

Bill of Quantities for ETC Works

**Project : 2 x 250MW TPS-II EXPANSION POER PROJECT
400 kV SWITCHYARD & POWER TRANSFORMERS**

Customer : NEYVELI LIGNITE CORPORATION LIMITED, NEYVELI

S.No.	Description	Unit	Qty.			Unit Price (Rs.)	Total Price (Rs.)
			EXP.	EXTN.	TOTAL		
	MAIN EQUIPMENT						
1	400KV, SF6, 3 Ph Circuit Breaker alongwith lattice type GS supporting structure, terminal connectors for 4" Al tube, Breaker Control Cabinets and interpole cabling	nos.	6	4	10		
2	400 kV, Single phase, Pantograph, motor operated isolator complete with support insulator, terminal connectors for 4" Al tube and lattice type GS supporting Structure				-		
2.1	- with one earth switch	nos.	24	12	36		
2.2	- without earth switch	nos.	27	24	51		
3	400 kV, Single phase ,Horizontal Center Break (HCB), motor operated isolator complete with 2 nos. of support insulators & terminal connectors for 4" Al tube and lattice type GS supporting Structure	nos.					
3.1	- with two earth switch	nos.	18	12	30		
3.2	- without earth switch	nos.	3	-	3		
4	360KV, 1 Phase , Gapless Metal Oxide Surge Arrester complete with surge counter, leakage current meter, insulating base, connecting cable, Line terminal connector for twin ACSR Moose conductor and lattice type GS supporting structure	nos.	12	12	24		
5	400KV , CVT, 1 Phase , complete with Line terminal connector for Twin ACSR Moose and GS supporting structure	nos.	14	12	26		
6	400KV, Current Transformer, 1 Phase , 5 core complete with terminal connectors for ACSR Moose and lattice type GS supporting structure.	nos.	21	12	33		
7	400KV, 1 phase pedestal mounted Wave Trap complete with 3 nos support insulators per WT, terminal connectors for ACSR Moose/ 4" Al tube and lattice type GS supporting structure	nos.	-	4	4		
8	400kV Post Insulators for Bus support complete with corona ring, terminal connector and lattice type GS supporting Structure.	nos.	80	60	140		
	Power Transformers						
9	180/240/300MVA, 400/16.5KV, ONAN/ONAF/OFAF, 2 winding, 3 Phase generatorTransformer along with Marshalling Kiosk. Work includes unloading, dragging upto plinth, erection of all auxiliaries, viz turrets, bushings, terminal connectors, laying of all cables from MK to bushing CTs, Transducers. Filling of oil under high degree vacuum as per manufacturer's standard practices. Neutral earthing of transformer shall be carried out.	nos.	2		2		
10	40/20/20MVA, 16.5/6.9/6.9KV, ONAN/ONAF/OFAF, 3 windings, 3 Phase Unit Auxiliary Transformer with OLTC and Marshalling Kiosk. Work includes unloading, dragging upto plinth, erection of all auxiliaries, viz turrets, bushings, terminal connectors, laying of all cables from MK to bushing CTs, Transducers. Filling of oil under high degree vacuum as per manufacturer's standard practices. Neutral earthing of transformer shall be carried out.	nos.	2		2		
11	40/20/20MVA, 16.5/6.9/6.9KV, ONAN/ONAF/OFAF, 3 windings, 3 Phase Station Auxiliary Transformer with OLTC and Marshalling Kiosk. Work includes unloading, dragging upto plinth, erection of all auxiliaries, viz turrets, bushings, terminal connectors, laying of all cables from MK to bushing CTs, Transducers. Filling of oil under high degree vacuum as per manufacturer's standard practices. Neutral earthing of transformer shall be carried out.	nos.	2		2		
12	BUS BAR MATERIALS				-		

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	MAIN EQUIPMENT						
12.1	420 kV Double Tension String insulator, each string comprising 2x25 No. Discs with hardware set with all hardware accessories including tension clamp and Turn Buckle set suitable for QUAD. ACSR MOOSE Conductor.	set	33	27	60		
12.2	420 kV Double Tension String insulator, each string comprising 2x25 No. Discs with hardware set with all hardware accessories including tension clamp but without Turn Buckle set suitable for QUAD. ACSR MOOSE Conductor.	set	6	9	15		
12.3	420 kV Double Tension String insulator, each string comprising 2x25 No. Discs with hardware set with all hardware accessories including tension clamp (To be used along with SAG Compensating Spring) set suitable for QUAD. ACSR MOOSE Conductor.	set	27	18	45		
12.4	420 kV Double Tension String insulator, each string comprising 2x25 No. discs with hardware set with all hardware accessories including tension clamp and Turn Buckle set suitable for TWIN ACSR MOOSE Conductor.	set	18	24	42		
12.5	420 kV Double Tension String insulator, each string comprising 2x25 No. discs with hardware set with all hardware accessories including tension clamp but without Turn Buckle set suitable for TWIN ACSR MOOSE Conductor.	set	24	36	60		
12.6	420 kV Single Suspension String insulator, each string comprising 25 No. discs with hardware set with all hardware accessories including drop type suspension clamp suitable for QUAD ACSR MOOSE Conductor.	set	12	-	12		
12.7	421 kV Single Suspension String insulator, each string comprising 25 No. discs with hardware set with all hardware accessories including through type suspension clamp suitable for QUAD ACSR MOOSE Conductor.	set	-	18	18		
12.8	420 kV Single Suspension String insulator, each string comprising 25 No. discs with hardware set with all hardware accessories including drop type suspension clamp suitable for TWIN ACSR MOOSE Conductor.		18	12	30		
12.9	420 kV Single Suspension String insulator, each string comprising 25 No. discs with hardware set with all hardware accessories including through type suspension clamp suitable for TWIN ACSR MOOSE Conductor.	set	12	24	36		
13	GS Stranded Shield wire, 7/3.66 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	3,500	1,500	5,000		
14	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	12,000	11,000	23,000		
15	4" Al Tube (ETC of Al.Tube includes Aluminium welding and bending to be included. Welding sleeve tube will be supplied by BHEL.)	m	2,200	1,400	3,600		
16	Mounting of Phase color Disc and Danger Plates	nos.	30	30	60		
	YARD WORK INCLUDING CABLING, TRENCH & EARTHING.				-		
17	A. Cabling including laying, dressing and termination of cables - laying can be either on trays, supports, underground, over ground, through wall etc. Glands will be supplied by BHEL and all other erection materials viz. ferrules, copper lugs, cable ties / straps, markers, GI / PVC wall sleeves with rubber / nylon bushes and flexible steel conduits as per sl. no. 18 etc. included in the quoted rates. B. Fire Sealing system shall be fixed for cable trenches etc. as per clause no. 2.14 of "Guidelines of cable laying and termination" Doc. No.TB-269-507-033 Rev. 02. Required material shall be provided by BHEL.						

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	MAIN EQUIPMENT						
17.1	Control cables- Armoured, PVC insulated , Copper conductor. FRLS Type				-		
17.1.1	24C, 2.5 sq.mm	m	3,000	3,000	6,000		
17.1.2	19C, 2.5 sq.mm	m	8,000	8,000	16,000		
17.1.3	14C, 2.5 sq.mm	m	8,000	8,000	16,000		
17.1.4	10C, 2.5 sq.mm	m	15,000	15,000	30,000		
17.1.5	7C, 2.5 sq.mm	m	2,000	2,000	4,000		
17.1.6	5C, 2.5 sq.mm	m	10,000	10,000	20,000		
17.1.7	4C, 2.5 sq.mm	m	2,000	2,000	4,000		
17.1.8	3C, 2.5 sq.mm	m	2,000	2,000	4,000		
17.1.9	2C, 2.5 sq.mm	m	2,000	2,000	4,000		
17.1.10	2C, 4.0 sq.mm	m	400	300	700		
17.1.11	2C, 16 sq.mm	m	300	200	500		
17.1.12	5C, 4.0 sq.mm	m	4,000	4,000	8,000		
17.1.13	5C, 16 sq.mm	m	3,500	3,500	7,000		
17.2	Auxiliary Power cables, Armoured, PVC insulated, Al conductor, FRLS Type				-		
17.2.1	1C x 185 Sq.mm	m	500	500	1,000		
17.2.2	1C x 150 Sq.mm	m	500	500	1,000		
17.2.3	3.5C x 240 Sq.mm	m	1,000	1,000	2,000		
17.2.4	3.5C x 70 Sq.mm	m	3,000	3,000	6,000		
17.2.5	4Cx16 sq.mm	m	2,500	2,500	5,000		
17.2.6	4Cx 6 sq.mm	m	4,000	4,000	8,000		
17.2.7	2C x 6 Sq.mm	m	3,000	3,000	6,000		
18	Flexible steel conduit with fittings manufactured and electro-galvanised as per IS-4649, 3480	m	1,000	500	1,500		
19	Laying and splicing of fibre-optic cable including excavation, backfilling, making and repairing of walls, cutting, threading, fixing of sockets/bends where required etc. complete (Payment will be made for the as erected cable/pipe conduit length)	m	4,000		4,000		
20	Laying of GI conduits along with bends and sockets including excavation, backfilling, making and repairing of walls in trenches, cutting, threading, fixing of sockets/bends where required etc. complete (Payment will be made for the as erected pipe length)	m			-		
20.1	GI pipe, 50 NB	m	350	250	600		
20.2	GI Pipe, 100NB	m	450	350	800		
21	Marshalling Kiosks & CT / CVT Junction Boxes				-		
21.1	Bay Marshalling Kiosks (Outdoor)	nos.	6	4	10		
21.2	63 A , 220 V Outdoor type Welding sockets.	nos.	2	2	4		
21.3	CT JB	nos.	7	5	12		
21.4	CVT JB	nos.	6	4	10		
22	Cable trench material						
22.1	GI trays including bends, tees, crosses with coupler plates & bolting to tray supports etc. to complete						
22.1.1	600 mm Wide ladder tray 2.5 long including coupler.	nos.	2,100	3,670	5,770		
22.1.2	300 mm Wide ladder tray 2.5 long including coupler.	nos.	810	680	1,490		
22.2	Cable trench material (outdoor and indoor cable racks), work includes welding of racks with inserts in trenches and cable vaults, on outdoor wall and alignments etc.	MT	26.0	42.0	68		
23	Earthing material- 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. The Earthing of equipments shall be carried out as per TB-4-269-509-028 : Equipment earthing earthing details and Earthmat layout Drawing and control room earthmat layout drawing as per enclosed annexure A. Test link connection to test pits as per earthing layout drawing shall also be included in ETC scope.						
23.1	75 x 12 mm GS Flat	m	3,500	2,500	6,000		
23.2	50 x 6 mm GS Flat	m	1,950	1,150	3,100		
23.3	25 x 3 mm GS Flat	m	2,300	2,100	4,400		
23.4	40 mm DIA, 3470mm LONG G.I. PIPE ELECTRODES	m	12	-	12		
24	Galvanised steel structures including hardware				-		
24.1	Lattice Structures for Towers and beams	MT	400	300	700		
24.2	Equipment and structure fixing Hardware	MT	30	25	55		
	CONTROL ROOM EQUIPMENT						
25.1	Control & Relay / Protection panels — 400kV						
25.1.1	Bus bar protection panels (1 set = 2 panels)	Set	1	1	2		
25.1.2	Control Panels	nos.	6	4	10		

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	MAIN EQUIPMENT						
25.1.3	Relay Panels	nos.	12	8	20		
25.1.4	Synchronising trolley	nos.	1	1	2		
25.1.5	Energy Meters panel	nos.	6	4	10		
25.2	SCADA System as per SCADA Architecture Diagram, Drg. No. TCE.4347A-EL-SK-2007 Rev P4 enclosed						
25.2.1	PC along with 20" Monitors and Furniture (out of 4 PCs for expansion, 2 nos of PCs along with furniture are to be installed in Plant control room (DCS))	nos.	4	1	5		
25.2.2	Printers (out of 4 Printers for expansion, 2 nos of Printers along with furniture are to be installed in Plant control room (DCS))	nos.	4	-	4		
25.2.3	Scanner	nos.	1	-	1		
25.2.4	SCADA Interface Panels	nos.	6	-	6		
25.2.5	Mimic Control Panels	nos.	6	-	6		
25.3	Event Recorder Panel	no.	-	1	1		
25.4	Disturbance Recorder Panel	no.	-	1	1		
25.5	GPS	no.	-	1	1		
25.6	FOTE Panels	nos.	1	1	2		
25.8	OLTC Panels	nos.	4	-	4		
25.9	PLCC Panels (Optional) (1 set = 4 panels)	set	-	2	2		
25.10'	Transducer Panel (1 set = 2 panels)	set	-	1	1		
26	AUXILIARY SUPPLY - (BATTERY/ CHARGER/ DIST BD)				-		
26.1	220V DC Battery Bank	Set	2	-	2		
26.2	50V DC Battery Bank (optional)	Set	-	2	2		
26.3	220V DC, Float CUM Boost Charger	Set	2	-	2		
26.4	50V DC, Float CUM Boost Charger (optional)	Set	-	2	2		
26.5	50 V DCDB	Set	-	1	1		
26.6	415V main LT Switchgear ACDB	Set	1	1	2		
26.7	220V DCDB	Set	1	1	2		
26.8	Inverter (UPS)	nos.	2	-	2		
26.9	UPS Distribution Panel	Set	1	-	1		
27	30kL capacity oil storage tank with local starter box and pump	Set	2	-	2		
28	Misc Fabrication work including cutting, welding and painting of steel angles to make trench material as per site requirement. (Steel will be supplied by BHEL)	ton	1	1	2		
					-		

Notes for ETC works

- 1 Loading / Unloading, handling, shifting to & from stores, proper storage, assembly, installation, pre-commissioning test and commissioning tests are included in the scope.
- 2 MS welding - As per Equipment earthing details : TB-4-269-509-028 enclosed
- 3 GS welding - As per Equipment earthing details : TB-4-269-509-028 enclosed
- 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.
- 6 modification as required like breaking of concrete flooring, chipping and wall opening etc., while providing build in trenches for extension / expansion switchyard control room building.
- 7 All the drawings and documents as per Annexure- A shall be followed for ETC work.