

PROJECT : 220 KV SWITCHYARD AT RAIBAREILLY
CUSTOMER : POWER GRID CORPORATION INDIA LIMITED

Bill of Quantities for ETC Works

S.No.	Description	Unit	Qty.	Rate	Amount	Remarks
	MAIN EQUIPMENT					
1	Breakers					
1.1	245KV, 1600/2500A, SF6, Circuit Breaker alongwith support structure, Rigid / Expansion type terminal connectors for Al tube / ACSR Moose, Breaker Control Cabinets and interpole cabling	nos.	9			
2	Isolators					
2.1.1	245 kV, 1600/2500A, 3 phase Central post rotating Double Break, motor operated (Standard- mechanically ganged) isolator, mounting at 3 meters height complete with support insulators, Rigid / Expansion type terminal connectors for Al tube / ACSR Moose (Erection of Support Structure included)					
2.1.2	- without earth switch	nos.	15			
2.1.3	- with one earth switch	nos.	8			
2.1.4	- with two earth switches	nos.	10			
3	Lightning Arresters					
3.1	216 kV Surge Arresters	nos.	21			
3.2	120 kV Surge Arresters	nos.	6			
4	Wave Trap					
4.1	1600 A, 40 kA wave traps	nos	8			
5	Auto Transformer					
5.1	100 MVA, 220/132 kV, 3 phase Auto Transformer	nos	2			
6	Capacitive voltage Transformer					
6.1	245KV , CVT, 1 Phase, complete with Line terminal connector, mounting on GS supporting structure(Erection of Support Structure included)	nos.	21			
7	Current Transformer					
7.1	245KV, Current Transformer, 1 Phase, complete with Rigid / Expansion type terminal connectors for Al tube / ACSR Moose and mounting on existing GS supporting structure	nos.	27			
8	Post Insulators					
8.1	245kV Post Insulator					
8.1.1	245kV Post Insulators for Bus support (plus required for isolator) complete with corona ring, terminal connector and mounting on structure at standard height(Erection of Support Structure included)	nos.	377			
8.1.2	245kV Post Insulators for wave trap	nos.	24			
9	LT Switchgear					
9.1	415V LV AC Main Distribution board	Set	1			

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S.No.	Description	Unit	Qty.	Rate	Amount	Remarks
9.2	415 V ACDB	Set	1			
9.3	415 V MLDB	Set	1			
9.4	415 V Emergency LDB	Set	1			
9.5	220 DCDB	Set	2			
9.6	48 V DCDB	Set	2			
10	Batteries					
10.1	220V, 600AH VRLA Battery	Sets	2			
10.2	48V, 600AH VRLA Battery	Sets	2			
11	Battery Charger system					
11.1	75A, 220V DC Battery charger (Float cum boost)	Sets	2			
11.2	100A, 48V DC Battery charger (Float cum boost)	Sets	2			
12	LT Yard Equipment					
12.1	33 kV Isolator	nos.	6			
12.2	30 kV Lightning Arrester	nos.	6			
12.3	33 kV Horn Gap	nos.	6			
12.4	Laying of 33 kV Cable	m	1,300			
12.5	Laying of buried cable from Control room to LT yard and to Fire Fighting Pump House	m	112			
13	BUS BAR MATERIALS					
13.1	220 kV Double Tension Double Anchoring Hardware with Turnbuckle suitable for Quad ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 15 Discs	nos.	18			
13.2	220 kV Double Tension Double Anchoring Hardware without Turnbuckle suitable for Quad ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 15 Discs	set	18			
13.3	220 kV Double Tension Double Anchoring Hardware with Turnbuckle suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 15 Discs	set	18			
13.4	220 kV Double Tension Double Anchoring Hardware without Turnbuckle suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 15 Discs	set	18			
13.5	220 kV Single Suspension Single Anchoring Hardware with Straight Clamp suitable for Quad ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 1 x 15 Discs	set	12			

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S.No.	Description	Unit	Qty.	Rate	Amount	Remarks
13.6	220 kV Single Suspension Single Anchoring Hardware with Straight Clamp suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 1 x 15 Discs	set	6			
13.7	220 kV Single Suspension Single Anchoring Hardware with Drop Clamp suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 1 x 15 Discs	set	19			
13.8	132 kV Single Suspension Single Anchoring Hardware with Straight Clamp suitable for Single ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 1 x 10 Discs	nos	6			
13.9	GS Stranded Shield wire, 7/9 SWG, 10.98 mm dia including tension clamp, PG clamp and clamping on structure for down conductor, fixing/bolting with earth strip etc to complete.	m	600			
13.10	ACSR "Moose" conductor complete with tee connectors for droppers to equipment connections, PG clamps for busbar jumpering, Twin / Quad bundle spacers etc to complete.	m	10,000			
13.11	4 " IPS Al tube including cutting , bending , Al welding with sleeves, Radiography testing & D.P. Test of 100% welded joints, fixing Corona end bells etc. to complete.	m	13,280			
13.12	220kV Clamps and Connectors of all types suitable for single/twin conductor suitable for Moose ACSR conductor for busbar connections, bus drops etc in form of TEE connectors, PG clamps, spacers, earthing clamps, shield wire clamps etc.	Lot	1			
14	YARD WORK INCLUDING CABLING, TRENCH & EARTHING.					
	Cabling including laying, dressing and termination of cables - laying can be either on trays, supports, underground, over ground etc. Glands will be supplied by BHEL and all other erection materials viz. ferrules, lugs, cable ties / straps, markers etc. included in the quoted rates.					
14.1	Control cables- PVC insulated , Copper conductor					
14.1.1	19C, 2.5 sq.mm	m	4,500			
14.1.2	14C, 2.5 sq.mm	m	6,500			
14.1.3	10C, 2.5 sq.mm	m	15,400			
14.1.4	7C, 2.5 sq.mm	m	600			
14.1.5	5C, 2.5 sq.mm	m	8,800			
14.2	Auxiliary Power cables, PVC insulated, Al conductor					
14.2.1	1C x 630 sqmm	m	600			
14.2.2	3.5C x 300 sqmm	m	750			
14.2.3	3.5C x 70 sqmm	m	425			
14.2.4	4C x 16 sqmm	m	1,100			
14.2.5	3.5C x 35 sqmm	m	1,400			
14.2.6	1Cx 150 sqmm	m	650			
14.2.7	2Cx 6 sqmm	m	4,450			
	Note: The above lengths are subject to change. Also these lengths will be laid in various part lengths from 15 m to 500 m with termination at both ends complete with glands etc.					

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S.No.	Description	Unit	Qty.	Rate	Amount	Remarks
15	Trench Material					
15.1	Laying of cables and welding of 50x50x6 mm angles of length (which includes the following angles to be welded in the trenches)	m	883			
	750 mm length angles to be welded	nos	1,400			
	600 mm length angles to be welded	nos	175			
	450 mm length angles to be welded	nos	175			
	400 mm length angles to be welded	nos	450			
	200 mm length angles to be welded	nos	450			
15.2	Laying of PVC conduits	m	308			
16	Marshalling Kiosks & CT / CVT Junction Boxes					
16.1	Bay MK	nos.	9			
16.2	CT JB	nos.	9			
16.3	CVT JB	nos.	7			
17	Earthing material- GS strip including cutting, bending, welding with 40 dia MS rod riser/earth strip, applying zinc rich paint, clamping to structure/building wall etc. to complete.					
17.1	75 x12 mm GS Flat	m	2,200			
17.2	50 x 6 mm GS Flat	m	700			
17.3	50x6 mm MS earth strip (for trench earthing)	m	800			
17.4	40 mm dia pipie electrode for earting the ICTs and Aux. Transformers	nos	8			
	Note: Note for Earthing: The earthing includes earthing of all 220/132kV switchyard equipment, lattice/pipe structures, fence and Control room equipments using necessary Connectors for earthing flats.					
18	Lattice Sructures	MT	146			
19	Pipe Structures	MT	46			
20	CONTROL ROOM EQUIPMENT					
20.1	220 kV Circuit Breaker Relay Panel					
20.1.1	With Auto Reclose	nos.	6			
20.1.2	Without auto reclose	Set	3			
20.2	Line protection panel	Set	5			
	Evaluation unit for disturbance recorder (220 kV)	nos	1			
20.3	Bus bar protection panel (including future bays)					
	220 kV singlr bus bar protection for SMT scheme	Sets	1			
20.4	Transformer protection panel (for both HV and LV side)	Sets	2			

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20.5	Other Common Equipment pertaining to C&R system					
20.5.1	Time synchronising Equipment	nos.	1			
20.6	PLCC Equipment at Unchahar Substation					
20.6.1	Coupling Device	Sets	4			
20.6.2	Carrier Equipment	nos.	12			
20.3	Protection Coupler	nos.	8			
20.4	EPAX (24/8)	Set	1			
20.5	2 wire telephone sets with connecting cables	nos.	24			
20.6	Testing and maintenance equipment	lots	2			
20.7	H.F. cable	m	3,000			
TOTAL AMOUNT						

Notes for ETC works

1	Loading / Unloading, handling, shifting to & from stores, proper storage, assembly, installation, pre-sommissioning test and Commissioning tests are included in the scope.
2	MS welding - apply red lead paint then aluminium paint then bitumen after welding
3	GS welding - apply 2 coats of cold galvanising anti corrosive paint after welding
4	10% welding joints in earthing shall be tested for dye penetration test.
5	Quoted rates are deemed to be inclusive of miscellaneous works, viz.. Erection of clamps and connectors, phase colour discs etc.