

## B. ELECTRICAL(Spares to be considered for the items v

Sl. No.	Equipment/Package Name	Quantity Required
<b>1.0</b>	<b>Generator Transformer (3 X 1φ)</b>	
<b>1.1</b>	Bushing	
1.1.1	HV	1No.
1.1.2	HV Neutral	1No.
1.1.3	LV	1No.
<b>1.2</b>	Winding Temperature Indicator	1No.
<b>1.3</b>	Oil Temperature Indicator	1No.
<b>1.4</b>	Pressure Relief Device or Diaphragm for explosion Relief Vent	1No.
<b>1.5</b>	Magnetic Oil Level Gauge	1No.
<b>1.6</b>	Buchholz Relay	1No.
<b>1.7</b>	Silica Gel Breather	1No.
<b>1.8</b>	<b>HV Neutral CT</b>	
1.8.1	For Restricted Earth Fault	1No.
1.8.2	For Standby Earth Fault	1No.
1.8.3	HV Line CT for Restricted Earth Fault	1No.
<b>2.0</b>	<b>Unit Transformer</b>	
<b>2.1</b>	Bushing	
2.1.1	HV	1No.
2.1.2	LV	1No.
2.1.3	LV Neutral	1No.
2.2	Winding Temperature Indicator	1No.
2.3	Oil Temperature Indicator	1No.
2.4	Pressure Relief Device or Diaphragm for explosion Relief Vent	1No.
2.5	Magnetic Oil Level Gauge	1No.
2.6	Buchholz Relay	1No.
2.7	Silica Gel Breather	1No.
2.8	Oil Surge Relay for OLTC	1No.
<b>3.0</b>	<b>HT(11/3.6kV) Aux Transformer</b>	
3.1	Bushing	
3.1.1	HV	2Nos.
3.1.2	LV	2Nos.
3.1.3	HV Neutral	2Nos.
3.1.4	LV Neutral	2Nos.
3.2	Winding Temperature Indicator	2Nos.
3.3	Oil Temperature Indicator	2Nos.
3.4	Pressure Relief Device or Diaphragm for explosion Relief Vent	2Nos.
3.5	Magnetic Oil Level Gauge	2Nos.

3.6	Buchholz Relay	2Nos.
3.7	Silica Gel Breather	2Nos.
3.8	Oil Surge Relay for OLTC	2Nos.
3.9	Coplete Cable Cum Busduct LV Terminals	1 No
<b>4.0</b>	<b>400/220 kV Interconnecting Transformers, 220/33 kV Transformers</b>	
4.1	Bushing	
4.1.1	HV	2 Nos for each type and Rating
4.1.2	LV	2 Nos for each type and Rating
4.1.3	HV Neutral	2 Nos for each type and Rating
4.1.4	LV Neutral	2 Nos for each type and Rating
4.2	Winding Temperature Indicator	2 Nos for each type and Rating
4.3	Oil Temperature Indicator	2 Nos for each type and Rating
4.4	Pressure Relief Device or Diaphragm for explosion Relief Vent	2 Nos for each type and Rating
4.5	Magnetic Oil Level Gauge	2 Nos for each type and Rating
4.6	Buchholz Relay	2 Nos for each type and Rating
4.7	Silica Gel Breather	2 Nos for each type and Rating
4.8	Oil Surge Relay for OLTC	2 Nos for each type and Rating
<b>5.0</b>	<b>Station Transformer</b>	
5.1	Bushing	
5.1.1	HV	2 Nos
5.1.2	LV	2 Nos
5.1.3	HV Neutral	2 Nos
5.1.4	LV Neutral	2 Nos
5.2	Winding Temperature Indicator	2 Nos
5.3	Oil Temperature Indicator	2 Nos
5.4	Pressure Relief Device or Diaphragm for explosion Relief Vent	2 Nos
5.5	Magnetic Oil Level Gauge	2 Nos
5.6	Buchholz Relay	2 Nos
5.7	Silica Gel Breather	2 Nos
5.8	Oil Surge Relay for OLTC	2 Nos
<b>6.0</b>	<b>Bus Duct</b>	

<b>6.1</b>	<b>Genertor Bus Duct</b>	
6.1.1	Bus Bar Support Insulator	3Nos.
6.1.2	Bolt Disconnct Link (single Phase) Rigid Type Complete with hardware rated for :	
6.1.2.1	Main Run ( Full Load Current)	2Nos.
6.1.2.2	Tap-Off Run ( Full Load Current)	2Nos.
<b>6.1.3</b>	<b>Flexible Terminal Connetor (Single Phase) complete with hardware rated for:</b>	
6.1.3.1	Generator end ( Full Load Current)	2Nos.
6.1.3.2	Generator Transformer end ( Full Load Current)	2Nos.
6.1.3.3	Unit Transformer end ( Full Load Current)	2Nos.
<b>6.1.4</b>	<b>Tap-off CTs</b>	
6.1.4.1	Unit Transformer Differential	2Nos
6.1.4.2	Backup Impedence Protection	2Nos
6.1.4.3	Overall Differential	2Nos
5.1.4.4	UT Over Current	2Nos
<b>6.1.5</b>	<b>Voltage Transformer</b>	2Nos
<b>6.1.6</b>	<b>Surge Capacitor</b>	2Nos
<b>6.1.7</b>	<b>Seal-off Bushings for the rating</b>	2Nos
6.1.7.1	Main Run ( Full Load Current)	2Nos
6.1.7.2	Tap-Off Run ( Full Load Current)	2Nos
<b>6.1.8</b>	<b>Expansion Bellows for the rating</b>	2Nos
6.1.8.1	Main Run ( Full Load Current)	2Nos
6.1.8.2	Tap-Off Run ( Full Load Current)	2Nos
<b>6.2</b>	<b>11 KV &amp; 3.3 KV Bus Duct</b>	
6.2.1	Bus Support Insulator	20 Nos.
6.2.2	Flexible Terminal Connetor (Single Phase) complete with hardware rated for:	3 Nos each type and ratings
6.2.3	Wall Seal-off Bushing	4 No each type and ratings
6.2.4	Expansion Bellows	2 No each type and ratings
<b>6.3</b>	<b>415 V Bus Duct</b>	
6.3.1	Aluminum Flexible	2 set for each type and Rating
6.3.2	Copper Flexible	2 set for each type and Rating
6.3.3	Rubber (Nuprene Bellow)	2 set for each type and Rating
<b>7.0</b>	<b>33 kV, 11 KV &amp; 3.3 KV System</b>	
<b>7.1.1</b>	<b>LT Aux. Transformer (Cast Resin Dry Type)</b>	
7.1.1.1	Limb of complete LT and HT of temperature sensing devices	1 set

7.1.1.2	Bushing (in case of separate item on transformers offered) HV, LV and LV neutral	3 nos
7.1.1.3	Tap changer contacts	1 set
<b>7.1.2</b>	<b>Oil filled type transformer</b>	
7.1.2.1	HV, LV and Neutral bushing of each type and rating	1 set
7.1.2.2	Winding temperature indicator for each rating of transformer	1 no
7.1.2.3	Tap changer contacts for each rating of transformer	1 set
7.1.2.4	Magnetic oil gauge/ oil level indicator with contacts for each rating of transformer	1 no
7.1.2.5	Oil temperature indicator with contacts for each rating of transformer	1 no
7.1.2.6	Buchholz Relay for each rating of transformer	1 no
7.1.2.7	Float with contact for Buchholz Relay for each rating of transformer	1 no
7.1.2.8	Set of gaskets (other than that with bushing) for each rating of transformer	1 no
7.1.2.9	Set of valves for each rating of transformer	1 set
7.1.2.10	Pressure relief device for each rating of transformer	1 no
7.1.2.11	Neutral grounding resistor of each type and rating	1 no
<b>7.2</b>	<b>33 KV, 11 KV &amp; 3.3 KV Switch Gear</b>	
7.2.1	Trip Coil	15Nos. Each Voltage Level
7.2.2	Closing Coil	15Nos. Each Voltage Level
7.2.3	Spring Charging Motor	10Nos. Each Voltage Level
7.2.4	Spring Charging Motor with complete Mechanisim	4No.Each Voltage Level
7.2.5	Spring Charging Limit Switch	15Nos.Each Voltage Level
7.2.6	Thermal Overload for Spring Charging Motor	10Nos. Each Voltage Level
7.2.7	Breaker Complete Pole Assembly (Bottle)	6Sets Each (1set consists of 3nos.)
7.2.8	Breaker Auxiliary (A & B) Contact Assembly	10Nos Each Voltage Level
7.2.9	Breaker Auxiliary (C & D) Contact Assembly	10Nos Each Voltage Level
7.2.10	Plug Socket with Prefab cable	10Nos Each Voltage Level
7.2.11	Position Limit Switch	15Sets Each Voltage Level
7.2.12	Surge Arrester	9Nos.

<b>7.2.13</b>	Indicating Lamps complete assembly	
7.2.13.1	Red	30Nos.
7.2.13.2	Amber	30Nos.
7.2.13.3	Green	30Nos.
7.2.13.4	White	30Nos.
7.2.13.5	Blue	30Nos.
7.2.14	CT	1No. for each type and Rating for BTG Area. and 1No. For each rating for Other Plant Area
7.2.15	Transducer	5 Nos. for each type and Rating
7.2.16	Breaker Control Switch	
7.2.16.1	Trip / Neutral / close Switch	8Nos. for each type and Rating
7.2.16.2	Swgear / Trial / Normal Switch	8Nos. for each type and Rating
7.2.16.3	AC Supply On / Off Switch	8Nos. for each type and Rating
7.2.16.4	DC Supply On / Off Switch	8Nos. for each type and Rating
7.2.16.5	Motor Heater On /Off Switch	2No. for each type and Rating
7.2.16.6	DC Supply Source Selector Switch (3-position)	5Nos. for each type and Rating
7.2.16.7	Ammeter Selector Switch	1 No. for each type and Rating
7.2.16.8	Voltmeter Selector Switch	1 No. for each type and Rating
7.2.17	Voltmeter	1 No. for each type and Rating
7.2.18	Ammeter	1 No. for each type and Rating
7.2.19	Breaker Jaw Contact ( Bus-end & Breaker- end) assembly	5Sets. for each type and Rating
7.3	Energy Meter	1No. For each type &rating
<b>8.0</b>	<b>415V System</b>	
<b>8.1</b>	<b>Air Circuit Breaker</b>	
8.1.1	Trip Coil	20 Nos
8.1.2	Closing Coil	21 Nos
8.1.3	Spring Charging Motor	10Nos
8.1.4	Spring Charging Motor with complete Mechanisim	10Nos

8.1.5	Spring Charged Limit Switch	10Nos.
8.1.6	Thermal Overload for Spring Charging Motor	5Nos.
8.1.7	Breaker Contact	
8.1.7.1	Main Contact (Fixed and moving) assembly	5Sets for each type and rating
8.1.7.2	Arcing Contact (Fixed and moving) assembly	5Sets for each type and rating
8.1.7.3	Breaker Jaw Contact ( Bus-end & Breaker- end) assembly	5Sets. for each type and Rating
8.1.7.4	Sliding Contact (Fixed & Moving)	15Sets.
8.1.7.5	Breaker Auxiliary Contact Block	15Nos.
8.1.8	Arcing Chute	5Sets for each type and rating
8.1.9	Plug Socket with Prefab cable	5Nos
8.1.10	Position Limit Switch	10Sets
8.1.11	Indicating Lamps complete assembly	
8.1.11.1	Red	30Nos.
8.1.11.2	Amber	30Nos.
8.1.11.3	Green	30Nos.
8.1.11.4	White	30Nos.
8.1.11.5	Blue	30Nos.
8.1.12	CT	1No. for each type and Rating
8.1.13	Transducer	5 Nos. for each type and Rating
8.1.14	Breaker Control Switch	
8.1.14.1	Trip / Neutral / close Switch	10Nos. for each type and Rating
8.1.14.2	Sw.gear / Trial / Normal Switch (Local/Remote)	10Nos. for each type and Rating
8.1.14.3	AC Supply On / Off Switch	10Nos. for each type and Rating
8.1.14.4	DC Supply On / Off Switch	10Nos. for each type and Rating
8.1.14.5	Motor Heater On /Off Switch	10Nos. for each type and Rating
8.1.14.6	DC Supply Source Selector Switch (3-position)	3Nos. for each type and Rating
8.1.14.7	Ammeter Selector Switch	1 No. for each type and Rating
8.1.14.8	Voltmeter Selector Switch	1 No. for each type and Rating

8.1.15	Voltmeter	1 No. for each type and Rating for BTG Area & 1 No. for each type & Rating for BOP Area.
8.1.16	Ammeter	2 No. for each type and Rating for BTG Area & 1 No. for each type & Rating for BOP Area.
8.1.17	Auxiliary Control Contactor	
8.1.17.1	Auxiliary Control Contactor DC complete	25Nos.
8.1.17.2	Auxiliary Control Contactor DC spare kits	25Nos.
8.1.17.3	Auxiliary Control Contactor DC Coils	25Nos.
<b>8.2</b>	<b>PMCC/MCC/ACDB</b>	
<b>8.2.1</b>	<b>Contactor</b>	
8.2.1.1	Power Contactor (AC)	
8.2.1.1.1	Power Contactor Complete Assembly	4 Nos.for each type and rating
8.2.1.1.2	Power Contactor spare kits	10Sets for each type and rating
8.2.1.1.3	Power Contactor AC Coils	10Nos. Coils for each type and rating
8.2.1.2	Auxiliary Control Contactor (AC)	
8.2.1.2.1	Auxiliary Control Contactor Complete Assembly	30 Nos.for each type and rating
8.2.1.2.2	Auxiliary Control Contactor spare kits	40 Sets for each type and rating
8.2.1.2.3	Auxiliary Control Contactor AC Coils	35 Nos.for each type and rating
8.2.2	MCCB (Power Circuit)	5 Nos. for each type and rating
8.2.3	MCB (Control Circuit)	25 Nos.for each type and rating
8.2.4	Switch	
8.2.4.1	Local / Remote Selector Switch	10Nos.
8.2.4.2	MCCB Status (On/off) Monitoring Switch/Contact	5Nos.
8.2.4.3	Trial / Normal /MCC Selector Switch	15Nos.
8.2.4.4	MCC module Service Position Limit Switch	5Nos.
8.2.5	Thermal Overload Relay	5Nos. for each type and rating
8.2.6	Sliding Contact (Fixed & Moving)	25Sets
8.2.7	Bus bar to MCC module Lira Contact Assembly ( Bus-end & MCC Module-end)	5Sets for each type and rating

8.2.8	Indicating Lamps complete assembly	
8.2.8.1	Red	30Sets
8.2.8.2	Amber	30Sets
8.2.8.3	Green	30Sets
8.2.9	Push Button (On/Off) Complete Assembly	20Sets
8.2.10	CT	1No.for each type and rating
8.2.11	Ammeter	1No. for each type and rating
8.2.12	Control Transformer	1No. for each type and rating
8.2.13	Off Delay/ On Delay Timer	5Nos.for each type and rating
8.2.14	Switch Fuse Unit	5Nos.for each type and rating
<b>8.2.15</b>	<b>Terminal Block</b>	
8.2.15.1	Power Terminal Block	10% of total nos. for each type and rating used in the system or minimum one (1) no. whichever is more
8.2.15.2	Control Terminal Block	10% of total nos. for each type and rating used in the system or minimum one (1) no. whichever is more
8.2.15.3	End Plate for Power & Control Terminal Block	Each type 25Nos.
8.3	Energy Meter	1No. For each type &rating
<b>9.0</b>	<b>DC Starter Panel/DCDB</b>	
9.1	DC Power Contactor complete assembly	1No. for each type and Rating
9.2	Power Contact Spare Kit	2Sets for each type and rating
9.3	Coil for Power Contactor	2Nos.
9.4	Control Contactor complete assembly	5Nos.
9.5	Control Contact Spare Kit	5Sets for each type and rating
9.6	Coil for Control Contactor	5Nos.
9.7	On/Off Delay Timer	1No. for each type and Rating
9.8	Indicating Lamps complete assembly	
9.8.1	Red	3Sets
9.8.2	Amber	3Sets

9.8.3	Green	3Sets
9.9	Push Button (On/Off) Complete Assembly	2Nos.for each colour
9.10	MCCB	1No. for each type and Rating
9.11	Power Fuse	3Nos. for each type and Rating
9.12	Control Fuse	5Nos each type and rating
9.13	Thermal Over Load Relay	1No. each type and rating
9.14	Ammeter	1No. each type and rating
9.15	Switch Fuse Unit	5Nos.for each type and rating
	Any Electronic Components/PCB used in the system	
9.16	Terminal Block	
9.16.1	Power Terminal Block	10% of total nos. for each type and rating used in the system
9.16.2	Control Terminal Block	10% of total nos. for each type and rating used in the system
9.16.3	End Plate for Power & Control Terminal Block	Each type 25Nos.
<b>10.0</b>	<b>Protective Relaying system</b>	
<b>10.1</b>	<b>11 KV &amp; 3.3 KV System</b>	
10.1.1	Numerical Relay	
10.1.1.1	Feeder/Transformer Protection	3 Nos.each type and rating
10.1.1.2	Motor Protection	7 Nos.each type and rating
10.1.2	Conventional (Electromagnetic/Static type) Relay	10% for each type and rating or minimum one (1) no.
		whichever is more
<b>10.2</b>	<b>415V System</b>	
10.2.1	Numerical Relay	
10.2.1.1	Feeder/Transformer Protection	4 Nos.each type and rating
10.2.1.2	Motor Protection	5 Nos.each type and rating
10.2.2	Conventional (Electromagnetic/Static type) Relay	10% for each type and rating or minimum one (1) no.
		whichever is more

<b>10.3</b>	<b>Generator Protection System</b>	
10.3.1	Numerical microprocessor based Relay	10% for each type and rating or minimum one (1) no. whichever is more
<b>10.4</b>	<b>Generator Transformer Protection System</b>	
10.4.1	Numerical microprocessor based Relay	10% for each type and rating or minimum one (1) no. whichever is more
<b>11.0</b>	<b>UPS (Main UPS for DCS System)</b>	
11.1	Fuse	3 (Three) times of total quantity of each type of fuses used in the system
11.2	SCR	10% of total quantity of each type used in the system or minimum 2(two) nos. whichever is more.
11.3	Diode	10% of total quantity of each type used in the system or minimum 2(two) nos. whichever is more.
11.4	IGBT	2 (two) nos.
11.5	Electronic Module/ PCB	
11.5.1	Static Switch	1 (one) no. each type of Electronic Card/PCB/modules used in the system
11.5.2	Inverter	1 (one) no. each type of Electronic Card/PCB/modules used in the system

11.5.3	Static voltage Regulator	1 (one) no. each type of Electronic Card/PCB/modules used in the system
11.5.4	Charger	1 (one) no. each type of Electronic Card/PCB/modules used in the system
<b>11.6</b>	<b>UPS Battery</b>	
11.6.1	Battery Cell (Uncharged, Dry)	8 nos.
11.6.2	Inter connecting cell strips	10 nos.
11.6.3	Vent cap	10 nos.
11.6.4	Hydrometer	1 no.
11.6.5	Rubber gloves	1 pair
11.6.6	Voltmeter for measuring cell voltage (Center zero type)	1 no.
11.6.7	Funnel	1 no.
11.6.8	Jug	1 no.
11.6.9	Apron & Goggles	1 set
11.6.10	Cell lifting puller	1 no.
11.6.11	Insulated socket spanner with handle	1 no.
11.6.12	Terminal screw with bellville washer	5% of total quantity used
11.6.13	Plastic filling bottle	1 no.
11.6.14	Thermometer	1 no.
11.7	For other applicable items Sl No.12 & 8 of this document shall be followed.	
<b>12.0</b>	<b>Control Panel/Desk Mounted Items</b>	
12.1	Push Button	
12.1.1	Complete assembly	5Nos for each colour
12.1.2	Contact Element (1NO + 1NC) Block	20Nos.
12.2	Selector Switch	10Nos. for each type and rating
<b>12.3</b>	<b>Meter (Analog or Digital)</b>	
12.3.1	Ammeter	10% for each type and range or minimum one (1) no. whichever is more
12.3.2	Voltmeter	10% for each type and range or minimum one (1) no. whichever is more

12.3.3	Frequency	10% for each type and range or minimum one (1) no. whichever is more
12.3.4	MW	10% for each type and range or minimum one (1) no. whichever is more
12.3.5	MVAR	10% for each type and range or minimum one (1) no. whichever is more
12.3.6	Power Factor	10% for each type and range or minimum one (1) no. whichever is more
12.3.7	Synchroscope	10% for each type and range or minimum one (1) no. whichever is more
12.4	Indicating Lamps complete assembly	10Nos. for each Colour and type
12.5	Mimic Lamps	10Nos. for each Colour and type
12.6	MCB	2Nos. for each type and rating
12.7	Door Limit Switch	2Nos.
<b>12.8</b>	Annunciation system	
12.8.1	Lamp Box with Facia & Lamps (LED type)	25Nos.
12.8.2	Hooter	1No.
12.8.3	Each type of PCB (for non-PLC driven system)	1(one) no.
<b>13.0</b>	<b>Actuator</b>	
13.1	Complete set of Actuator	1No. for each type and rating
13.2	Limit Switch	2 Nos each type and rating
13.3	Torque Switch	2 Nos each type and rating
13.4	Auxiliary Contact	1 no each type and rating
13.5	Motor	1 no each type and rating
13.6	Complete Seal kit	1Set for each type and rating

13.7	Complete O-Ring Set	1Set
<b>14.0</b>	<b>Illumination</b>	
14.1	Comptalux Lamp 100 W	40 nos.
14.2	High Pressure Mercury Vapour Lamp 125W	20 nos.
14.3	High Pressure Sodium Vapour Lamp 70W	150 nos.
14.4	High Pressure Sodium Vapour Lamp 150W	40 nos.
14.5	High Pressure Sodium Vapour Lamp 250W	40 nos.
14.6	High Pressure Sodium Vapour Lamp 400W	40 nos.
14.7	Ignitors (Separate type) for High Pressure Sodium Vapour Lamp	200nos.
14.8	Ballast for 1 x 125 W High Pressure Mercury Vapour Lamp	30 nos.
14.9	Ballast for 1 x 70 W High Pressure Sodium Vapour Lamp	150 nos.
14.10	Ballast for 1 x 150 W High Pressure Sodium Vapour Lamp	100 nos.
14.11	Ballast for 1 x 250 W High Pressure Sodium Vapour Lamp	50 nos.
14.12	Capacitor for 1 x 125 W High Pressure Mercury Vapour Lamp	50 Nos.
14.13	Capacitor for 1 x 70 W High Pressure Sodium Vapour Lamp	80 Nos.
14.14	Capacitor for 1 x 150 W High Pressure Sodium Vapour Lamp	80 Nos.
14.15	Capacitor for 1 x 250 W High Pressure Sodium Vapour Lamp	80 Nos.
14.16	Capacitor for 1 x 400 W High Pressure Sodium Vapour Lamp	80 Nos.
14.17	Fluorescent Lamp 2 X 28W (T5)	20 Nos.
14.18	Ballast for Fluorescent Lamp 2 X 28W (T5)	50 Nos.
14.19	Clockswitch type Time Switch	40 Nos.
14.20	Miniature Circuit Breakers (M.C. Bs)	
14.20.1	1-Pole 20 Amps.	40Nos.
14.20.2	2-Pole 20 Amps.	20Nos.
14.20.3	2-Pole 16 Amps.	20Nos.
14.21	Receptacles	
14.21.1	5Amp	20Nos.
14.21.2	15Amp	20Nos.
14.21.3	63Amp	20Nos.
14.22	Lamp Cover Set	2Nos. for each colour
14.23	LED lamp and fixtures	150 nos.
14.24	Metal Halide Lamp 400W	20 nos.

14.25	CFL	10 nos of each type and rating
<b>15.0</b>	<b>Power &amp; Control Cable</b>	
15.1	11KV Grade HT Power Cables for each type and size	10% of installed quantity
15.2	3.3KV Grade HT Power Cable for each type and size	10% of installed quantity
15.3	1.1kV grade Power Cables for each type and size	10% of installed quantity
15.4	1.1kV grade Control Cables for each type and size	10% of installed quantity
15.5	Trailing Cable	
15.5.1	Elevator	One set of full length of each size/type of cables as used for each type of Elevator
15.5.2	Electrical Hoist	One set of full length of each size/type of cables as used for each type of Electrical Hoist
<b>16.0</b>	<b>Neutral Grounding Resistor</b>	
16.1	Brown glazed Porcelain insulators for supporting between mounting frame and each Resistor Assembly	2 Nos.
16.2	Interposing insulator assembly	2 Nos.
16.3	Ceramic and Micanite insulator for supporting between Resistor and mounting frame	2 Nos.
<b>17.0</b>	<b>Plant 220V DC System &amp; Other DC system of Various Voltage Levels</b>	
<b>17.1</b>	<b>Battery</b>	
17.1.1	Battery Cell (Uncharged, Dry)	20 nos
17.1.2	Inter connecting cell strips	20 nos
17.1.3	Vent plug	20 nos
17.1.4	Teak wood cable clamps with hardware	10 Nos.
17.1.5	Hydrometer	1 No.
17.1.6	Rubber gloves	1 pair
17.1.7	Voltmeter for measuring cell voltage (Center zero type)	1 no.
17.1.8	Insulated socket spanner with handle	1 no.
17.1.9	Thermometer	1 no.
17.1.10	Cell container of each type	10 nos.
<b>17.2</b>	<b>Float -cum- Boost Charger</b>	

17.2.1	Fuses & fuse links	100% of total quantity for each type & rating of fuses used in the system
17.2.2	SCR	4Nos. for each type and rating
17.2.3	Diode	4Nos. for each type and rating
17.2.4	Indicating lamps	5Nos.
17.2.5	Electronic Module/ PCB/Card (with all components mounted)	1 (one) No. each type used in the system
17.2.6	Pulse transformer	2 set
17.2.7	Potentiometer of each type and rating	3 sets.
<b>17.3</b>	For other applicable items SI No.11& 7 of this document shall be followed.	Item & Quantity same as indicated in Electrical list 'B' of SI
<b>18.0</b>	<b>Motor</b>	
<b>18.1</b>	<b>HT Motor (other than BFP Motor)</b>	
18.1.1	Driving End Bearing	1No. (or 1Set as applicable) for each type and rating of Motor
18.1.2	Non-Driving End Bearing	1No. (or 1Set as applicable) for each type and rating of Motor
18.1.3	Cooling Fan Internal & External	1Set for each type and rating of Motor
18.1.4	Bearing Temperature Gauge Driving & Non-Driving End	1Set for each type and rating of Motor
18.1.5	Phase-Segregated Terminal Box	1Set for each type and rating of Motor
18.1.6	Neutral End Terminal Bushing with Fasteners	1No. for each type and rating of Motor
18.1.7	RTD for Bearing Temperature	1No. for each type and rating of Motor
18.1.8	Motor Space Heater	1No. for each type and rating of Motor
18.1.9	Complete Set of Coupling	1Set for each Application
<b>18.2</b>	<b>BFP Motor</b>	
18.2.1	HT Bushing	1Set
18.2.2	Elastomould Jointing Kit	1Set

18.2.3	Driving End & Non-Driving End Bearing	1Set
18.2.4	Oil Seal Ring	1Set
18.2.5	Bearing Temperature Gauge Driving & Non-Driving End	1Set
18.2.6	RTD for Bearing Temperature	1Set
18.2.7	Motor Space Heater	1Set
18.3	<b>415 Volt Motor (above 30KW Rating upto 200KW)</b>	
18.3.1	End Shield Cover Driving & Non-Driving End	1Set for each type and rating of Motor
18.3.2	Driving End & Non-Driving End Bearing	1Set for each type and rating of Motor
18.3.3	Cooling Fan	1No. for each type and rating of Motor
18.3.4	Motor Space Heater	1No. for each type and rating of Motor
18.3.5	Motor Terminal Block	1No. for each type and rating of Motor
18.3.6	Complete Set of Coupling	1Set for each Application
18.4	<b>415 Volt Motor (Upto 30KW Rating)</b>	
18.4.1	Driving End & Non-Driving End Bearing	3Set for each type and rating of Motor
18.4.2	Cooling Fan	2No. for each type and rating of Motor
18.4.3	Motor Terminal Block	5No. for each type and rating of Motor
18.4.4	Complete Set of Coupling	1Set for each Application
18.5	<b>DC Motors</b>	
18.5.1	Carbon brushes of each type	10 sets
18.5.2	Brush assemblies of each type	2 sets
18.5.3	Terminal blocks of each type	2 sets
18.5.4	Heaters of each type	2 sets
18.5.5	Pulleys of each type	2 sets
18.5.6	Motor of each type and rating	10% of the installed quantity or minimum 1 number whichever is higher
18.5.7	Bearings (DE and NDE) for each type and rating of motor	3 sets
<b>19.0</b>	<b>Chimney Lighting</b>	
19.1	Medium intensity red flashing light	3 Nos.
19.2	Low intensity steady red light	3 Nos.

19.3	Control Unit for aviation warning light	2 Nos.
19.4	Lighting transformer	1 No.
19.5	M.C.C.B.	One (1 ) of each type and rating
19.6	M.C.B.	Five (5) of each type and rating.
19.7	Motor	One (1 ) of each type and rating
19.8	Indicating meters	One (1 ) of each type and rating
19.9	Push Button	Two (2 ) of each type and rating
19.10	Contactora	One (1 ) of each type and rating
19.11	Control Transformer	One (1 ) of each type and rating
19.12	Receptacles	One (1 ) of each type and rating
<b>20.0</b>	<b>NDCT Lighting</b>	
20.1	Medium intensity red flashing light	3 Nos.
20.2	Low intensity steady red light	3 Nos.
20.3	Control Unit for aviation warning light	2 Nos.
20.4	Lighting transformer	1 No.
20.5	M.C.C.B.	One (1 ) of each type and rating
20.6	M.C.B.	Five (5) of each type and rating.
20.7	Motor	One (1 ) of each type and rating
20.8	Indicating meters	One (1 ) of each type and rating
20.9	Push Button	Two (2 ) of each type and rating
20.10	Contactora	One (1 ) of each type and rating
20.11	Control Transformer	One (1 ) of each type and rating
20.12	Receptacles	One (1 ) of each type and rating
<b>21.0</b>	<b>UPS (For BOP systems)</b>	

21.1	Fuse	3 (Three) times of total quantity of each type of fuses used in the system (for all BOP systems).
21.2	SCR	10% of total quantity of each type used in the system or minimum 2(two) nos. whichever is more.
21.3	Diode	10% of total quantity of each type used in the system or minimum 2(two) nos. whichever is more.
21.4	IGBT	2 (two) nos.
<b>21.5</b>	Electronic Module/ PCB	
21.5.1	Static Switch	1 (one) no. each type of Electronic Card/ PCB/ modules used in the system
21.5.2	Inverter	1 (one) no. each type of Electronic Card/ PCB/ modules used in the system
21.5.3	Static voltage Regulator	1 (one) no. each type of Electronic Card/ PCB/ modules used in the system
21.5.4	Charger	1 (one) no. each type of Electronic Card/ PCB/ modules used in the system
21.5.5	UPS of 2 KVA rating or below.	One Complete set.
21.5.6	Selector Switch	1 (one) no. each type
21.5.7	Digital Voltage/ Current Indicator (LCD type)	1 (one) no. each type
21.5.8	Indication Lamp- Complete assembly (Red/ Green colour)	1 (one) no. each type
21.5.9	Cooling Fan - 240 VAC supply	1 (one) no. each type
<b>21.6</b>	UPS Battery	
21.6.1	Battery Cell (Uncharged, Dry)	10% of total quantity of each BOP UPS.
21.6.2	Inter connecting cell strips	10 nos.
21.6.3	Rubber gloves	1 pair

21.6.4	Voltmeter for measuring cell voltage (Center zero type)	1 no.
21.6.5	Apron & Goggles	1 set
21.6.6	Cell lifting puller	1 no.
21.6.7	Insulated socket spanner with handle	1 no.
21.6.8	Terminal screw with bellaville washer	10% of total quantity used
21.6.9	Thermometer	1 no.
<b>22.0</b>	<b>Variable Frequency Drive for ID Fan</b>	
22.1	SCRs /Thyristors	20% each type.
22.2	Printed Circuit Board	1 set
22.3	Control circuits Modules	1 set each type
22.4	Any other major components	1 set each type
<b>23.0</b>	<b>400 KV and 220 KV Switchyard</b>	
23.1	Complete set of breaker	1 no. for each voltage level
23.2	Isolator complete set	1 no. or each voltage level
23.3	Complete Mechanism Box for Breaker	1 no. or each voltage level
23.4	Closing Coil	6 nos or each voltage level
23.5	Tripping Coil	6 nos or each voltage level
23.6	Spring Charging Motor with Gear Box Assembly	1 set or each voltage level
23.7	Auxiliary Relay Contactor	5 nos or each voltage level
23.8	Gas density monitor	1 no. or each voltage level
23.9	CT	1 no. or each voltage level
23.10	Switchyard hardware	
23.10.1	Clamps & connectors	3sets of each type & rating
23.10.2	Insulators	10% of total quantity & rating used for each type
23.10.3	ACSR Conductor	1(one) Drum of 1Km Length
23.11.	Lighining Arrester	1 No. of each type of rating
<b>24.0</b>	<b>Control, Metering and Protection Panels</b>	
24.1	Trip circuit supervision relay	1 set
24.2	Voltmeter of each ranges	1 set

24.3	Ammeter of each ranges	1 set
24.4	MW meter of each ranges	1 set
24.5	MVAR meter of each ranges	1 set
24.6	MWH meter of each make and model	1 no.
24.7	Frequency meter of each make and model	1 no.
24.8	MW transducer of each make and model	1 no.
24.9	MVAR transducer of each make and model	1 no.
24.10	Summation MW transducer	1 no.
24.11	Summation MVAR transducer	1 no.
24.12	Synchroscope	1 no.
24.13	Generator differential protection relay (87G)	1 no.
24.14	Generator inter-turn fault relay (95G)	1 no.
24.15	100% Generator stator earth fault relay (64G1)	1 no.
24.16	Generator loss of excitation protection relay (40G)	1 no.
24.17	Generator back-up impedance protection relay (21G)	1 no.
24.18	Negative phase sequence relay (46G)	1 no.
24.19	Generator reverse power relay (32G)	1 no.
24.20	Generator low forward power relay (37G)	1 no.
24.21	Generator rotor earth fault protection relay (64F)	1 no.
24.22	Generator over-voltage relay (59G)	1 no.
24.23	Generator pole slipping relay (98G)	1 no.
24.24	Synchro check relay (25)	1 no.
24.25	Generator under frequency protection relay (81G)	1 no.
24.26	Standby stator earth fault protection relay (64G2)	1 no.
24.27	Generator overload protection relay (51G)	1 no.
24.28	Generator over fluxing relay (99G)	1 no.
24.29	Voltage balance relay (60G)	2 nos.
24.30	Generator transformer overall differential protection relay (87OA)	1 no.
24.31	Generator transformer back-up overcurrent protection relay (51T)	1 no.
24.32	Generator transformer restricted earth fault protection relay (87NT)	1 no.
24.33	Generator transformer over fluxing relay (99T)	1 no.
24.34	Generator transformer neutral over current protection relay (51NT)	1 no.
24.35	Generator transformer differential protection relay (87T)	1 no.
24.36	Overhead line connection differential protection relay (87L)	1 no.
24.37	Accidental back energization protection relay	1 no.
24.38	Pole discrepancy protection relay (162)	1 no.
24.39	Breaker (HV) back-up protection relay (50Z)	1 no.
24.40	Unit auxiliary transformer (UAT) differential protection relay (87UAT)	1 no.

24.41	UAT restricted earth fault protection relay (87NUAT)	1 no.
24.42	UAT back-up over current protection relay (51UAT)	1 no.
24.43	UAT back-up earth fault protection relay (50UAT))	1 no.
24.44	Auxiliary VT for each type of rating	2 nos.
24.45	Auxiliary/ intermediate CT for each type of rating	2 nos.
24.46	Push Button	
24.47	Complete assembly	5Nos for each colour
24.48	Contact Element (1NO + 1NC) Block	20Nos.
24.49	Selector Switch	10Nos. for each type and rating
24.50	Indicating Lamps complete assembly	10Nos. for each Colour and type
24.51	Mimic Lamps	10Nos. for each Colour and type
24.52	MCB	2Nos. for each type and rating
24.53	Door Limit Switch	2Nos.
24.54	Annunciation system	
24.55	Lamp Box with Facia & Lamps (LED type)	25Nos.
24.56	Hooter	1No.
24.57	Each type of PCB (for non-PLC driven system)	1(one) no.
<b>24.0</b>	<b>Substation Automation System</b>	with all required spares.
<b>25.0</b>	<b>33 kV System</b>	
25.1	ACSR Conductor	1(one) Drum of 1Km Length
25.2	Insulators	10 nos
25.3	Numerical Relay Feeder/Transformer Protection	3 Nos.each type and rating
25.4	Conventional (Electromagnetic/Static type) Relay	10% for each type and rating or minimum one (1) no. whichever is more









































