

BOQ cum Price Schedule (Annexure-I)

Name of the Work: Balance ETC works of 132 kV Switchyard at Barauni TPS in Bihar

S.No.	Voltage Class (kV)	Type	Description	Unit	Qty.	Unit ETC INR (Excluding GST)	Total ETC INR (Excluding GST)
	MAIN EQUIPMENTS						
1	132 kV	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.	6	25,054.28	1,50,325.65
2	132 kV	HDB(Normal)	3 Ph, Isolator , motor/ manual operated complete with 9 nos. of support insulators & terminal connectors and interpole cabling without support structure				
2.1	132 kV	HDB(Normal)	- without earth switch	Nos.	5	7,211.09	36,055.47
2.2	132 kV	HDB(Normal)	- with one earth switch (motor/ manual operated)	Nos.	5	7,211.09	36,055.47
2.3	132 kV	HDB(Normal)	- with two earth switch (motor/ manual operated)	Nos.	7	9,134.05	63,938.37
3	33 kV	HDB(Normal)	3 Ph, Isolator , motor/ manual operated complete with 9 nos. of support insulators & terminal connectors and interpole cabling without support structure				
3.1	33 kV	HDB(Normal)	- without earth switch	Nos.	2	3,745.34	7,490.67
4	132 kV	Upto 3000 A	1 Ph, Current Transformer (Upto 3000 A) , live/dead tank complete with terminal connectors without support structure.	Nos.	18	7,652.94	1,37,752.96
5	132 kV		1 Ph, CVT/PT complete with terminal connector without support structure.	Nos.	12	6,104.13	73,249.59
6	120 kV		1 Phase, Gapless type Metal Oxide Surge Arrester complete with surge counter, leakage current meter, insulating base, connecting cable and terminal connectors.	Nos.	15	5,193.07	77,896.02
7	132 kV	Pedestal type	1 phase, Wave Trap complete with 3 nos. post insulators per WT with terminal connectors without support structure.	Nos.	1	5,193.07	5,193.07
8	132 kV	Solidcore	Post Insulators complete with terminal connectors without support structure	Nos.	20	1,153.78	23,075.50
9	BUS BAR MATERIALS						
9.1	Stringing hardware						
9.1.1	132 kV	SingleTension	Tension insulator string with double/single anchoring point , string comprising 1X12/10 nos. Disc with hardware set with all accessories including tension clamp with/ without Turn Buckle set suitable for single/twin/quad conductor.	Set	36	956.62	34,438.24

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9.1.2	132 kV	Double Tension	Tension insulator string with double/single anchoring point , string comprising 2X12/10 nos. disc with hardware set with all accessories including tension clamp with/ without Turn Buckle set suitable for twin/quad conductor.	Set	42	1,184.38	49,744.12
9.1.3	132 kV	Single Suspension	Suspension insulator string comprising 1X12/10 nos. disc with hardware set with all accessories including drop/through type suspension clamp suitable for single/twin/quad conductor.	Set	54	774.40	41,817.86
9.1.4	-	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	2	20,680.94	41,361.89
9.1.5	-	ACSR Moose/ Zebra/Marculia	Conductor complete with Tee connectors for droppers to equipment connections, PG clamps for busbar jumpering, Twin/Quad bundle spacers etc to complete.	Km	15	40,694.76	6,10,421.45
ENGINEERED ITEMS							
10			A. Cabling 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 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. Glands shall be quoted separately.				
10.1			Control cables				
10.1.1		PVC	5Cx2.5 sqmm Cu	Km	37	9,342.41	3,45,669.30
10.1.2		PVC	7Cx2.5 sqmm Cu	Km	3	10,004.36	30,013.07
10.1.3		PVC	10Cx2.5 sqmm Cu	Km	17.5	10,004.36	1,75,076.23
10.1.4		PVC	14Cx2.5 sqmm Cu	Km	5.5	13,344.16	73,392.86
10.1.5		PVC	19Cx2.5 sqmm Cu	Km	4	14,675.56	58,702.25
10.2			Auxiliary Power cables				
10.2.1		XLPE	2Cx2.5 sqmm Al/Cu	Km	3	7,288.52	21,865.55
10.2.2		XLPE	2Cx6 sqmm Al/Cu	Km	6	10,300.06	61,800.38
10.2.3		XLPE	4Cx6 sqmm Al/Cu	Km	1	10,300.06	10,300.06
10.2.4		XLPE	3.5Cx35 sqmm Al/Cu	Km	4	13,344.16	53,376.62
10.2.5		XLPE	3.5Cx70 sqmm Al/Cu	Km	3	19,346.77	58,040.31
10.2.6		XLPE	3.5Cx120 sqmm Al/Cu	Km	0.71	48,264.73	34,267.96
10.2.7		XLPE	1Cx150 sqmm Al/Cu	Km	0.17	33,608.62	5,713.47
10.2.8		XLPE	1Cx50 sq. mm Al/Cu	Km	0.17	38,611.78	6,564.00
10.2.9		XLPE	1Cx1000 sqmm Al/Cu	Km	0.51	96,529.46	49,230.02
11			Tin/ Nickel, Nickel/chromium - Plated (coating thickness not less than 10 microns) brass cable glands , double compression heavy-duty type complete with necessary armour clamp & tapered washer etc for the following cables				
11.1		PVC/ XLPE	5Cx2.5 sqmm Al/Cu	Nos.	1289	166.78	2,14,983.47
11.2		PVC/ XLPE	7Cx2.5 sqmm Al/Cu	Nos.	380	200.14	76,054.54

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11.3		PVC/ XLPE	10Cx2.5 sqmm Al/Cu	Nos.	541	225.15	1,21,808.54
11.4		PVC/ XLPE	14Cx2.5 sqmm Al/Cu	Nos.	126	250.17	31,522.01
11.5		PVC/ XLPE	19Cx2.5 sqmm Al/Cu	Nos.	50	271.02	13,551.01
11.6		PVC/ XLPE	2Cx2.5 sqmm Al/Cu	Nos.	200	160.00	32,000.00
11.7		PVC/ XLPE	2Cx6 sqmm Al/Cu	Nos.	204	183.86	37,507.08
11.8		PVC/ XLPE	4Cx6 sqmm Al/Cu	Nos.	50	252.80	12,639.90
11.9		PVC/ XLPE	3.5Cx35 sqmm Al/Cu	Nos.	100	291.87	29,186.58
11.10		PVC/ XLPE	3.5Cx70 sqmm Al/Cu	Nos.	88	333.56	29,353.01
11.11		PVC/ XLPE	3.5Cx120 sqmm Al/Cu	Nos.	28	422.32	11,824.86
11.12		PVC/ XLPE	1Cx150 sqmm Al/Cu	Nos.	16	301.65	4,826.47
11.13		PVC/ XLPE	1Cx50 sq. mm Al/Cu	Nos.	10	241.32	2,413.24
11.14		PVC/ XLPE	1Cx1000 sqmm Al/Cu	Nos.	4	482.65	1,930.59
12			Marshalling Kiosks & CT / CVT Junction Boxes				
12.1			Bay Marshalling Kiosks (Outdoor, Floor mounted on cable trench)	Nos.	10	2,868.14	28,681.43
12.2			CT Junction Box (on CT structure)	Nos.	10	1,691.47	16,914.73
12.3			VT Junction Box (on VT structure)	Nos.	8	1,691.47	13,531.79
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.	399	78.14	31,176.07
14			Laying of buried cables as per IS along with trefoil clamps				
14.1			Cables upto 40mm OD	MTR	200	193.06	38,611.78
15			Cable Rack work includes welding of mild steel & painted racks (paint supply 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	3.2	9,226.21	29,523.88
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	200	51.48	10,296.21
16.2			PVC Pipe, 100/ 110NB	m	300	61.51	18,452.39
17			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)				
17.1			GI pipe, 50/ 63 NB	m	1150	48.09	55,307.48
17.2			GI Pipe, 100/ 110NB	m	1180	57.46	67,799.96

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18			Earthing material - 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 TB-4-345-316-007 :				
18.1			75 x 12 mm GI Flat	km	9.75	47,366.04	4,61,818.92
18.2			50 x 6 mm GI Flat	km	4.82	37,359.13	1,80,071.01
19			Galvanised steel Lattice Structures including hardwares for Towers, beams & equipment support	MT	220	3,002.07	6,60,456.28
20			Galvanised steel Pipe Structures including hardwares for equipment support	MT	123	2,535.09	3,11,815.91
			CONTROL ROOM EQUIPMENT				
21			LT Auxiliary System				
21.1			Main 415V ACDB with 2/3/4 incomers	Set	1	47,895.32	47,895.32
21.2			MLDB with 2 incomers	Set	1	29,934.58	29,934.58
21.3			415V Emergency LDB	Set	1	23,947.66	23,947.66
21.4			220V DCDB with 1 incomer from battery charger	No.	1	29,934.58	29,934.58
21.5			48V DCDB with 1 incomer from battery charger	No.	1	11,975.84	11,975.84
21.6	220 V	Lead Acid Plante/ VRLA/ Tubular or Ni-Cd	Battery Bank including all accessories (Lead Acid)	Nos.	2	23,698.21	47,396.41
21.7	48 V	Lead Acid Plante/ VRLA/ Tubular or Ni-Cd	Battery Bank including all accessories (Lead Acid)	Nos.	2	20,662.25	41,324.50
21.8	220 V		Battery Charger for Battery Bank	Nos.	2	6,161.53	12,323.07
21.9	48 V		Battery Charger for Battery Bank	Nos.	2	5,785.43	11,570.86
21.10			132 kV Line Protection panel (Approx. width1600 MM) (2 cubicle)	Sets	3	6,671.27	20,013.82
21.11			132 kV Bus Transfer Protection panel (Approx. width1000 MM)	Sets	1	6,671.27	6,671.27
21.12			132 kV ICT Protection panel (Approx. width1600 MM)	Sets	2	6,671.27	13,342.55
21.13			132 kV Single Bus Bar Protection panel (Approx. width1600 MM)	Sets	1	6,671.27	6,671.27

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S.No.	Voltage Class (kV)	Type	Description	Unit	Qty.	Unit ETC INR (Excluding GST)	Total ETC INR (Excluding GST)
21.14			Energy Metering Panels (Approx. Width 3000 mm) (3 cubicles)	Sets	1	867.81	867.81
21.15			Laying of Optical fibre Cable (In GI Pipes in Trenches) (GI pipe not in scope of supply)	km	6	10,696.39	64,178.32
21.16			Laser/ Inkjet/ Dot matrix Black & white Printer(A4)	No	1	236.95	236.95
22			Making Cut out in the floor of existing control room, work includes cutting RCC & finishing	sq. m	10	2,078.84	20,788.38
23			Supplying Rubber mats (Class-A suitable for 1.1 kV as per IS: 15652) and laying in front of Panels	SQ. M	10	1,546.76	15,467.60
24			Panel Supporting Angles / Channel etc on cable trench in Control Room & Bay Control Room (Including Supply).	MT	1	78,142.03	78,142.03
25			PLCC Panels at Barauni End -Testing and commissioning of PLCC system are in scope of panels supplier.Necessary skilled electrician & labour to be provided by ETC contractor to panels supplier during testing & commissioning. All the other works related to erection and handling at Barauni site is in ETC contractor's scope.				
25.1			PLCC Panels	Nos	3	4,580.80	13,742.40
25.2			Coupling Device	Set	6	8,163.80	48,982.82
25.3			HF cable	m	500	7.90	3,949.09
25.4			EPAX (24/8) suitable for PLCC	nos.	1	3,949.09	3,949.09
25.5			4-wire Telephone Sets with connecting cables	Nos.	6	78.98	473.89
25.6			2-wire Telephone Sets with connecting cables	Nos.	24	78.98	1,895.56
25.7			Single Pair Telephone cable	m	500	5.64	2,820.78
25.8			Five Pair armoured Telephone cable	m	2000	7.90	15,796.35
26	33kV/ 415V	Outdoor	LT Auxilairy Oil filled Transformers. Work includes unloading, dragging upto plinth, erection of all auxiliaries, viz bushings, terminal connectors, filling of oil, oil filtration , oil testing, testing & Commissioning etc.				
26.1			630kVA	Nos.	2	8,526.42	17,052.84
27	33 kV	Outdoor	Horn Gap Fuse Assembly, 1-phase, along with support insulators, terminal connector	Nos.	6	4,577.64	27,465.84
			Total amount				

55,35,699.02
Total ETC INR (Excluding GST)

<u>Following also forms the scope of ETC work in addition to above, but not limited to this.</u>	
1	Material except which is in the scope of ETC Contractor is unloaded and available at site. Loading / Shifting to and from stores, verification, handling, proper storage, assembly, installation, pre-commissioning test and commissioning tests (As per BHEL FQP) are included in the scope of ETC Contractor.
2	Annexure- 2 (Switchyard Erection guidelines) shall be followed for ETC work.

BOQ cum Price Schedule (Annexure-I)

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3			All the drawings and documents as per Annexure-1 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			Complete ETC package is under the scope of bidder. All TNP including 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, M/s GR Power. Necessary manpower support, tools, tackles etc shall be in the scope of ETC contractor.				
14			Testing instruments (dully calibrated) have to be arranged by ETC Contractor at its 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.)				
			DCRM (OPERATIONAL ANALYZER)				
			Contact Resistance Measurement kit (CRM)				
			Capacitance and Tan delta measurement Kit				
			Dew Point Measurement kit				
			5kV/1kV Megger				
			Primary current Injection Kit				
			Secondary current/Voltage Injection kit				
			1Ph Variac				
			Multimeters				
			Clamp on meter				
			Relay test kit				

ANNEXURE-II

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

PRICE SCHEDULE FORMAT

SUB: Balance ETC Works of 132kV Switchyard at Barauni TPS in Bihar

(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/ below/At Par the rates shown in the Bill of Quantities (Annexure-I) of subject tender. 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 uniformly.

Date:

Place

Signature of tenderer

Name & Designation of authorized person(s) with seal

ANNEXURE-III		
Name of Work:- Balance ETC Works of 132kV Switchyard at Barauni TPS in Bihar		
Sl. No.	Description	Amount (Rs.)
1	Total amount as per the rates in BOQ for Balance ETC Works of 132kV Switchyard at Barauni TPS in Bihar.(Annexure-I)	55,35,699.00
2	Value of percentage above/below/at par (As indicated in Price Schedule Format, Annexure-II)% above/below/ at par
3	Total amount after consideration of percentage above/below/ at par.	