

ANNEXURE-A
ESSENTIAL SPARES FOR ELECTRICAL SYSTEM

S.No.	PARTICULARS	UNITS	Quantity
1	Relay Panels (For Switchyard protection system)		
1.1	Numerical breaker fail protection relay type P122 of Areva India make or equivalent	No.	1
1.2	Numerical stub protection relay type P122 of Areva India make or equivalent	No.	1
1.3	Numerical Transformer Differential Protection Relay, with built in overfluxing, type Micom P633 of Areva India make or equivalent, for 87/99ST	No.	1
1.4	Numerical O/C, E/F / REF protection relay type P122 of Areva India make or equivalent for 50/51/51N/64R	No.	1
1.5	Numerical Transformer overall Differential Protection Relay, with built in backup earthfault&overfluxing, type Micom P633 of Areva India make or equivalent, for 87/51N/99ICT	No.	1
1.6	Numerical O/C & REF protection relay type P122 of Areva India make or equivalent for 50/51/64ICT	No.	1
1.7	Trip Relay		
1.7.1	High Speed Tripping Relay with H/R contacts, type VAJHM53 of Areva India make or equivalent.	No.	3
1.8	Auxiliary relays		
1.8.1	Fuse failure relay type VAPM31 of Areva India make or equivalent for Metering VT.	No.	4
1.8.2	Trip Relay Coil Supervision Relay, electromechanical type VAX21 of Areva India make or equivalent.	No.	4
1.8.3	Circuit Breaker Trip Coil Supervision Relay, electromechanical type VAX31 of Areva India make or equivalent.	No.	4
1.8.4	Auxiliary Relay, electromechanical type VAA21 of Areva India make or equivalent.	No.	4
1.8.5	DC supply supervision relay, type VAA11 of Areva India make or equivalent.	No.	4
1.8.6	Bistable relays type VAJC11 of Areva India make or equivalent	No.	4
1.8.7	Set of fuse cartridges	No.	1
1.9	Test block/test plug		
1.9.1	Test Block for type MPG of Areva India make or equivalent.	No.	2
1.9.2	Test Plug, type MPB of Areva India make or equivalent.	No.	2
2	Generator Control Desk cum Panel & Switch yard control & metering panels		
2.1	Digital Meters		
2.1.1	Ammeter, moving coil type, accuracy class 1, 96 mm sq flush , MECO, AEL, Rishabh, Ubah make or equivalent.	No.	4
2.1.2	MW Meter, moving coil type, accuracy class 1, 96 mm sq flush , MECO, AEL, Rishabh, Ubah make or equivalent.	No.	4
2.1.3	MVAR Meter, moving coil type, accuracy class 1, 96 mm sq flush , MECO, AEL, Rishabh, Ubah make or equivalent.	No.	4
2.1.4	MVA Meter, moving coil type, accuracy class 1, 96 mm sq flush , MECO, AEL, Rishabh, Ubah make or equivalent.	No.	2
2.1.5	Voltmeter, moving coil type, accuracy class 1, 96 mm sq flush , MECO, AEL, Rishabh, Ubah make or equivalent.	No.	3
2.1.6	PF Meter, moving coil type, accuracy class 1, 96 mm sq flush , MECO, AEL, Rishabh, Ubah make or equivalent.	No.	1
2.1.7	Digital Frequency meter 96 mm square, PT operated, accuracy class 1.0.	No.	1
2.1.8	Volt Meter Moving coil type 96 mm square, accuracy class 1.	No.	1
2.1.9	Frequency meter 96 mm square, PT operated, accuracy class 1.5.	No.	1
2.1.10	Synchroscope suitable for 110V 50Hz supply, complete with 63.5V/110V 50Hz two winding auxiliary volage transformer.	No.	1
2.2	Discrepancy switches of each type		
2.2.1	Breaker control switch discrepancy type ABB/Control Dynamics make or equivalent	No.	2
2.2.2	Isolator control switch discrepancy type ABB/Control Dynamics make or equivalent	No.	2
2.3	Status indicating lamps of each type		

2.3.1	LED type Red/Green Indicating Lamps	No.	4
2.3.2	LED type Indicating Lamps	No.	4
2.3.3	Indicating Lamp for SYNCHROSCPE IN / OUT indication.	No.	2
2.3.4	Indicating lamp for bright at synchronism.	No.	2
2.3.5	Indicating lamp for Check Synchroniser Operated.	No.	2
2.4	Semaphore indicators(Each size)		
2.4.1	Semaphore indicator for earth switch type VAM12 of Areva India make or equivalent.	No.	2
2.5	Synchronising switch/Socket		
2.5.1	Synchronising socket.	No.	2
2.5.2	Synchronising Switch, Stayput type, KAYCEE / RECOM / SETON make or equivalent.	No.	2
2.6	Synchroscope		
2.6.1	Synchroscope suitable for 110V 50Hz supply, complete with 63.5V/110V 50Hz two winding auxiliary volage transformer.	No.	1
2.7	Guard relay, Check synchronising relay		
2.7.1	Check Synchronising Relay, type SKD11 of Areva India make or equivalent.	No.	1
2.7.2	Auxiliary / Guard relay, type VAA11 of Areva India make or equivalent.	No.	2
2.8	Transducers		
2.8.1	Current transducer accuracy class 0.5.	No.	4
2.8.2	MW transducer accuracy class 0.5.	No.	4
2.8.3	MVAR transducer accuracy class 0.5.	No.	4
2.8.4	MVA transducer accuracy class 0.5.	No.	2
2.8.5	voltage transducer accuracy class 0.5.	No.	3
2.8.6	PF transducer accuracy class 0.5.	No.	1
2.8.7	Frequency transducer accuracy class 0.5.	No.	1
3	Switch yard SCADA Panels:		
3.1	Micro- processor module	No.	1
3.2	Digital input module	No.	2
3.3	Digital output module	No.	2
3.4	Interposing relays/contactors	No. (of each type)	5
3.5	Power supply modules of each type	No.	1
3.6	Network switch/hub	No. (of each type)	1
4	Indication Panels		
4.1	Fuses	No. (of each rating)	5
4.2	Indicating lamps	No.	10
4.3	Energy meter for Generator	No.	1
4.4	Energy meter for Switchyard	No. (of each type)	1
5	400kV & 245 kV Isolators		
5.1	400KV Isolators		
5.1.1	Complete set of Gaskets	Set (each type)	1
5.1.2	Insulator column	No. (of each type)	1
5.1.3	Drive motor <u>with gear box</u> assembly	No (each type)	1
5.1.4	Motor contactor of each type/rating	No. (each type & rating)	1
5.1.5	Fuses of each rating	No.	5
5.1.6	Relays, contactors, switches, timer Fuses, limit switches, PBs etc., for electrical control circuit	sets	2
5.1.7	Moving & fixed contacts (Main & Earth)	set (each type)	1
5.1.8	Arcing Contact	set (each type)	1
5.2	220KV Isolators		
5.2.1	Complete set of Gaskets	Set (each type)	1
5.2.2	Insulator column	No. (of each type)	1
5.2.3	Drive motor <u>with gear box</u> assembly	No (each type)	1
5.2.4	Motor contactor of each type/rating	No. (each type & rating)	1
5.2.5	Fuses of each rating	No.	5
5.2.6	Relays, contactors, switches, timer Fuses, limit switches, PBs etc., for electrical control circuit	sets	2
5.2.7	Moving & fixed contacts (Main & Earth)	set (each type)	1

5.2.8	Arcing Contact	set (each type)	1
6	400kV & 245 kV Circuit Breaker		
6.1	400KV Circuit Breaker		
6.1.1	Relays, contactors, MCB's, Timer, switches, Push buttons, indicating lamps, fuses etc., for electrical control circuit	sets	2
6.1.2	SF6 density monitor	No.	1
6.1.3	Aux. switch block	No.	2
6.1.4	Position indicator	No.	2
6.1.5	Pressure switch for compressed air (If applicable)	No.	1
6.1.6	Operating Mechanism block complete	No.	1
6.1.7	Main contacts	sets	1
6.1.8	Arcing contacts	sets	1
6.1.9	Trip coils and closing coils	sets (each type)	4
6.1.10	Set of gaskets	sets	1
6.1.11	SF6 gas evacuation & filling unit	No.	1
6.1.12	Gas cylinder with Gas (20 Kg)	No.	1
6.1.13	Travel transducers (to be used for OWNERS Circuit breaker analyser Kit)	No.	4
6.1.14	Spare pole with PIR comprising of Interrupters, support insulators, operating Mechanism block etc Complete	No.	1
6.1.15	Spare pole without PIR comprising of Interrupters, support insulators, operating Mechanism block etc Complete	No.	1
6.1.16	Gas Leakage Detector	No.	1
6.2	220KV Circuit Breaker		
6.2.1	Relays, contactors, MCB's, Timer, switches, Push buttons, indicating lamps, fuses etc., for electrical control circuit	sets	2
6.2.2	SF6 density monitor	No.	1
6.2.3	Aux. switch block	No.	2
6.2.4	Position indicator	No.	2
6.2.5	Pressure switch for compressed air (If applicable)	No.	1
6.2.6	Operating Mechanism block complete	No.	1
6.2.7	Main contacts	sets	1
6.2.8	Arcing contacts	sets	1
6.2.9	Trip coils and closing coils	sets (each type)	4
6.2.10	Set of gaskets	sets	1
6.2.11	SF6 gas evacuation & filling unit	No.	1
6.2.12	Gas cylinder with Gas (20% gas)	No.	1
6.2.13	Travel transducers (to be used for OWNERS Circuit breaker analyser Kit)	No.	4
6.2.14	Spare pole comprising of Interrupters, support insulators, operating Mechanism block etc Complete	No.	1
6.2.15	Gas Leakage Detector	No.	1
7	400kV & 245 kV CTs, and CVTs		
7.1	400KV Current Transformer		
7.1.1	Complete set of gaskets Bushings,	Set (each type)	3
7.1.2	Oil level gauge	1 No.	1
7.1.3	CT (6 Core - 400 KV)	No.	2
7.1.4	CT (5 Core - 400 KV)	No.	2
7.2	220KV Current Transformer		
7.2.1	CT (5 core - 220 KV)	No.	1
7.3	400KV CVT		
7.3.1	Complete CVT	Nos	2
7.4	220KV CVT		
7.4.1	Complete CVT	Nos	1
8	400kV & 245kV Lightning Arrestor		
8.1	360KV Lightning Arrestor		
8.1.1	Lightning Arrestors	No.	1
8.1.2	Surge Monitor	No.	2
8.2	198KV Lightning Arrestor		
8.2.1	Lightning Arrestors	No.	1
8.2.2	Surge Monitor	No.	2

9	Clamps & Connectors:	Nos. (each type)	2
10.1	400kV Bus Post insulator	sets	2
10.2	220kV Bus Post insulator	sets	2
11	Stringing Hard ware		
11.1	String/suspension insulators	Lot (10% of total quantity used)	1
11.2	Spacers	Lot (10% of total quantity used)	1
11.3	Telescopic ladder 12 mtrs height	No.	1
12	315MVA, 400/220kV Interconnecting transformer		
12.1	Complete set of gaskets (each size)	set	1
12.2	Bushing	of each type	1
12.3	CTs of each type	No.	1
12.4	Cooler fan & fan motor	No.	1
12.5	Oil Pump and pump motor	set	1
12.6	Bushing clamps one no of each type	set	1
12.7	Pressure relief device	No.	1
12.8	Limit switch for OLTC	set of each type	1
12.9	Buchholz relay	No.	1
12.10	Buchholz relay for OLTC chamber	No.	1
12.11	Valves of each type and size	No.	1
12.12	Silica gel breather of each type	No.	1
12.13	Oil level gauge	No.	1
12.14	Winding temp. indicating equipment.	complete set.	1
12.15	Dial type thermometer with remote repeater	No.	1
12.16	Relays, contactors, MCB's, switches, Indicating lamps , fuses etc., for Cooler control cabinet & OLTC	set	1
13	415V Switchgear		
13.1	Complete pole of breaker	Nos. (of each rating)	2
13.2	Breaker complete with operating mechanism and truck mounted	Nos. (of each rating)	2
13.3	Closing & tripping coils	Nos. (of each rating)	5
13.4	Fixed and moving contact assemblies of each breaker	sets	2
13.5	Spring charging motors	Nos.	4
13.6	Set of gasket	sets	5
13.7	Bus bar support insulators	Nos.	10
13.8	Aux. switch assembly, limit position switches, Local/ Remote selector switch, breaker control switches AC switch, DC switch & other switches	Nos.	5
13.9	Relays of each type used	3 Nos.	3
13.10	Clustered type LED	Nos. (of each colour)	10
13.11	CTs. of each ratio & type	Nos.	2
13.12	VTs. of each ratio & type	Nos.	2
13.13	Meters. of each type & rating.	Nos.	1
13.14	Fuses(Power & Control)	Nos.(of each rating & type)	25
13.15	Transducers of each type & rating	Nos.	2
13.16	Power / aux contactors	Nos. (of each type & rating)	5
13.17	Trolley to handle modules (Stand with adjustable jacks, castor wheel, etc)	No.(for each MCC)	1
13.18	Industrial type Heavy duty Vacuum cleaner	Nos.	2
14	DC System		
14.1	Battery		
14.1.1	,/	set	1
14.1.2	Insulators	set	1
14.1.3	Connectors with Nuts & Bolts	set	1
14.1.4	Vent Plugs	set	1
14.1.5	P.V.C. Spill Trays	set	1
14.1.6	Terminal Post	set	1
14.2	Battery Chargers		

14.2.1	Silicon Diodes	set	1
14.2.2	Control Switch	set	1
14.2.3	Current Regulator	set	1
14.2.4	Off-Load Tap Changing Device	set	1
14.2.5	Fuse of each type	Nos. (of each rating)	2
14.2.6	D.C. Ammeter	set	1
14.2.7	Miniature circuit Breaker	set	1
14.2.8	LED Lamps	set	10
14.2.9	Thyristors	Nos. (of each Type)	1
14.2.10	Semi conductor fuses of each rating	set	1
14.2.11	Control cards(PCB with components)	Nos. (of each Type)	1
14.2.12	Voltage regulator	No.	1