private Limited

S.No.	Voltage Class	Type	Description	Unit	Qty	Unit Rate	Total
14			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 sucessful 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)				
14.1			DCRM (OPERATIONAL ANALYZER)				
14.2			Contact Resistance Measurement kit (CRM)				
14.3			Capacitance and Tan delta measurement Kit				
14.4			Dew Point Measurement kit				
14.5			5kV/1kV Megger				
14.6			Primary current Injection Kit				
14.7			Secondary current/Voltgae Injection kit				
14.8			1Ph Variac				
14.9			Multimeters				
14.10			Clamp on meter				
14.11			Relay test kit				
15			The scope of supply items as mentioned in the above BOQ are tentative. Items shall be supplied by Contractor as per exact site requirements only.				
16			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)

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

PRICE SCHEDULE FORMAT

SUB: RECEIPT OF EQUIPMENT/ MATERIAL AT SITE, UNLOADING, INSPECTION, VERIFICATION, STORAGE, UP-KEEPING DURING STORAGE, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF 400KV SWITCHYARD AT 4X270 MW BHADRADRI (MANUGURU) IN TELANGANA.

- (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) 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). 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).

Date:

Place

Signature of tenderer

Name & Designation of authorized person(s) with seal

ANNEXURE-III

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 SWITCHYARD AT 4X270 MW BHADRADRI (MANUGURU) IN TELANGANA

Sl No.	Description	Amount (Rs.)
1	Total Amount for ETC work for 400kV switchyard at 4x270 MW Bhadradi (Manuguru) in Telangana (Annexure-I)	195,33,966.83
2	Value of percentage above/below/at par (As indicated in Price Schedule Format, Annexure-II) applicable to the total amount mentioned at sl. no. 1 above.% above/below/ at par
3	Total amount after consideration of percentage above/below/ at par.	