

ANNEXURE-1
MANDATORY SPARES FOR 765kV/400kV RAICHUR S/S

Sl. No.	Item Description	Unit	Qty.
1	800 KVA 33/.433 kV LT Transformer	LS	1
2	Circuit Breaker (3-phase) with support structure		
a.	3150A,50kA,420kV Circuit breaker	LS	1
3	Isolator (Three phase)		
a.	3150A , 40 kA, 765 kV (Double break type/Vertical Knee type) Isolators	LS	1
b.	3150A , 50 kA, 420 kV (Double break type) Isolators	LS	1
c.	630A, 25 KA, 36 kV (HDB) Isolators	LS	1
4	Isolator (Single phase)		
a.	3150A, 40 kA, 765kV (Double break type/Vertical Knee type)Isolators	LS	1
b.	3150A, 50 kA, 420kV (Double break type)Isolators	LS	1
5	Current Transformer (1 Ph.)		
a.	3000A, 40kA, 765kV 6 core CT with 120% extended current rating	LS	1
b.	3000A, 50kA, 400kV 5 core CT with 120% extended current rating	LS	1
6	Capacitive Voltage Transformer (1 Ph.)	LS	
a.	765 kV,8800 pF	LS	1
b.	420 kV,4400 pF	LS	1
7	Surge Arrestor(1 Ph.)	LS	
a.	624 kV	LS	1
b.	336 kV	LS	1
c.	30 kV	LS	1
8	Relay & Protection Panels (With Automation) (As per Annexure-2)	LS	1
9	PLCC equipment (As per Annexure-2)	LS	1
10	LT switchgear	LS	1
11	Batteries	LS	1
12	Battery Charger	LS	1
13	Substation Automation system (As per annexure-2)	LS	1
14	Erection hardware items (Excluding BPI)	LS	1
15	Bus Post Insulator		
a.	765kV BPI	Nos	4
b.	400 kV BPI	Nos	2
	NOTE: LS is quantified in Annexure-I		

Annexure-2

	Mandatory spares for SAS		
1	Mandatory Spares for Line Protection Panel : Main-1 Protection Relay with cable for front panel communication to PC	Nos.	2
2	Mandatory Spares for Line Protection Panel : Main-2 Protection Relay with cable for front panel communication to PC	Nos.	2
3	Mandatory Spares for Line Protection Panel : Disturbance recorder acquisition units with software for 765kV & 400kV (if stand alone)	Nos.	2
4	Mandatory Spares for Line Protection Panel : DR evaluation Unit with software and Colour Laser A4 Printer	LS	1
5	Mandatory Spares for Transformer Protection Panel : Transformer differential protection relay with cable for front panel communication to PC	No.	1
6	Mandatory Spares for Transformer Protection Panel : Restricted earth fault protection relay with non linear resister(if applicable) and cable for front panel communication to PC	No.	1
7	Mandatory Spares for Transformer Protection Panel : Back up protection relay with 3 O/C and E/F element and cable for front panel communication to PC	No.	1
8	Mandatory Spares for Transformer Protection Panel : CVT selection relay (if applicable)	No.	1
9	Mandatory Spares for Reactor Protection Panel : Reactor differential protection relay with cable for front panel communication to PC	No.	1
10	Mandatory Spares for Reactor Protection Panel : Reactor Back up impedance relay with cable for front panel communication to PC	No.	1
11	Mandatory Spares for Reactor Protection Panel Equipment : Restricted earth fault protection relay with non-linear resistor (If applicable) and cable for front panel communication to PC	No.	1
12	Mandatory Spares for Breaker Relay Panel : Breaker failure relay	Nos.	2
13	Mandatory Spares for Breaker Relay Panel : Trip circuit supervision relay	Nos.	2
14	Mandatory Spares for Breaker Relay Panel : Auto-Reclose relay with check synchronizing relay and dead line charging relay (if stand alone)	Nos.	2
15	Mandatory Spares for Breaker Relay Panel : Self reset trip relay (if applicable) of each type and contact configuration.	Nos.	2
16	Mandatory Spares for Breaker Relay Panel : Hand reset trip relay (if applicable) of each type and contact configuration.	Nos.	2
17	Mandatory Spares for Breaker Relay Panel : Timer relay (if applicable) of each type and contact configuration.	Nos.	2
18	Mandatory Spares for Breaker Relay Panel : DC supervision relays (if applicable) of each type and contact configuration.	Nos.	2

19	Mandatory Spares for Breaker Relay Panel : Auxiliary relays of each type and contact configuration.	Nos.	2
20	Mandatory Spares for Breaker Relay Panel : Flag relay of each type and contact configuration.	Nos.	2
21	Mandatory Spares for Bubar Protection Panel : Power supply module (for central unit Bus Bar protection.	No.	1
22	Mandatory Spares for Bubar Protection Panel :Bay unit for Bus Bar Protection	No.	2
23	Mandatory Spares for Bubar Protection Panel :Central unit for Bus bar protection	No.	1
24	Mandatory Spares for SAS : Bay Control IED of each type	LS	2
25	Mandatory Spares for SAS : Ethernet switch of each type	LS	2
26	Mandatory Spares for SAS : Longest Optical Cable with end Equipment	LS	2
	Mandatory spares for PLCC		
1	Mandatory Spares - Set of prints for carrier terminal of each type - Raichur	Set	2
2	Mandatory Spares - Set of prints for protection coupler - Raichur	Set	2
3	Mandatory Spares - Set of prints for EPAX(24/8) - Raichur	Set	1
4	Mandatory Spares - Telephone (4 wires) with necessary connecting cable - Raichur	Set	3
5	Mandatory Spares - Co-axial connector - Raichur	Set	10
6	Mandatory Spares - Straight through joint - Raichur	Set	2
7	Mandatory Spares - Co-axial cable - Raichur	meter	500
8	Mandatory Spares - PLCC tool kit - Raichur	Set	1
9	Mandatory Spares - Coupling device (ph to ph) without base plate - Raichur	Set	2
10	Mandatory Spares - PLCC Cubicle Fan - Raichur	Nos.	2
11	Mandatory Spares - Dummy load - Raichur	No.	1
12	Mandatory Spares - Set of prints for protection coupler - Gooty	Set	2
13	Mandatory Spares - Set of prints for carrier terminal of each type - Gooty	Set	2
14	Mandatory Spares - Telephone (4 wires) with necessary connecting cable - Gooty	Set	3
15	Mandatory Spares - Co-axial connector - Gooty	Set	10
16	Mandatory Spares - Straight through joint - Gooty	Set	2
17	Mandatory Spares - PLCC tool kit - Gooty	Set	1
18	Mandatory Spares - PLCC Cubicle Fan - Gooty	Nos.	2
19	Mandatory Spares - Dummy load - Gooty	Nos.	1

Note: Mandatory spares shall be unloaded and handed over to customer at different sites as mentioned above.

Mandatory Spares

S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
A.	420 kV SF6 Circuit Breaker (Breakup of 1 set)			
1.	Complete Pole of circuit breaker , grading capacitor, pole column, interrupter, operating mechanism and Marshaling Box but without support structure (without closing resistor)	No.	1 Pole (3150A, 50KA, 1 sec rated)	
2.	Rubber gaskets, 'O' rings and seals	Set	1	
3.	Trip coils with resistor	No.	3	
4.	Closing coils with resistor	No.	3	
5.	Terminal Pads and connectors	No.	2	
6.	Molecular filter	No.	2	
7.	Density / pressure monitoring systems (if applicable)	No.	1	
8.	Corona rings	No.	1	
9.	Relays, Power contactors, switch fuse units, limit switches, push buttons, timers & MCB etc.	Set	1	
10.	Pressure switches	Set	1	
11.	Pressure Gauge and coupling	Set	1	
12.	SF6 Gas	Lot	50 % as spare with main order	
13.	Auxiliary switch assembly	Set	1	
14.	Operation Counter	No.	1	
15.	Magnetic ventile for ABB make CBs if supplied CB is of ABB make only	No.	3	
16.	Actuator rings for ABB make CBs if supplied CB is of ABB make only	No.	6	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
17.	Control valves for ABB make CBs if supplied CB is of ABB make only	No.	1	
18.	Fixed, moving and arcing contact assemblies including Insulating Nozzles etc.	Set	1	
A.1	Hydraulic Operating Mechanism (Not Applicable)			
1.	Hydraulic operating mechanism with drive motor	Set	1	
2.	Ferrules and joints	Set	1	
3.	Hydraulic filter	Set	3	
4.	High pressure hose	Set	1	
5.	N2 Accumulator	No.	1	
6.	Pressure transducer	No.	1	
7.	Valves	Set	1	
8.	O' rings, gaskets and seals	Set	1	
9.	Pipe length (copper & steel)	Set	1	
10.	Pressure switches	Set	1	
11.	Pressure gauges	Set	1	
12.	Hydraulic oil	Lot	50% of total oil quantity	
A.2	Spring Operated Mechanism (Not Applicable)			
1.	Closing Dashpot	Set	1	
2.	Opening Dashpot	Set	1	
3.	Opening Catch gear	Set	1	
4.	Closing Catch gear	Set	1	
5.	Complete Spring Operating Mechanism	Set	1	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
A.3	Pneumatic Operated Mechanism			
1.	Complete compressor assembly along with motor, accessories & coupling along with regenerating unit (wherever applicable)	Set	1	
2.	Micro -filter	No.	1	
3.	Coupling for compressor air	Set	1	
4.	Valves & reducers (including safety valve)	Set	1	
5.	Gaskets 'O' rings and seals	Set	1	
6.	Pressure switches	Set	1	
7.	Pressure gauges	Set	1	
8.	Operating Drive	Set	1	
9.	Dowty Seal	Set	2	
B.	765 KV DOUBLE BREAK ISOLATORS (Breakup of 1 set)			
1. a)	Complete pole of 3 phase , 3150A, 40kA Isolator with 2 E/S including support insulator & motor operating mechanism for Isolator & earth switch.	No.	1	
1. b)	Complete pole of 1phase, 3150A, 40kA Isolator with 1 E/S including support insulator & motor operating mechanism for Isolator & earth switch	No.	1	
2.	Copper contact fingers for male & female contacts	Set	2	
3.	Open / Close contactor assembly, timers, key interlock push button switch & auxiliary switches	Set	1	
4.	Limit switch	Set	2	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
5.	Motor housing bearing assembly	No.	1	
6.	Terminal Pads and connectors	No.	6	
7.	Motor with gear assembly and bevel gear assembly	No.	1	
8.	Corona shield rings	No.	3	
9.	Hinge pins	No.	3	
10.	Bearings	Set	1	
11.	Current Transfer assembly	No.	3	
12.	Interlocking coil with resistor	No.	5	
13.	Fuses of each rating	No.	5	
C. 420 KV Double Break Type Isolator (Breakup of 1 set)				
1. a)	One complete pole of 3-phase, 3150 A, 50 kA, Isolator with 2 E/S including support insulator, support structure stool (2 nos.) & motor operating mechanism for Isolator & earth switch	No.	1	
1. b)	Complete pole of 1-phase, 3150A, 50kA Isolator with 1 E/S including support insulator, support structure stool (2 nos.) & motor operating mechanism for Isolator & earth switch	No	1	
2.	Copper contact fingers for male & female contacts	Set	2	
3.	Open / Close contactor assembly, timers, key interlock push button switch & auxilia switches	Set	1	
4.	Limit switch	Set	2	
5.	Motor housing bearing assembly	No.	1	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
6.	Terminal Pads and connectors	No.	6	
7.	Motor with gear assembly and bevel gear assembly	No.	1	
8.	Corona shield rings	No.	3	
9.	Hinge pins	No.	3	
10.	Bearings	set	1	
11.	Current Transfer assembly	No.	3	
12.	Interlocking coil with resistor	No.	5	
13.	Fuses of each rating	No.	5	
D.I	765 KV CURRENT TRANSFORMER (Breakup of 1 set)			
1.	3000 A, 40kA CT with 120% extended current rating, Complete CT and 1 no. terminal connectors of Each type and rating.	No.	2	
D.II	420 KV CURRENT TRANSFORMER (Breakup of 1 set)			
1.	3000 A, 50kA CT with 120% extended current rating, Complete CT with support structure stool and 1 no. terminal connectors of Each type and rating.	No.	2	
E.I	765 KV CAPACITIVE VOLTAGE TRANSFORMER (Breakup of 1 set)			
1.	Complete pole of CVT of each rating with 1 no. terminal connectors of Each type	No.	3	
E.II	400 KV CAPACITIVE VOLTAGE TRANSFORMER (Breakup of 1 set)			
1.	Complete pole of CVT of each rating with support structure stool and 1 no. terminal connectors of Each type	No.	2	
F	624 kV SURGE ARRESTOR (Breakup of 1 set)			
1.	Complete surge arrester with insulating	No.	2	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
	base and 1 no. terminal connectors of Each type.			
2.	Surge counter/monitor	No.	5	
G.I	336 kV SURGE ARRESTOR (Breakup of 1 set)			
1.	Complete surge arrester with insulating base, support structure stool and 1 no. terminal connectors of Each type.	No.	2	
2.	Surge counter/monitor	No.	5	
G.II	30 kV SURGE ARRESTOR (Breakup of 1 set)			
1.	Complete surge arrester with insulating base, support structure stool and 1 no. terminal connectors of Each type.	No.	1	
2.	Surge counter/monitor	No.	1	
H	FIRE PROTECTION SYSTEM (Breakup of 1 set): Not Applicable			
H.1	GENERAL			
1.	Quartzoid bulb detectors	No.	10 % of population	
2.	Projectors (Merxles)	No.	10 % of population	
3.	Smoke detectors	No.	10 % of population	
4.	Heat detectors	No.	10 % of population	
5.	Deluge valve	Set	1	
6.	Isolation valves (each size each type)	Set	1	
7.	Electrical control panel - Annunciation printed circuits Boards (For solid state annunciation) in the control panel	Set	1	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
8.	Pressure gauge	No.	1	
9.	Level switch	No.	1	
10.	Safety valve for hydro pneumatic system	No.	1	
11.	Pressure Switch	No.	1	
12.	Bronze Pipe fitted with nozzle & guide coupling	No.	1	
13.	Hydrant Valve	No.	1	
H.2	HVW Spray Pumps			
1.	Shaft sleeves	Set	1	
H.3	Diesel Engine Drive			
1.	Self Starter	No.	1	
H.4	Hydrant pumps & jockey pumps			
1.	Shaft sleeve	Set	1	
I	220V & 48V Batteries (Breakup of 1 set)			
1.	Spare battery cell (along with milky boost charger) without electrolyte	No.	5	
2.	Terminal connectors with Bolts & Nuts	No.	10 Nos. (each type)	
3.	Float level indicators	No.	10 Nos. (each type)	
4.	Vent Plugs	No.	10 Nos. (each type)	
J	220V & 48V Battery Chargers (Breakup of 1 set)			
1.	Set of Control Cards	Set	1	
2.	Set of relays	Set	1	
3.	Set of contactor	Set	1	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
4.	Micro switches	Set	1	
5.	Filter Capacitors	Set	1	
6.	Thyristor/ Diode	Set	1	
7.	Set of switches	Set	1	
8.	Set of wound resistors	Set	1	
9.	Potentiometers	No.	1	
10.	Fuses of Thyristor with indicators	Set	6	
K	DG SETS (Breakup of 1 set): Not Applicable			
1.	Set of filters (Lube oil/ fuel/ Air ckt)	Set	1	
2.	Solenoid coil assembly	No.	1	
3.	Self starter assembly	No.	1	
4.	Lub. oil pressure safety control	No.	1	
5.	High water temperature safety control	No.	1	
6.	AVR (Auto Voltage Regulator)/ AVR card for each type of DG set	Set	1	
L	Relay & Protection Panel Spares (Breakup of 1 set)- Qty. already listed in Annexure-2			
L.1	Line Protection Panel Equipment			
1.	Main-1 Protection Relay with cable for front panel communication to PC	No.	2	
2.	Main-2 Protection Relay with cable for front panel communication to PC	No.	2	
3.	Disturbance recorder acquisition units with software(if stand alone)	No.	2	
4.	DR evaluation Unit with software and Printer	Set	1	
L.2	Transformers Protection Panel			

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
1.	Transformer differential protection relay with cable for front panel communication to PC	No.	1	
2.	Restricted earth fault protection relay with non linear resister(if applicable) and cable for front panel communication to PC	No.	1	
3.	Back up protection relay with 3 O/C and E/F element and cable for front panel communication to PC	No.	1	
4.	CVT selection relay (if applicable)	No.	1	
L.3 Reactor Protection Panel				
1.	Reactor differential protection relay with cable for front panel communication to PC	No.	1	
2.	Reactor Back up impedance relay with cable for front panel communication to PC	No.	1	
3.	Restricted earth fault protection relay with non-linear resistor (If applicable) and cable for front panel communication to PC	No.	1	
L.4 Breaker Relay Panel Spares				
1.	Breaker failure relay	No.	2	
2.	Trip circuit supervision relay	No.	2	
3.	Auto-Reclose relay with check synchronizing relay and dead line charging relay (if stand alone)	No.	2	
4.	Self reset trip relay (if applicable)	No.	2 Nos. of each type and contact configuration	
5.	Hand reset trip relay (if applicable)	No.	2 Nos. of each type and	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
			contact configuration	
6.	Timer relay (if applicable)	No.	2 Nos. of each type and contact configuration	
7.	DC supervision relays (if applicable)	No.	2 Nos. of each type and contact configuration	
8.	Auxiliary relays	No.	2 Nos. of each type and contact configuration	
9.	Flag relay	No	2 Nos. of each type and contact configuration	
L.5	BUS BAR PROTECTION SPARES			
1.	Power supply module (for central unit Bus Bar protection.	No.	1	
2.	Bay unit for Bus Bar Protection	No.	2	
3.	Central unit for Bus bar protection	No.	1	
M	Sub-Station Automation system (Breakup of 1 set)			
1.	Bay Control IED of each type	Set	2	
2.	Ethernet switch of each type	Set	2	
3.	Longest Optical Cable with end equipment	Set	2	
N	PLCC (Breakup of 1 set) - Qty. already listed in Annexure-2			
1.	Set of prints for carrier terminal	Set	2	2
2.	Set of prints for protection coupler	Set	2	2
3.	Set of prints for EPAX(24/8)	Set	1set of each type	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
4.	Telephone (4 wires) with necessary connecting cable.	Set	3	3
5.	Co-axial connector	Set	10	10
6.	Straight through joint	Set	2	2
7.	Co-axial cable	metre	500	
8.	PLCC tool kit	Set	1	1
9.	Coupling device (ph to ph) without base plate	Set	2	
10.	PLCC Cubicle Fan	No.	2	2
11.	Wave Trap	No.	1 No. of each type & rating	1 No. of each type & rating
12.	Dummy load	No.	1	1
O	LT SWITCHGEAR (Breakup of 1 set)			
1	Relays	Set	1	
2	CT, PT (each type)	Set	1	
3	Switch, Push buttons, meters	Set	1	
4	TPN switches/MCB	Set	1	
5	MCCB of each rating	Set	1	
P	LT Transformer (Breakup of 1 set)			
1.	Bushings	Set	1	
2.	OTI & WTI with sensing device (as applicable)	Set	1	
3.	Tap changer contacts	Set	1	
4.	Bucholz relay	No	1	
5.	Explosion vent diaphragm	No	1	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
6.	Silicagel container	No	1	
Q	A/C and Ventilation (Breakup of 1 set)- Not Applicable			
1.	Split type A/C system	Set	1	
R	Erection Hardware Item (Breakup of 1 set)			
1.	Insulator string, clamps, connectors, spacers, corona bell, Al tube, welding sleeves etc.	Set	5% spare of the actual quantities	
S.1	Illumination System (Breakup of 1 set)-Not Applicable			
1.	Single Pole MCB	Set	2% of total population of each rating	
2.	Triple Pole MCB	Set	2% of total population of each rating	
S.2	Control Room Lighting - Not Applicable			
1.	Lighting fixture of each type	Set	10% of total population	
S.3	Sodium vapour/ Mercury vapour Lamps - Not Applicable			
1.	Lamp	No.	10% of total population	
2.	Ballast	No.	5% of total population	
3.	Condenser /Igniter	No.	5% of total population	
4.	Lamp holder	No.	5% of total population	
5.	Covers & reflectors	No.	5% of total population	

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S. No	DESCRIPTION	Unit	765/400kV Raichur Substation	400kV Gooty Substation
6.	Complete fittings	No.	5 Nos of each type	
S.4	Solar based street lighting - Not Applicable			
1.	LED Luminaire	Set	10% of total population	
2.	Solar Grid Panel	Set	5% of total population	

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