

PART 2: EMPLOYER'S REQUIREMENTS
Section VII Vol.II – TECHNICAL SPECIFICATION

**CHAPTER 11B: Auxiliary Substations
(GTP)**

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Note: These specifications are the bare minimum requirement, PST Contractor must verify the design and should fulfil while selecting system/equipment/component & executions. The final requirements of the specifications will depend upon the simulation studies and based upon that the PST contractor has to provide the material over and above to these specifications which shall be finally approved by Engineer / Employer.

1. INTRODUCTION

The below parameters are only indicative and for information to the bidders. The detail parameters given in Chapter 11A shall prevail.

2. 33KV AIS CIRCUIT BREAKER

2.1 33KV AIS MVCB (FOR TRANSFORMER PROTECTION)

Sr. No.	DESCRIPTION	Unit	Values Required
1.	Manufacturer		
2.	Place of manufacture		
3.	Standards		IEC 62271-1, 62271-100,
1) CUBICLE (FIXED PART)			
4.	- Class		Indoor
5.	- Rated insulation voltage	kV	36
6.	- Rated operating voltage	kV	33
7.	- Rated frequency	Hz	50
	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
8.	- Rated lightning impulse withstand voltage	kV peak	170
9.	- Cubicle rated current	A	1250
10.	- Bar set rated current	A	1250
11.	- Allowable overcurrent for 3 seconds	kA r.m.s.	25
12.	- Instantaneous overcurrent	kA peak	62.5
	Number of flip-flop contacts for circuit-breaker plugging- in and plugging-out monitoring	As reqd, along with spares	
13.	- Number of flip-flop contact for earthing isolator open/closed position monitoring	As reqd, along with spares	
14.	- Number of flip-flop contacts for isolator open/closed	As reqd, along with spares	
15.	- Approximate dimensions of the cubicle	mm mm mm	1000 3100 2800
	Width - Depth - Height		
16.	- Protection degree		IP 4X
17.	- Earthing isolator making capacity	kA	25kA for 1sec
18.	- Overall dimension Drawings Numbers		
19.	- Internal Arc Test duration	s	1

Sr. No.	DESCRIPTION	U	Values Required
2) CIRCUIT-BREAKER (Vacuum Type)			
	Three pole types		
1.	- Rated insulation voltage	kV	36
2.	- Rated operating voltage	kV	33
3.	- Rated frequency	Hz	50
4.	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
5.	- Rated lightning impulse withstand voltage	kV peak	170
6.	- Rated short time duration power frequency withstand voltage across isolating distance	kV r.m.s.	70
7.	- Rated lightning impulse withstand voltage across isolating distance	kV peak	170
8.	- Rated current	A	As per SLD
9.	- Allowable overcurrent for 3 seconds	kA r.m.s.	25
10.	- Instantaneous overcurrent	kA peak	62.5
11.	- Breaking capacity	kA r.m.s	25
12.	- Making capacity	kA peak	62.5
13.	- Breaking mode :		
14.	- Opening time	ms	<70
15.	- Breaking time	ms	<80
16.	- Closing time	ms	<100
17.	- Rated operating cycle		0-0.3s-C0-3 min-C0
18.	- Breaking capacity of cable at no load	A	25kA
19.	-Number of auxiliary contact for open/closed position of the circuit-breaker	0/0 0/C	
20.	- Auxiliary supply voltage	V dc	110
21.	Supply voltage for motor drive circuits	V dc	110

Sr. No.	DESCRIPTION	U	Values Required
22.	- Allowable variation range of supply voltage		+10%, -15%
23.	- Power consumption of auxiliary	VA	
24.	- Coils consumption: - engagement coil - release coil	A A	
25.	- Consumption of arming motor	A	
26.	- Maximum noise level during opening and closing actuation	dB	
27.	Degree of protection for auxiliary circuit		IP3X
28.	Internal Arc Test Duration	s	1

2.2 33KV AIS CIRCUIT BREAKER (FOR RING MAIN FEEDER)

Sr. No.	DESCRIPTION	Unit	Values Required
A	Switchgear Panel		
1.	Standard		IEC 62271-1, 62271-100, 62271-102, 62271-200
2.	Class		Indoor
3.	Type		AIS
4.	Nominal system Voltage	KV	33
5.	Highest System Voltage	KV	36
6.	Frequency	Hz	50
7.	Nominal Current Rating	A	As per SLD
8.	One Minute Power frequency withstand Voltage	kV (rms)	70
9.	1.2/50 microsecond Impulse withstand Voltage	kV (peak)	170
10.	Rated short time duration power frequency withstand voltage across isolating distance @	kV r.m.s.	
11.	Rated lighting impulse withstand voltage across isolating distance @	kV Peak	
12.	Symmetrical breaking capacity	kA	25
13.	Making Capacity	kA	62.5
14.	Short time current for 3 sec	kA	25
15.	Degree of Protection		IP 3X

16.	- Approximate dimensions of the cubicle - Width - Depth - Height	Mm Mm mm	1000 3100 2800
B	CIRCUIT BREAKERS		
	Type		Vacuum
1.	Reference Standard		IEC 62271-1, IEC 62271-100, 62271-102, 62271200
2.	Rated Voltage	KV	33
3.	Rated Frequency	Hz	50
4.	Rated Insulation Voltage	KV	36
5.	No of Poles		3
6.	Nominal current rating	A	As per SLD
7.	One Minutes Power frequency withstand Voltage	KV (rms)	70
8.	1.2/50 microsecond Impulse withstand Voltage	KV (peak)	170
9.	Allowable Overcurrent for 1 sec	KA	25
10.	Opening time	ms	<=70
11.	Breaking time	ms	<=80
12.	Closing time	ms	<=80
13.	Arcing time (max)	ms	
14.	Rated operating cycle		0-0.3s-C0-3min-CO
15.	Breaking capacity of cable at no load	A	
16.	Number of auxiliary contact for open/closed position of the circuit-breaker	0/0 0/C	
17.	Auxiliary Supply voltage	V dc	110
18.	Supply voltage for motor drive circuits	V dc	110
19.	Allowable variation range of supply voltage		+10%, - 15%
20.	Coils Consumption: - engagement coil -	A	
21.	Consumption of arming motor	A	
22.	Maximum noise level during opening and closing actuation	dB	
23.	Degree of protection for auxiliary circuit		IP 3X

3. COUPLING CIRCUIT BREAKER & BUS PT/RISER PANEL (AIS)**3.1 33 KV COUPLING CIRCUIT BREAKER CUBICLES (CCB)**

Sr. No.	DESCRIPTION	U	Values Required
	Manufacturer		
	Place of manufacture		
A	Standards		IEC 62271-1, IEC 62271-100, 62271-
	1) CUBICLE		
1.	- Class		Indoor
2.	- Rated insulation voltage	kV	36
3.	- Rated operating voltage	kV	33
4.	- Rated frequency	Hz	50
	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
6.	- Rated lightning impulse withstand voltage	kV peak	170
7.	- Cubicle rated current	A	As per SLD
8.	- Bar set rated current	A	As per SLD
9.	- Allowable overcurrent for 3 seconds	kA r.m.s.	25
10.	- Instantaneous overcurrent	kA peak	62.5
11.	- Number of flip-flop contacts for circuit-breaker plugging-in and plugging-out monitoring	minimum	
12.	- Number of flip-flop contact for earthing isolator open/closed position monitoring	minimum	
13.	- Number of flip-flop contacts for isolator open/closed position monitoring	minimum	
14.	- Approximate dimensions of the cubicle - Width - Depth - Height	m m m m	1000 3100 2800
15.	- Protection degree		IP 3X
16.	- Earthing isolator making capacity	kA	
17.	- Overall dimension Drawings Numbers		
	2) CIRCUIT BREAKER (Vacuum Type)		
	Three pole types		
1.	- Rated insulation voltage	kV	36

2.	- Rated operating voltage	kV	33
3.	- Rated frequency	Hz	50
4.	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
5.	- Rated lightning impulse withstand voltage	kV peak	170
6.	- Rated short time duration power frequency withstand voltage across isolating distance	kV r.m.s.	
7.	- Rated lightning impulse withstand voltage across isolating distance	kV peak	
8.	- Rated current	A	1250
9.	- Allowable overcurrent for 3 second	kA r.m.s.	25
10.	- Instantaneous overcurrent	kA peak	62.5
11.	- Breaking capacity	KA r.m.s	25
12.	- Making capacity	kA peak	62.5
13.	- Breaking mode:		
14.	- Opening time	ms	<70
15.	- Breaking time	ms	<80
16.	- Closing time	ms	<100
17.	-Number of auxiliary contact for open/closed position of the circuit-breaker	□/□ O/C	
18.	- Auxiliary supply voltage	V dc	110
19.	Supply voltage for motor drive circuits	V dc	110
20.	- Allowable variation range of supply voltage		+10%, -15%
21.	- Power consumption of auxiliary	VA	
22.	- Consumption of arming motor	A	
23.	- Maximum noise level during opening and closing actuation	dB	
24.	- Degree of protection for auxiliary circuit	-	- IP3X

3.2 33 KV BUS RISER/PT CUBICLE

Sr. No.	DESCRIPTION	U	Values Required
	Manufacturer		
	Place of manufacture		
A	Standards		IEC 62271-1, IEC 62271-100, 62271-
	1) CUBICLE		
	- Class		Indoor
	- Rated insulation voltage	kV	36
	- Rated operating voltage	kV	33
	- Rated frequency	Hz	50
	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
	- Rated lightning impulse withstand voltage	kV peak	170
	- Cubicle rated current	A	As per SLD
	- Bar set rated current	A	As per SLD
	- Allowable overcurrent for 3 seconds	kA r.m.s.	25
	- Instantaneous overcurrent	kA peak	62.5
	- Approximate dimensions of the cubicle - Width - Depth - Height	m m m m	1000 2640 2800
	- Protection degree		IP 3X

4. CURRENT TRANSFORMER (AIS)**4.1 33KV CURRENT TRANSFORMER (TCT) FOR MVCB CELL**

DESCRIPTION	U	Values Required
Manufacturer		
Place of manufacture		
Port of embarkation		
Standards		IEC 61869-2
- Suitable voltage Level	kV	36
- Operating voltage suitable for	kV	33
- Rated frequency	Hz	50
- Rated power frequency short duration withstand voltage	kV	70

- Rated lightning impulse withstand voltage	kV	170
Transformation ratio*	A	50-25/ 1-1
Secondary Core 1 - Protection - Accuracy class* - Rated output*	VA	5P1 5 10
Secondary Core 2 - Measurement - Accuracy class* - Rated output*	VA	0.5 10
Short-circuit current allowable for 3 seconds	kA	25
Permanent operation without danger	In	1.2
Overheating	In	>1.2
Overcurrent class		

*The details mentioned are indicative. Contractor to verify the design and provide above details for review and approval of Employer.

4.2 PROTECTION CT (PCT) FOR RING MAIN CIRCUIT BREAKERS

DESCRIPTION	U	Values Required
Manufacturer		
Place of manufacture		
Port of embarkation		
Standards		IEC 61869-2
- Suitable voltage Level	kV	36
- Operating voltage Suitable for	kV	33
- Rated frequency	Hz	50
- Rated power frequency short duration withstand voltage	kV	70
- Rated lightning impulse withstand voltage	kV	170
Transformation ratio-	A	800-400 / 1/1/1
Secondary Core 1 — Protection - Accuracy class* - Rated output*	VA	5P1 5 10
Secondary Core 2 — Measurement - Accuracy class* - Rated output*	VA	0.5 10
Secondary Core 3 - Protection - Accuracy class* - Rated output*	VA	PS 10
Short-circuit current allowable for 3 seconds	kA	25
Permanent operation without danger	In	1.2
Overheating	In	>1.2

Overcurrent class		
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*The details mentioned are indicative. Contractor to verify the design and provide above details for review and approval of Employer.

5. 33 KV VOLTAGE TRANSFORMERS (AIS)

5.1 FOR RING MAIN, COUPLING CB PANEL & BUS PT PANEL AT ASS (PT)

DESCRIPTION	U	Values Required
Manufacturer		
Place of manufacture		
Port of embarkation		
Standards		IEC 61869-3
- Primary insulation voltage	kV	36
- Operating voltage	kV	33
- Rated frequency	Hz	50
- Rated short-time duration power frequency withstand voltage	kV	70
- Rated lightning impulse withstand voltage	kV	170
Actual transformation ratio - Primary winding - secondary winding	kV V	33/ 110/
Accuracy class*		3P/0.5
Rated output*	VA	30VA

* The details mentioned are indicative. Contractor to verify the design and provide above details for review and approval of Employer.

6. 33KV GIS CIRCUIT BREAKER

6.1 33KV GIS MVCB (FOR TRANSFORMER PROTECTION)

Sr. No.	DESCRIPTION	U	Values Required
1	Manufacturer		
2	Place of manufacture		
3	Standards		IEC 62271-1, 62271-100, 62271-102, 62271-200
1	CUBICLE (FIXED PART)		
1	- Class		Indoor

2	- Rated insulation voltage	kV	36
3	- Rated operating voltage	kV	33
4	- Rated frequency	Hz	50
5	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
6	- Rated lightning impulse withstand voltage	kV peak	170
7	- Cubicle rated current	A	1250
8	- Bar set rated current	A	1250
9	- Allowable overcurrent for 3 seconds	kA r.m.s.	25
10	- Instantaneous overcurrent	kA peak	62.5
11	- Number of flip-flop contacts for circuit-breaker plugging-	minimum	
12	- Number of flip-flop contact for earthing isolator open/closed position monitoring	minimum	
13	- Number of flip-flop contacts for isolator open/closed position monitoring	minimum	
14	- Approximate dimensions of the cubicle		
	- Width	mm	600
	- Depth	mm	1330
	- Height	mm	2400
15	- Protection degree		IP65 for HV, IP 3X
16	- Earthing isolator making capacity	kA	
17	- Overall dimension Drawings Numbers		

Sr. No.	DESCRIPTION	U	Values Required
	2) CIRCUIT-BREAKER (Vacuum Type)		
	Three pole types		
1	- Rated insulation voltage	kV	36
2	- Rated operating voltage	kV	33
3	- Rated frequency	Hz	50
4	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
5	- Rated lightning impulse withstand voltage	kV peak	170
6	- Rated short time duration power frequency withstand voltage across isolating distance	kV r.m.s.	
7	- Rated lightning impulse withstand voltage across isolating distance	kV peak	

8	- Rated current	A	1250
9	- Allowable overcurrent for 3 seconds	kA r.m.s.	25
10	- Instantaneous overcurrent	kA peak	62.5
11	- Breaking capacity	kA r.m.s	25
12	- Making capacity	kA peak	62.5
13	- Breaking mode :		
14	- Opening time	ms	<70
15	- Breaking time	ms	<80
16	- Closing time	ms	<100
17	- Rated operating cycle		0-0.3s-C0-3 min-C0
18	- Breaking capacity of cable at no load	A	
19	- Number of auxiliary contact for open/closed position of the circuit-breaker	0/0 0/C	
20	- Auxiliary supply voltage	V dc	110
21	Supply voltage for motor drive circuits	V dc	110

1	DESCRIPTION	U	Values Required
22	- Allowable variation range of supply voltage		+10%, -15%
23	- Power consumption of auxiliary	VA	
24	- Coils consumption: - engagement coil - release coil	A A	
25	- Consumption of arming motor	A	
26	- Maximum noise level during opening and closing actuation	dB	
27	Degree of protection for auxiliary circuit		IP3X

6.2 33KV GIS CIRCUIT BREAKER (FOR RING MAIN FEEDER)

Sr. No	DESCRIPTION	U	Values Required
1.	Standard		IEC 62271-1, 62271-100, 62271-102, 62271-200
2.	Class		Indoor
3.	Type		GIS
4.	Nominal system Voltage	KV	33
5.	Highest System Voltage	KV	36
6.	Frequency	Hz	50
7.	Nominal Current Rating	A	1250
8.	One Minute Power frequency withstand Voltage	kV (rms)	70
9.	1.2/50 microsecond Impulse withstand Voltage	kV (peak)	170
10.	Rated short time duration power frequency withstand voltage across isolating distance @	kV r.m.s.	
11.	Rated lightning impulse withstand voltage across isolating distance @	kV Peak	
12.	Symmetrical breaking capacity	kA	25
13.	Making Capacity	kA	62.5
14.	Short time current for 1 sec	kA	25
15.	Degree of Protection		IP-65 for HV, IP-3X for LV
16.	- Approximate dimensions of the cubicle - Width - Depth - Height	Mm Mm mm	600 1330 2400
B CIRCUIT BREAKERS			
	Type		Vacuum
1.	Reference Standard		IEC 62271-1, IEC 62271-100, 62271-102, 62271200
2.	Rated Voltage	KV	33
3.	Rated Frequency	Hz	50
4.	Rated Insulation Voltage	KV	36
5.	No of Poles		3
6.	Nominal current rating	A	1250 A
7.	One Minutes Power frequency withstand Voltage	KV (rms)	70
8.	1.2/50 microsecond Impulse withstand Voltage	KV (peak)	170
9.	Allowable Overcurrent for 1 sec	KA	25
10.	Opening time	ms	<=70

Sr. No.	DESCRIPTION	U	Values Required
11.	Breaking time	ms	<=80
12.	Closing time	ms	<=80
13.	Arcing time (max)	ms	
14.	Rated operating cycle		0-0.3s-C0-3min-C0
15.	Breaking capacity of cable at no load	A	
16.	Number of auxiliary contact for open/closed position of the circuit-breaker	0/0 0/C	
17.	Auxiliary Supply voltage	V dc	110
18.	Supply voltage for motor drive circuits	V dc	110
19.	Allowable variation range of supply voltage		+10%, - 15%
20.	Coils Consumption: - engagement coil -	A	
21.	Consumption of arming motor	A	
22.	Maximum noise level during opening and closing actuation	dB	
23.	Degree of protection for auxiliary circuit		IP 3X

7. COUPLING CIRCUIT BREAKER & BUS PT PANEL (GIS)

7.1 33 KV COUPLING CIRCUIT BREAKER CUBICLES (CCB)

Sr. No.	DESCRIPTION	U	Values Required
	Manufacturer		
	Place of manufacture		
A	Standards		IEC 62271-1,, IEC 62271-100, 62271-
1	1) CUBICLE		
2	- Class		Indoor
3	- Rated insulation voltage	kV	36
4	- Rated operating voltage	kV	33
5	- Rated frequency	Hz	50
	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
7	- Rated lightning impulse withstand voltage	kV peak	170
8	- Cubicle rated current	A	1250
9	- Bar set rated current	A	1250
10	- Allowable overcurrent for 1 second	kA r.m.s.	25

11	- Instantaneous overcurrent	kA peak	62.5
12	- Number of flip-flop contacts for circuit-breaker plugging-in and plugging-out monitoring	minimum	
13	- Number of flip-flop contact for earthing isolator open/closed position monitoring	minimum	
14	- Number of flip-flop contacts for isolator open/closed position monitoring	minimum	
15	- Approximate dimensions of the cubicle - Width - Depth - Height	m m m m m	600 1330 2400
16	- Protection degree		IP65 for HV, IP 3X for LV
17	- Earthing isolator making capacity	kA	
18	- Over all dimension Drawings Numbers		

Sr. No.	DESCRIPTION	U	Values Required
	2) CIRCUIT BREAKER (Vacuum Type)		
	Three pole types		
1	- Rated insulation voltage	kV	36
2	- Rated operating voltage	kV	33
3	- Rated frequency	Hz	50
4	- Rated short time duration power frequency withstand voltage	kV r.m.s.	70
5	- Rated lightning impulse withstand voltage	kV peak	170
6	- Rated short time duration power frequency withstand voltage across isolating distance	kV r.m.s.	
7	- Rated lightning impulse withstand voltage across isolating distance	kV peak	
8	- Rated current	A	1250
9	- Allowable overcurrent for 3 second	kA r.m.s.	25
10	- Instantaneous overcurrent	kA peak	62.5
11	- Breaking capacity	KA r.m.s	25
12	- Making capacity	kA peak	62.5
13	- Breaking mode:		

14	- Opening time	ms	<70
15	- Breaking time	ms	<80
16	- Closing time	ms	<100
17	-Number of auxiliary contact for open/closed position of the circuit-breaker	0/0 0/C	
18	- Auxiliary supply voltage	V dc	110
19	Supply voltage for motor drive circuits	V dc	110
20	- Allowable variation range of supply voltage		+10%, -15%

Sr. No.	DESCRIPTION	U	Values Required
21	- Power consumption of auxiliary	VA	
22	- Consumption of arming motor	A	
23	- Maximum noise level during opening and closing actuation	dB	
24	Degree of protection for auxiliary circuit		IP3X

8. CURRENT TRANSFORMER (GIS)

8.1 33KV CURRENT TRANSFORMER (TCT) FOR MVCB CELL

DESCRIPTION	U	Values Required
Manufacturer		
Place of manufacture		
Port of embarkation		
Standards		IEC 61869-2
- Suitable voltage Level	kV	36
- Operating voltage suitable for	kV	33
- Rated frequency	Hz	50
- Rated power frequency short duration withstand voltage	kV	70
- Rated lightning impulse withstand voltage	kV	170
Transformation ratio*	A	200-100/ 1-1-1
Secondary Core 1 - Protection - Accuracy class* - Rated output*	VA	5P1 5 10

Secondary Core 2 - Measurement - Accuracy class* - Rated output*	VA	0.5 10
Secondary Core 3 - Protection - Accuracy class* - Rated output*	VA	PS 10
Short-circuit current allowable for 3 seconds	kA	25
Permanent operation without danger	In	1.2
Overheating	In	>1.2
Overcurrent class		

*The details mentioned are indicative. Contractor to verify the design and provide above details for review and approval of Employer.

8.2 PROTECTION CT (PCT) FOR RING MAIN CIRCUIT BREAKERS

DESCRIPTION	U	Values Required
Manufacturer		
Place of manufacture		
Port of embarkation		
Standards		IEC 61869-2
- Suitable voltage Level	kV	36
- Operating voltage Suitable for	kV	33
- Rated frequency	Hz	50
- Rated power frequency short duration withstand voltage	kV	70
- Rated lightning impulse withstand voltage	kV	170
Transformation ratio-	A	800-400 / 1/1/1
Secondary Core 1 — Protection - Accuracy class* - Rated output*	VA	5P1 5 10
Secondary Core 2 — Measurement - Accuracy class* - Rated output*	VA	0.5 10
Secondary Core 3 - Protection - Accuracy class* - Rated output*	VA	PS 10
Short-circuit current allowable for 3 seconds	kA	25
Permanent operation without danger	In	1.2
Overheating	In	>1.2
Overcurrent class		

*The details mentioned are indicative. Contractor to verify the design and provide above details for review and approval of Employer.

9. 33 KV VOLTAGE TRANSFORMERS (GIS)**9.1 FOR RING MAIN, COUPLING CB PANEL & BUS PT PANEL AT ASS (PT)**

DESCRIPTION	U	Values Required
Manufacturer		
Place of manufacture		
Port of embarkation		
Standards		IEC 61869-3
- Primary insulation voltage	kV	36
- Operating voltage	kV	33
- Rated frequency	Hz	50
- Rated short-time duration power frequency withstand voltage	kV	70
- Rated lightning impulse withstand voltage	kV	170
Actual transformation ratio - Primary winding - secondary winding	kV V	33/ 110/
Accuracy class*		3P/0.5
Rated output*	VA	30VA

* The details mentioned are indicative. Contractor to verify the design and provide above details for review and approval of Employer.

10. AUXILIARY TRANSFORMER 315 KVA

DELETED

11. AUXILIARY TRANSFORMER 2500 KVA (FOR DEPOT & UG STATIONS)

DESCRIPTION	U	Values Required
Manufacturer		
Place of manufacture		
Port of embarkation		
Manufacturer drawing reference		
Standards		IEC 60076/IS 2026
Insulation type		Cast resin
Rated power	kVA	2500
Cooling mode		AN
Primary rated insulation voltage	kV	36
Primary operating voltage	kV	33
Secondary rated operating voltage	V	415/240
Rated short duration power frequency withstand voltage for primary winding	kV	70
Rated lightning impulse withstand voltage for primary winding	kV	170
Short-circuit voltage	%	6
Voltage setting (off load tap changer)	%	±0, ±2.5, ±5
Coupling		Dyn11
Maximum noise level	dBA	74
Maximum iron losses	kW	3.70

Maximum load losses (Copper losses -4/4 of Secondary load)	kW	15.0
Dimensions (maximum)* - Length - Width - Height	mm mm mm	2100 2900 2250
Weight (maximum)*	kg	8000

*Dimensions & Weight shown are indicative only.

12. 110 V DC BATTERY CHARGER

DESCRIPTION	U	Values Required
Manufacturer		
Type of battery charger		Float Cum Boost Charger
Standards		IEC 60146
3 Phases power supply	V AC	415
Frequency	Hz	50
Rated DC voltage	V DC	110
Power conversion		Silicon diode/thyristor/IGBT or thyristor bridge (Full Wave) .for converting 3-phase supply to DC voltage.
Cooling		Natural cooling
Allowable output voltage variation for +10% variation of supply voltage - for +5% variation of		+1% +1%
Average winding Temperature rise over Ambient	Degree	90
Internal Cabling /Wiring		FRLS for elevated section FRLSOH for UG
Residual ripple ratio		Less than 3 %
Recharge to 80% of the battery capacity		8 hours
Dimensions* - length - depth - height	mm mm mm	1350 650 1350
Voltmeter on AC side		To be provided
Voltmeter on DC side		To be provided
Ammeter on DC side		To be provided
Alarms		
AC Main Fail		To be provided
DC Overvoltage		To be provided
DC Under Voltage		To be provided
Charging fail		To be provided
Battery low		To be provided
One pair of Potential Free Contact grouping all fault to be provided for remote Annunciation at		To be provided
Protections		
Current Limit Protection		To be provided
Soft start feature		To be provided
Surge suppressor		To be provided
HRC Fuse at rectifier Output		To be provided

Battery Reverse Polarity protection		To be provided
Automatic Changeover feature		To be provided
Switchgear		
Input Side		MCCB/MCB & Fuse
Output side		MCB & Fuse

* Dimensions shown are indicative only.

13. 110 V DC BATTERIES

DESCRIPTION	U	Values Required
Standards		IEC 60622/IEC 60623
Type		Ni-Cd in Polypropylene Container
Stationary compact		
Maintenance free		
Capacity offered for 10 hours discharge duration*	Ah	180 (For Elevated ASS) 100 (For UG ASS)
Internal Cabling /Wiring		FRLS for elevated section FRLSOH for UG section
Voltage per cell	V	
Number of cells		
Rated operating voltage	V DC	110
Maximum output current	A	
Documentation to be supplied		
Dimensions		
- Length	mm	
- width	mm	
Total weight	kg	

*The capacity of the battery shall be designed by the Contractor taking into account the permitted voltage tolerance of the individual loads, the power consumption of various loads, the length of time they are in operation and the manner in which they draw power. The precise capacity of battery shall be determined to ensure total autonomy of the station for 8 hours. Battery capacity shall not be less than 180 (For Elevated ASS) & 100 (For UG ASS), in any case.

14. 33 KV LIGHTNING ARRESTER

DESCRIPTION	U	Values Required
Manufacturer		
Place of Manufacture		
Manufacturer Drawing reference		
Standard		IEC 60099-4
Type of Substation		Indoor
Lightning Arrester type		Non-linear Metal Oxide Resistor type, gapless
Nominal System Voltage	Phase-to-Earth	19 kV
Possible variation in the Auxiliary Supply Voltage	kV	30 kV to 36 kV

Maximum continuous operating voltage	kV rms	29 kV
Rated frequency	Hz	50
Rated Voltage for lightning Arrester	kV rms	36
Nominal discharge current(8/20 micro sec wave)	kAp	10
Peak value of switching impulse current(30/60 micro sec wave)	Ap	500
Max. discharge Voltage at nominal discharge	kVp	91
Max. residual voltage at switching impulse current	kVp	62
Rated Impulse withstand of arrester insulation	KV peak	170
Power frequency withstand voltage for arrester insulation	kV	70
Pressure Relief Class		A
Line discharge class		3
Creepage distance	mm	Silicone rubber with 1300 mm

15. 33 KV CABLES

DESCRIPTION	UNIT	Values required	
Manufacturer			
Cable Size	Sq.mm.	400	120
Cable Type		Aluminium/XLPE	Aluminium/XLPE/PVC
Voltage Grade U /U (U)	KV	18/30 (36)	18/30 (36)
Reference Standard		IEC 60502	IEC 60502
No. and cross-sectional area of conductor		3x1C x 400 Sq.mm	3x 1C x 120 Sq.mm
Conductor Material		Aluminium	Aluminium
Shape		Circular compact stranded	Circular compact stranded
Class/Standard		Class 2/ IEC 60228	Class 2/ IEC 60228
Nominal Diameter of Conductor	mm	-	-
Conductor Screen Materials		Extruded semi-conducting compound	Extruded semi-conducting compound
Nominal thickness of conductor screen	mm	-	-
Insulation Material		XLPE	XLPE
Nominal thickness of insulation	mm	-	-
Nominal Diameter Over Insulation	mm	-	-
Longitudinal Water Barrier			
Material		Semi conducting water swellable tape	Semi conducting water swellable
Insulation screen material (Metallic)		Copper/Aluminium round wire	copper/aluminium round wire

Nominal Thickness of Insulation screen	mm	-	-
Nominal Thickness of Tape	mm	-	-
No. and diameter of wires	No./mm	-	-
Cross sectional Area	Sq.mm	-	-
Outer sheath material		Flame retardant/zero Halogen	Flame retardant/zero Halogen
Nominal Thickness of outer sheath	mm	-	-
Nominal overall diameter (± 2 mm)	mm	-	-
Minimum bending radius	mm	-	-
Max. DC conductor resistance at 20 deg C	Ohm/km	-	-

DESCRIPTION	UNIT	Values required	
Star reactance per phase at 50 Hz	Ohm/km	-	-
Capacitance per phase	μ F/km	-	-
Charging current per phase at U ₀ , 50 Hz	A/km	-	-
Max. Current rating in Air	A	-	-
Max. Current rating in Ground	A	-	-
Max. Conductor temperature on continuous	Deg.C	90	90
Max. Conductor temperature in short circuit	Deg.C	250	250
Max. Short circuit current rating (Conductor)		-	-
t = 0.1 sec	kA	-	-
t = 0.2 sec	kA	-	-
t = 0.5 sec	kA	-	-
t = 1.0 sec	kA	-	-

Length marking: Length shall be marked with number at one-meter intervals on the sheath. -Bidder to furnish the data

16. LV BUS DUCT

SN	Description	Unit	Values
1	Make		--
2	Applicable Standard		IEC61439 Part1 & 6
3	System nominal voltage	Volt	1000V
4	System frequency	Hz	50HZ
5	Number of phases		3 Phase
6	Current rating	A	1600A
a.	Continuous – 100%	A	1600A
b.	Over load – 150% for 2 hours	A	Comply, 2400A
c.	Over load – 300% for 1 minute	A	Comply, 4800A
8	Deleted		
9	Insulation level		Class F
a.	1-minute dry power frequency withstand voltage	kV rms	2.2 KV
b.	Impulse withstand voltage		12 KV
10	Short time rating (symmetrical kA for 1 second)	kA	80 KA
11	Cooling		Air Cooled
12	Design ambient temperature	°C	45 Deg. C
13	Location		India
14	Degree of protection		IP55
15	Maximum temperature rise (over 50°C ambient)		
a.	Bus conductor	°C	55 Deg C
b.	Bus enclosure and support structure	°C	45 Deg C
16	Material		
a.	Busbar		Aluminium
b.	Enclosure		GI
17	Constructional features		
a.	Busbar joints		Uniblock Joint
b.	Flexible / expansion		Flexibleat termination
i.	Material		Copper
ii.	Type		Braided / Laminated
iii.	Short circuit & continuous rating		80 KA & 1600A
c.	Cover over chamber		Adopter box provided
18	Enclosure joints		provided
19	Disconnecting link		NA
20	Ground bus		Earth Bus Bar provided
21	Grounding terminal		provided
22	Paint finish		
a.	Inside		NA
b.	Outside		RAL 7032
c.	Coating thickness		50-80 micron
23	Applicable standards		RAL 7032
24	Acceptance tests		Thickness & adhesive
25	Application clearance		14 mm
26	Creepage distance		16 mm

25	Application clearance		14 mm
26	Creepage distance		16 mm
27	Seal off bushing at wall entries		NA
28	Insulators non-hygroscopic FRP/SMC with high anti-tracking index		NA
29	Inspection		Visual.