

Project : 220 kV SUBSTATION SALEMPUR

Customer : HARYANA VIDYUT PRASARAN NIGAM LIMITED

**Bill of Quantities for ETC Works**

S.No.	Description	Unit	Qty.	Rate	Amount
<b>MAIN EQUIPMENT</b>					
1	245kV, 1600 A, SF6, 3 Ph Circuit Breaker along with support structure, Rigid / Expansion type terminal connectors for ACSR Zebra, Breaker Control Cabinets and interpole cabling	nos.	7		
2	245 kV, 1600 A, 3 phase Horizontal Centre break, motor operated (Standard- mechanically ganged) isolator complete with support insulators, Rigid / Expansion type terminal connectors for Al tube / ACSR Zebra, and GS supporting Structure				
2.1	- with one earth switch	nos.	4		
2.2	- without earth switch	nos.	14		
3	198kV, 1 Phase, Gapless Metal Oxide Surge Arrester complete with surge counter, leakage current meter, insulating base, connecting cable, Line terminal connector and GS supporting structure	nos.	18		
4	245kV , CVT/CC, 1 Phase, complete with Line terminal connector, LTU and GS supporting structure	nos.	4		
5	220kV PTs, 1 Phase, complete with Line terminal connector and GS supporting structure	nos.	6		
6	245kV, Current Transformer, 1 Phase, complete with terminal connectors for ACSR Zebra and GS supporting structure.	nos.	21		
7	220 kV Neutral Current Transformer (NCT) (33 kV) complete with GS supporting structure and terminal connector suitable for ACSR Zebra Conductor.	nos.	2		
8	1 mH, 1250/400A, 1 ph Wave Trap complete with support insulators, Rigid / Expansion type terminal connectors for ACSR Zebra and GS supporting structure	nos.	10		
9	245kV Post Insulators for Bus support complete with corona ring, terminal connector and GS supporting Structure.	nos.	14		
10	100MVA, 220/66kV, outdoor Power transformer complete with terminal connectors, all auxiliaries and internal cabling and termination complete including oil filtration, if necessary	nos.	2		
11	12.5/16 MVA, 66/11kV, outdoor Power transformer complete with terminal connectors, all auxiliaries and internal cabling and termination complete including oil filtration, if necessary	nos.	2		
12	200 KVA, 11/.4 kV, outdoor Station transformer complete with terminal connectors, all auxiliaries and internal cabling and termination complete including oil filtration, if necessary	nos.	1		
13	20 MVAR 66kV rating capacitor bank with allied equipment like NCT, series reactor and GS Support Structure	nos.	0		
14	66KV, 1600/2500A, SF6, 3 Ph Circuit Breaker along with support structure, Rigid / Expansion type terminal connectors for Al tube / ACSR Zebra, Breaker Control Cabinets and interpole cabling(if required)	nos.	10		
15	66 kV, 1600/2500A, 3 phase Horizontal Double break, manual operated (tandem/Standard- mechanically ganged) isolator complete with support insulators, Rigid / Expansion type terminal connectors for ACSR Zebra, and GS supporting Structure				
15.1	- with one earth switch	nos.	5		
15.2	- with two earth switches	nos.	0		
15.3	- without earth switch	nos.	20		

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S.No.	Description	Unit	Qty.	Rate	Amount
16	66KV, 1 Phase, Gapless Metal Oxide Surge Arrester complete with surge counter, leakage current meter, insulating base, connecting cable, Line terminal connector and GS supporting structure	nos.	27		
17	66KV , CVT/CC, 1 Phase, complete with Line terminal connector and GS supporting structure	nos.	8		
18	66KV , PT, 1 Phase, complete with Line terminal connector and GS supporting structure	nos.	6		
19	66KV, Current Transformer, 1 Phase, complete with Rigid / Expansion type terminal connectors for ACSR Zebra and GS supporting structure.				
19.1	66 kV CTs for line/ buscoupler bay	nos.	18		
19.2	66 kV CTs for capacitor bank	nos.	0		
19.3	66 kV CT for Transformer I/C	nos.	6		
19.4	66 kV Transformer CT ( 150-75/.0577-1-1)	nos.	6		
19.5	66 kV Transformer CT ( 200-100/.0577-1-1)	nos.	0		
20	66kV Post Insulators for Bus support complete with terminal connector and GS supporting Structure.	nos.	20		
21	66 KV, Neutral Current Transformer (NCT), complete with GS supporting structure and Rigid / Expansion type terminal connectors suitable for ACSR Zebra Conductor.				
21.1	66 kV NCT(150-75/1) ( 11 kV)	nos.	2		
21.2	66 kV NCT(200-100/1) ( 11 kV)	nos.	0		
21.3	66 kV NCT(1000-500/1) ( 11 kV)	nos.	2		
22	11 kV 1 Phase, Gapless Metal Oxide Surge Arrester complete with surge counter, leakage current meter, insulating base, connecting cable, Line terminal connector and GS supporting structure	nos.	6		
23	2x2.268 MVAR 11 kV Capacitor Bank with 2 no. 11kV RVTs and 2 no. 11kV L&E Switch, support structure and Terminal connector and interconnections	Set	2		
24	11 kV NCT with GS Support Structure				
24.1	11 kV NCT (900- 450/5)	nos.	2		
24.2	11 kV NCT (1200- 600/5)	nos.	0		
<b>BUS BAR MATERIALS</b>					
25	Bolted type 220 kV <b>single tension</b> string assembly with 15 numbers FOG type disc insulators (E&M strength 120 kN) per string with all hardware accessories including ball & socket connection and tension clampsets suitable for <b>Single Zebra</b> ACSR conductor	set	42		
26	Bolted type 220 kV single suspension string assembly with 14 numbers FOG type disc insulators (E&M strength 120 kN) per string with all hardware accessories including ball & socket connection and tension clamp set suitable for single Zebra ACSR (string)	set	39		
27	Bolted type 220 kV single tension string assembly with 15 numbers disc insulators (E&M strength 120 kN) per string with all hardware accessories including ball & socket connection and tension clamp sets suitable for twin Zebra (String)	set	36		
28	Bolted type 220 kV single suspension string assembly with 14 numbers disc insulators (E&M strength 120 kN) per string with all hardware accessories including ball & socket connection and tension clampsets suitable for twin Zebra ACSR conductor	set	12		

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S.No.	Description	Unit	Qty.	Rate	Amount
29	Bolted type 66 kV single tension string assembly with 6 numbers disc insulators (E&M strength 90 kN) per string with all hardware accessories including ball & socket connections and tension clamp sets suitable for twin Zebra ACSR (string)	set	78		
30	66 kV Bolted type single tension string assembly with 6 numbers FOG type disc insulators (E&M strength 90 kN) per string with hardware accessories including ball & socket connection and tension clamp set suitable for single Zebra ACSR	set	42		
31	66 kV Bolted type single suspension string assembly with 5 numbers FOG type disc insulators (E&M strength 90 kN) per string with all hardware accessories including ball & socket connections and suspension clamp set suitable for single Zebra ACSR	set	48		
32	66 kV Bolted type single suspension string assembly with 5 numbers FOG type disc insulators (E&M strength 90 kN) per string with all hardware accessories including ball & socket connections and suspension clamp set suitable for twin Zebra ACSR	set	33		
33	11 kV Bolted type single tension string assembly with 3 numbers FOG type disc insulators (E&M strength 90 kN) per string with hardware accessories including ball & socket connection and suspension clamp set suitable for twin Zebra ACSR	set	12		
34	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	1800		
35	ACSR "Zebra" conductor complete with tee connectors for droppers to equipment connections, PG clamps for busbar jumpering, Twin / triple bundle spacers etc to complete.	m	8360		
	<b>YARD WORK INCLUDING CABLING, TRENCH &amp; EARTHING.</b>				
36	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. by contractor.				
36.1	<b>Control cables- PVC insulated , Copper conductor</b>				
36.1.1	4C, 4 sq.mm	m	500		
36.1.2	5C, 4 sq.mm	m	26950		
36.1.3	10C, 4 sq.mm	m	2350		
36.1.4	19C, 2.5 sq.mm	m	6100		
36.1.5	14C, 2.5 sq.mm	m	16000		
36.1.6	10C, 2.5 sq.mm	m	29700		
36.1.7	7C, 2.5 sq.mm	m	500		
36.1.8	5C, 2.5 sq.mm	m	23200		
36.1.9	3C, 2.5 sq.mm	m	500		
36.1.10	2C, 2.5 sq.mm	m	500		
36.1.11	4C, 6 sq.mm	m	500		
36.1.12	HF Cable	m	1600		
36.2	<b>Auxiliary Power cables, XLPE / PVC insulated, Al conductor</b>				
	<b>PVC, armoured, FRLS, Al Cables</b>				
36.2.1	2Cx 6 sq.mm	m			

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S.No.	Description	Unit	Qty.	Rate	Amount
36.2.2	4Cx 4 sq.mm	m			
36.2.3	4Cx 6 sq.mm	m	800		
36.2.4	4Cx 10 sq.mm	m	1525		
36.2.5	3.5C x 25 Sq.mm	m	1750		
36.2.6	3.5C x 70 Sq.mm	m	1025		
36.2.7	3.5C x 185 Sq.mm	m	100		
36.2.8	3.5C x 240 Sq.mm	m	175		
36.2.9	3.5C x 35 Sq.mm	m	100		
36.2.10	3.5C x 95 Sq.mm	m	100		
36.2.11	1C x 70 Sq.mm	m	100		
	<b>PVC, armoured, FRLS, Cu Cables</b>				
36.2.12	1 C x 25 Sq.mm Cu	m	100		
36.2.13	1 C x 35 Sq.mm Cu	m	100		
36.2.14	2Cx2.5 Sq.mm Cu	m	500		
36.2.15	2Cx10 Sq.mm Cu	m	300		
36.2.16	2Cx50 Sq.mm Cu	m	100		
36.2.17	4C x 16 Sq.mm Cu	m	800		
36.2.18	2C x 25 Sq.mm Cu	m	150		
36.2.19	1Cx16 sq.mm Cu	m	100		
	<b>11kV XLPE, Al Cables</b>				
36.2.20	1Cx630 sq.mm , XLPE	m	2350		
36.2.21	3 C x 185 sq.mm , XLPE	m	75		
36.2.22	3 C x 50sq.mm , XLPE	m	75		
36.2.23	3 C x 300sq.mm , XLPE	m	100		
36.2.24	3.5 C, 300 sq.mm, XLPE	m	100		
37	Laying of GI conduits 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)				
37.1	GI pipe, 50 NB	m	250		
37.2	GI Pipe, 100NB	m	300		
38	Marshalling Kiosks cum CT / CVT Junction Boxes	nos.	17		

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S.No.	Description	Unit	Qty.	Rate	Amount
39	Cable trench material				
39.1	Fabrication of Cable Tray supports with 40x40x5 MS Angle by cutting and welding in 200 to 900 mm of cutlengths in trench, including two coats of red oxide primer and two coats of enamel paint.	MT	7.5		
39.2	GI trays including bends, tees, crosses with coupler plates & bolting to tray supports etc.				
39.2.1	750 mm Wide 2.5 m long, ladder tray	no.	15		
39.2.2	650 mm Wide 2.5 m long, ladder tray	no.	46		
39.2.3	300 mm Wide 2.5 m long, ladder tray	no.	14		
39.2.4	250 mm Wide 2.5 m long, ladder tray	no.	100		
39.2.5	200 mm Wide 2.5 m long ladder tray	no.	272		
39.2.6	Mounting of 100mm wide, 25mm high, galvanised MS sheet <b>perforated type cable trays</b> each 1.5 m long along with Equipment structure from Ground to Operating Mechanism Box.	no.	94		
40	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.				
40.1	75 x 12 mm GS Flat	m	6700		
40.2	50 x 6 mm GS Flat	m	600		
40.3	50 x 6 mm MS Flat (Painted)	m	1700		
40.4	Galvanised steel structures including hardware Lattice Structures for Towers and beams	MT	194.6		
41	<b>CONTROL ROOM EQUIPMENT</b>				
41.1	220 kV Transformer C&R Panel	Set	2		
41.2	220 kV Line C&R Panel	Set	4		
41.3	220 kV SYNCHORINISING Panel	No.	1		
41.4	220 kV Bus coupler C&R Panel	No.	1		
41.5	66 Kv Transformer I/C C&R PANEL	No.	2		
41.6	66 Kv Transformer C&R PANEL	No.	2		
41.7	66 kV LINE C&R Panel	No.	5		
41.8	66 kV Capacitor Panel	No.	0		
41.9	66 kV Bus coupler .C&R Panel	No.	1		
41.10	PLC Terminal including Protection coupler	No.	5		
41.11	EPAX (8x24) including wiring for Telephones (10 Nos 2 wire and 5 nos. 4 wire) and supply of wiring.	No.	1		
41.12	11 kV 14 Panel Board	No.	2		

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S.No.	Description	Unit	Qty.	Rate	Amount
42	<b>AUXILIARY SUPPLY - (BATTERY/CHARGER/DIST BD)</b>				
42.1	220V, 200AH, Lead Acid, Tubular type, High discharge Battery Bank	Set	1		
42.2	220V, 100AH, Lead Acid, Tubular type, High discharge Battery Bank	Set	0		
42.3	220V, 10 A / 20 A Float and Boost Charger for 200AH Battery Bank	Set	1		
42.4	220V, 5 A / 10 A Float and Boost Charger for 100AH Battery	Set	0		
42.5	48V, 120AH, Lead Acid, Tubular type, High discharge Battery Bank	Set	0		
42.6	48V, 300AH, Lead Acid, Tubular type, High discharge Battery Bank	Set	1		
42.7	48V Battery Charger for 120AH Battery	Set	0		
42.8	48V Battery Charger for 300AH Battery	Set	1		
42.9	220 V DCDB ( 1 set = 1panel)	Set	1		
42.10	415V ACDB (1 set = 1panel)	Set	1		
42.11	415V Main Lighting Distribution Board (1 set = 1 panel)	Set	1		
42.12	415V Emergency Lighting Distribution Board (1 set = 1panel)	Set	1		
43	<b>SPARES Including following Items</b>	Lot	1		
43.1	220kV Line CT	No.	1		
43.2	220kV Line CVT	No.	1		
43.3	220kV PT	No.	1		
43.4	220kV Transformer CT	No.	1		
43.5	220kV NCT	No.	1		
43.6	66kV Transformer Incomer CT	No.	1		
43.7	66kV CVT	No.	1		
43.8	66kV Line CT	No.	1		
43.9	66kV Transformer CT	No.	1		
43.10	66kV NCT	No.	1		
43.11	11 kV NCT				
<b>TOTAL AMOUNT :</b>					

**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 - 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.
6	ETC works shall be done as per <b>HVPNL Specification</b> .
7	Scope for spare items shall include Loading/ Unloading, shifting to and from stores, proper storage.