

SECTION 08

GUARANTEED TECHNICAL PARTICULAR (GTP)

OF

(PLANT & EQUIPMENT)

8.01(a). Guaranteed Technical Particulars of 33 KV Indoor Type Gas insulated switchgear (GIS) With Protection, Control and Metering Equipment (for for Shershah Crescent Industries New, Chandgaon Residential Area New, Boro Dighir Par New, A K Khan School, Mohora New, Muradpur New)

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

	DESCRIPTION	UNIT	BPDB REQUIREMENT	BIDDER'S GUARANTEED VALUES
1.	a) Manufacturer's name & address With website, official domain email.	-	Shall be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
2.	Type/ Model	-	Shall be mentioned	
3.	Manufacturer & country of origin	-	USA/UK/EU/Japan/ South Korea/Malaysia	
4.	Applied Standard	-	Latest version of IEC 62271 fully complied	
5.	Rated nominal Voltage	kV	33	
6.	Rated Voltage	kV	36	
7.	Rated Frequency	Hz	50	
8.	Material of Bus-Bar	-	HDHC Copper	
9.	Busbar Scheme	-	Single Bus with Bus Coupler	
10	Installation	-	Free Standing	
11.	Rated Current for Main Bus			
	Single Bus (As per scope)	Amps	2000	
12.	Cross Section of bus bar	mm ²	Min 1600 for 2000A Bus or (As per IEC62271)	
13.	Rated symmetrical short circuit breaking current for Single Bus	KA	31.5	
14.	Short time current rated duration	Sec.	3	
15.	Pressure relief device is integrated with each gas chamber	-	Yes	
16.	Mimic diagram is depicted in front of switchgear panel	-	Yes	
17.	Electrical and Mechanical interlock between Circuit breaker, isolator and earth switch	-	Yes	
18.	Capacitive Voltage Indicator with Interlock contact for ES operation	-	Yes	
19.	Circuit Breaker:			
	Type of interrupter	-	VCB	

	Class of Circuit Breaker (Supported by Type Test report)	-	E2M2 or better	
	Designation of Internal Arc Classification (Supported by Type Test Report)	-	IAC AFLR 31.5 kA, 1 Sec	
	Insulation media	-	SF ₆	
	Interrupting media	-	Vacuum	
	Manufacturer's name and country of origin of vacuum interrupter	-	To be mentioned	
	Manufacturer's model no. of Vacuum Interrupter (Model no. shall be supported by Type Test)	-	To be mentioned	
	Guaranteed nos. of operation for Vacuum Interrupter			
	a) at rated Current switching	Nos.	Min. 10,000	
	b) at Short circuit current switching	Nos.	≥ 50	
	Rated Voltage	kV	36	
	Rated Current for Incoming as per scope	A	1250/2000	
	Rated Current for Outgoing	A	1250	
	Rated Current for Power Transformer	A	1250	
	Rated Current for Bus coupler (Single Bus) as per scope.	A	2000	
	Rated Short Circuit Breaking Current for Single Bus.	kA	31.5	
	Rated duration of short circuit current	sec	3	
	Rated Short Circuit Making Current for Single Bus.	kA	80	
	Rated Breaking time	Cycle	≤5	
	Opening time	Sec.	shall be mentioned	
	Closing time	Sec.	shall be mentioned	
	Rated operating Sequence	-	O-0.3 sec-CO-3 min-CO	
	Control Voltage	V	DC 110	
	AC Voltage for the Universal Motor for spring charge	V	AC 230	
	Power Consumption of Charging motor	W	Max 250	
	Power consumption of opening/trip coil	W	Max 300	
	Nos. of Trip coils	Nos.	2	
20.	Three position disconnecter Switch (Both Motor and Manual)			
	Type/ Model	-	Shall be mentioned	
	Rated Voltage	kV	36	
	Rated Current for Incoming as per scope	A	1250	
	Rated Current for Outgoing	A	1250	

	Rated Current for Power Transformer	A	1250	
	Rated Current for Bus coupler (Single Bus) as per scope.	A	2000	
	Rated short time current for Single Bus.	kA	31.5	
	Short time current rated duration	Sec	3	
	Switch Position	-	close, open, earth	
	Electrical and Mechanical interlock	-	As per IEC 62271-200	
	Mechanical Endurance Class	-	Shall be mentioned	
21.	Current Transformer :			
	Type	-	Ring core/block type with sensor	
	Rated Voltage	kV	36	
	Accuracy Class, Metering	-	0.2 S	
	Accuracy Class, Protection	-	5P20	
	Rated Current Ratio for incoming as per scope	A	600-1200/5-5A	
	Rated Current Ratio (for Outgoing, Station Auxiliary Feeder)	A	400-800/5-5A	
	Rated Current Ratio (for Bus Coupler; Single Bus)	A	900-1800/5-5A	
	Rated Current Ratio (for power transformer panel)	A	400-800/5-5-5A	
	Burden for metering	VA	20 (at max CT ratio)	
	Burden for protection	VA	20 (at max CT ratio)	
	Extended Current Rating for metering	A	120 % of rated Current	
	Instrument Security factor (metering)	-	< 5	
	R _{CT} at 75 ⁰ C			
	(a) Measuring Core	mΩ	shall be mentioned	
	(b) Protection Core	mΩ	shall be mentioned	
	Knee Point Minimum Voltage (Supported by Calculation)			
	(a) Measuring Core	V	shall be mentioned	
	(b) Protection Core	V	shall be mentioned	
	Rated frequency	Hz	50	
	CT burden shall meet the Short Circuit Current (31.5 kA, 3 Sec) (Supported by Calculation)	-	Yes	
22	33 kV Cable Compartment: (For INCOMING/OUTGOING & TRANSFORMER Feeder)			
	Material	-	Highly Conductive Copper	
	Bus bar type	-	Single	
	Cross Section	mm ²	Min 1600 for 2000A Bus or	

			(As per IEC62271)	
	Nominal Current	A	2000	
	Cable connection as per scope	-	1x1Cx800mm ² ,1x1Cx500mm ² (Incoming/Outgoing & Transformer Feeder Panels), 3Cx95 mm ² for Auxiliary x-former XLPE armoured copper cable per phase as per scope of works section 6. Cable termination plug and socket with all accessories required for cable termination, suitable for terminating with proper cable support shall be provided. One spare cable connection facility for each GIS panel and Sealing/cap for unused cable termination shall also to be provided.	
23.	Bus Voltage Transformer :			
	Type/ Model	-	Shall be mentioned	
	Number of Phase	-	Single Phase	
	Rated Primary Voltage	kV	33/√3	
	Rated Secondary Voltage	V	110/√3	
	Rated burden, Secondary	VA	20	
	Accuracy class (Metering & Protection)	-	0.2 & 3P	
	LV Compartment	-	IP40	
24	Line Voltage Transformer :			
	Type/ Model	-	Shall be mentioned	
	Number of Phase	-	Single Phase	
	Rated Primary Voltage	kV	33/√3	
	Rated Secondary Voltage	V	110/√3	
	Rated Burden	VA	20	
	Accuracy class (Metering & Protection)	-	0.2 & 3P	
25.	SF6 Safety and life			
	SF6 Pressure	KPa	Shall be mentioned	
	Rated pressure at 20 degree C	KPa	Shall be mentioned	
	Bursting Pressure	KPa	Shall be mentioned	
	Gas leakage rate/year (Supported by Type Test report)	KPa	≤0.1%	
	Safety indication	-	To be incorporated	
	Capacitive voltage indicator	-	In the front of the panel	
	Gas pressure Manometer	-	As per IEC 62271-1	
	Bus Bar Gas pressure Manometer	-	As per IEC 62271-1	
	Life/ Endurance of switchgear switches			
	a) Circuit Breakers	-	As per IEC 62271-100	
	b) Disconnectors & Earthing switches	-	As per IEC 62271-102	
	Alarm level for insulation	Kpa	140	
	Rated filling level for insulation	KPa	150	

26.	Dimension and Weight			
	Height	mm	Shall be mentioned	
	Width	mm	Shall be mentioned	
	Depth	mm	Shall be mentioned	
	Weight including Circuit Breaker	Kg.	Shall be mentioned	
27.	Construction :			
	a) Stainless steel tank	-	Shall be mentioned	
	b) Equipped with disconnecter and earthing switch. The earthing switch shall have full fault-making capacity.	-	Shall be mentioned	
	c) Each gas filled compartment shall be equipped with density sensors giving alarm by low gas density.	-	Shall be mentioned	
28.	Degree of Protection			
	Enclosure	-	IP3X	
	HV Compartment	-	IP65	
	LV Compartment	-	IP40	
29.	Insulation level :			
	AC withstand voltage 1min. dry	kV	70	
	Impulse Withstand, full wave	kV	170	
30.	Type Test Report (as per IEC 62271-200)			
	Lightning Impulse Voltage Withstand tests	-	Shall be submitted	
	Power frequency withstand tests	-	Shall be submitted	
	Temperature/ Gas pressure Rise Tests.	-	Shall be submitted	
	Measurement of resistance of the main circuit.	-	Shall be submitted	
	Short circuit performance tests	-	Shall be submitted	
	Mechanical Endurance tests.	-	Shall be submitted	
	Arc fault test	-	Shall be submitted	
	Gas Leakage Test	-	Shall be submitted	
A. Protection Control & Metering (Transformer Feeder)				
31.	Differential and Restricted Earth Fault Relay			
	Manufacturer's Name	-	ABB- Sweden, Switzerland, Finland/ Siemens -Germany/ Schneider-France /UK / Alstom (UK/France)/ NR, China/ SEL, USA.	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Numerical programmable	

	Maximum through fault at which the protective equipment is stable with recommend settings:		
	a) Earth faults	rating % of CT rating	Shall be mentioned
	b) Phase faults		Shall be mentioned
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	ms	Shall be mentioned
	The Relay shall be IEC 61850 protocol type.	-	Yes
	Relay Nominal operating voltage	-	110Vdc
	Relay CT Current rating	-	5A
	No of Binary Input (Minimum)	-	There shall be total 42 BI in Transformer Feeder Panel
	No of Binary Output (Minimum)	-	There shall be total 32 BO in Transformer Feeder Panel
	No of Communication Ports i) Electrical ii) Optical	-	Shall be mentioned with type.
	Protection Functions	-	Differential and Restricted earth fault protection (for a Two winding transformer considering Vector group of Dyn11) and other mandatory functions
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned
	Range of current setting : (a) Earth Faults (b) Phase Faults	% of CT rating	Shall be mentioned
	Range of timing settings	Sec	Shall be mentioned
	Burden of relay at 20 time CT rating	VA	Shall be mentioned
	Percentage of current setting at which relay will reset.	%	Shall be mentioned
	The relay shall have IEC 61850 communication Protocol	-	Yes
32.	Over Current & Earth Fault Protection Relay		

	Manufacture's Name Country of Origin	-	ABB- Sweden, Switzerland, Finland / Siemens -Germany/ Schneider-France /UK/ Alstom (UK/France)/ NR, China/ SEL, USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of relay	-	Numerical programmable Multifunction	
	Range of current setting:	-		
	a) Phase element	% of CT	Shall be mentioned	
	b) Each fault element	rating	Shall be mentioned	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	There shall be total 42 BI in Transformer Feeder Panel	
	No of Binary Output (Minimum)	-	There shall be total 32 BO in Transformer Feeder Panel	
	No of Communication Ports iii) Electrical iv) Optical	-	Shall be mentioned with type.	
	Protection Function	-	Non-Directional O/C, E/F Other Necessary Functions.	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	
	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	Drop off to Pick up ratio	%	Shall be mentioned	
	Reset time after removal of fault current	Sec	Shall be mentioned	
	The relay shall have IEC 61850 communication Protocol	-	Yes	
33	Trip Circuit Supervision (TCS) Relay (Separate Relay for each trip coil)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	

	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
34	Trip Relay (Separate Relay) for Differential and O/C & E/F			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
	Operating Time	ms	<10	
	Operating Coil Voltage- 110V DC	-	Yes	
	Self-reset type for O/C, E/F protection	-	Yes	
	Hand & Electrical reset type for Differential, REF and Transformer Self-protection	-	Yes	
35	Separate Auxiliary Flag Relays for Transformer self-protection (OTA, OTT, WTA, WTT, BA, BT, OLTC Surge, PRD for main tank & OLTC.			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
36	Annunciator			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Windows	nos.	30	
	Built in buzzer and buttons for accept, mute, test, reset, etc.	-	Yes	
	AC /DC Dual Supply Provision	-	Yes	
37	Control Switch			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Separate TNC/Discrepancy switch and Local Remote (L/R) selector switch	-	Yes	
B. Protection Control & Metering (Incoming/Outgoing Feeder & Bus Coupler)				

38.	Over Current & Earth Fault Protection Relay			
	Manufacture's Name Country of Origin	-	ABB- Sweden, Switzerland, Finland/ Siemens -Germany/ Schneider-France /UK/ Alstom -(UK/France)/ NR- China/ SEL- USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of relay	-	33kV Incoming/ Outgoing line feeders numerical relay shall have both directional	

			and non-directional O/C & E/F protection (IDMT, DMT, Inst.) feature with monitoring functions”	
			33kV Bus coupler feeders numerical relay shall have non-directional O/C & E/F protection (IDMT, DMT, Inst.) and synchro check feature with monitoring functions.	
	Range of current setting :	-		
	a) Phase element	% of CT rating	Shall be mentioned	
	b) Each fault element		Shall be mentioned	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	24 for line Feeder, 32 for Bus Coupler	
	No of Binary Output (Minimum)	-	24 for line Feeder, 24 for Bus Coupler	
	No of Communication Ports v) Electrical vi) Optical	-	Shall be mentioned with type.	
	Protection Function	-	Directional and Non-Directional O/C, E/F, Over/ Under Voltage, Over and Under Frequency, Sync Check And Other Necessary Functions.	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	

	Drop off to Pick up ratio	-	Shall be mentioned	
	Reset time after removal of fault current	-	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	
	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	The relay shall have IEC 61850 communication Protocol	-	Yes	

39	Trip Circuit Supervision (TCS) Relay (Separate Relay for each trip coil)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
40	Trip Relay (Separate Relay)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
	Operating Time	ms	<10	
	Self-reset type for O/C, E/F protection	-	Yes	
	Operating Coil Voltage- 110V DC	-	Yes	
41	Annunciator			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Windows	nos.	14	
	Built in buzzer and buttons for accept, mute, test, reset, etc.	-	Yes	
	AC /DC Dual Supply Provision	-	Yes	
42	Control Switch			
	Manufacture's Name	-		
	Country of Origin	-		
	Manufacture's Model no.	-		
	Separate TNC/Discrepancy switch and Local Remote (L/R) selector switch	-	Yes	
43	Metering and Instrumentation (for Incoming/Outgoing, Power Transformer & Bus Coupler feeder)			
	a) Energy Meter (Multi Tariff Programmable Meter) (N.B. Not applicable for Bus Coupler Panel)			
	Manufacture's Name	-	Shall be mentioned	
	Manufacture's Country		European Country/ North American Country/Japan/ Australia	
	Manufacture's Model no.	-	Shall be mentioned	

	Type of Meter	-	Numerical programmable	
	Class of Accuracy	-	0.2 S	
b) VOLT METERS with Selector Switch				
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Analogue, 90 degree scale range	
	Class of Accuracy	-	1.0	
	Bus Coupler panel shall have 2 nos. voltmeter with seven (7) position voltage selector switch	-	To be provided	
c) Ampere Meters				
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Analogue, 240 degree scale range	
	Class of Accuracy	-	1.0	
	Separate A-meter for each phase	-	Yes	
C. Station Auxiliary Transformer Switchgear Unit				
44.	Manufacturer's Name & Address	-	To be mentioned	
45.	Manufacturer country of origin	-	USA/UK/EU/Japan/ South Korea/Malaysia	
46.	Type	-	Shall be mentioned	
47.	Rated nominal Voltage	kV	33	
48.	Rated Voltage	kV	36	
49.	Material of Bus-Bar	-	HDHC Copper	
50.	Rated Current for main bus			
	Single Bus (As per scope)	Amps	2000	
51.	Cross Section of busbar	mm ²	1600	
52.	Rated short time current	kA	31.5	
53.	Short time current rated duration	Sec.	3	
54.	Circuit Breaker :			
	Manufacturer's model no. of vacuum interrupter	-	Shall be mentioned	
	Rated Voltage	kV	36	
	Rated Current	A	1250	
	Rated Short Ckt. Breaking Current	kA	31.5	
	Rated duration of short circuit current	sec	3	
	Rated Short CKt. Making Current	kA	80	
	Rated Breaking time	Cycle	≤5	
55.	TPS (DS-ES) (motor & manually operated)			
	Rated Maximum Voltage	kV	36	
	Operating Mechanism	-	Shall be mentioned	

	Insulating media	-	SF6	
	Rated Current	A	1250	
	Rated short time current	kA	31.5	
	Short time current rated duration	Sec	3	
	Switch Position	-	close, open, earth	
	Electrical and Mechanical interlock	-	As per IEC 62271-200	
	Mechanical Endurance Class	-	Shall be mentioned	
56.	Insulation level :			
	AC withstand voltage 1min. dry	kV	70	
	Impulse Withstand, full wave	kV	170	
58.	Degree of Protection			
	Enclosure	-	IP3X	
	HV Compartment	-	IP65	
	LV Compartment	-	IP40	
59.	Dimension and Weight			
	Height	mm	Shall be mentioned	
	Weight	mm	Shall be mentioned	
	Depth	mm	Shall be mentioned	
60.	Type Test Report (as per IEC 62271-200)			
	Lightning Impulse Voltage Withstand tests	-	Shall be submitted	
	Power frequency withstand tests	-	Shall be submitted	
	Temperature/Gas pressure Rise Tests.	-	Shall be submitted	
	Measurement of resistance of the main circuit.	-	Shall be submitted	
	Short circuit performance tests	-	Shall be submitted	
	Mechanical Endurance tests.	-	Shall be submitted	
	Arc fault test	-	Shall be submitted	
	Gas Leakage Test	-	Shall be submitted	
D. Protection Control & Metering for station transformer				

61	Over Current and Earth Fault Protection Relay			
	Manufacture's Name Country of Origin	-	ABB- Sweden, Switzerland, Finland/ Siemens –Germany/ Schneider-France /UK / Alstom (UK/France)/ NR, China/ SEL, USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of relay	-	Numerical programmable, multifunction with	

			both directional and non-directional O/C & E/F protection (IDMT, DMT, Inst.) feature and monitoring functions.	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	24	
	No of Binary Output (Minimum)	-	24	
	No of Communication Ports vii) Electrical viii) Optical	-	Shall be mentioned with type.	
	Protection Function	-	Non-Directional O/C, E/F Other Necessary Functions.	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Range of Current Setting a) Phase Fault Element b) Earth Fault Element	-	Shall be mentioned	
	Range of timing settings	-	Shall be mentioned	
	Drop off to Pick up ratio	-	Shall be mentioned	
	Reset time after removal of fault current	-	Shall be mentioned	
	Burden of Relay At 20 time CT rating.	VA	Shall be mentioned	
	The relay shall have IEC 61850 communication Protocol.	-	Yes	
62	Trip Circuit Supervision (TCS) Relay (Separate Relay)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	

	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
63	Trip Relay (Separate Relay)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
64	Annunciator			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Windows	nos.	14	
	Built in buzzer and buttons for accept, mute, test, reset, etc.	-	Yes	
	AC /DC Dual Supply Provision	-	Yes	
65	Metering			
	a) Energy Meter (Multi Tariff Programmable Meter)			
	Manufacture's Name	-	Shall be mentioned	
	Manufacture's Country	-	European Country/ North American Country/Japan/ Australia	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Numerical	
	Class of Accuracy	-	0.2 S	
	b) Volt Meters			
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Analogue, 90 degree scale range	
	Class of Accuracy	-	1.0	
	c) Ampere Meters			
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Analogue, 240 degree scale range	
	Class of Accuracy	-	1.0	
	Separate A-meter for each phase	-	Yes	
66	Marking	-	"BPDB & Contract No."	
67	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.01(b) Guaranteed Technical Particulars of 33 KV Indoor Type Gas insulated switchgear (GIS) With Protection, Control and Metering Equipment (for Sholoshohor Upgradation)

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

	DESCRIPTION	UNIT	BPDB REQUIREMENT	BIDDER'S GUARANTEED VALUES
1.	a) Manufacturer's name & address With website, official domain email.	-	Shall be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
2.	Type/ Model	-	Shall be mentioned	
3.	Manufacturer & country of origin	-	USA/UK/EU/Japan/ South Korea/Malaysia	
4.	Applied Standard	-	Latest version of IEC 62271 fully complied	
5.	Rated nominal Voltage	kV	33	
6.	Rated Voltage	kV	36	
7.	Rated Frequency	Hz	50	
8.	Material of Bus-Bar	-	HDHC Copper	
9.	Busbar Scheme	-	Double with Bus Coupler	
10	Installation	-	Free Standing	
11.	Rated Current for Main Bus			
	Double Bus (As per scope)	Amps	3150	
12.	Cross Section of bus bar	mm ²	Min 2500 for 3150A Bus or (As per IEC62271)	
14.	Rated symmetrical short circuit breaking current for Double Bus	KA	40	
	Short time current rated duration	Sec.	3	
15.	Pressure relief device is integrated with each gas chamber	-	Yes	
16.	Mimic diagram is depicted in front of switchgear panel	-	Yes	
17.	Electrical and Mechanical interlock between Circuit breaker, isolator and earth switch	-	Yes	
18.	Capacitive Voltage Indicator with Interlock contact for ES operation	-	Yes	
19.	Circuit Breaker:			

	Type of interrupter	-	VCB	
	Class of Circuit Breaker (Supported by Type Test report)	-	E2M2 or better	
	Designation of Internal Arc Classification (Supported by Type Test Report)	-	IAC AFLR 31.5 kA, 1 Sec	
	Insulation media	-	SF ₆	
	Interrupting media	-	Vacuum	
	Manufacturer's name and country of origin of vacuum interrupter	-	To be mentioned	
	Manufacturer's model no. of Vacuum Interrupter (Model no. shall be supported by Type Test)	-	To be mentioned	
	Guaranteed nos. of operation for Vacuum Interrupter			
	a) at rated Current switching	Nos.	Min. 10,000	
	b) at Short circuit current switching	Nos.	≥ 50	
	Rated Voltage	kV	36	
	Rated Current for incoming as per scope	A	2500	
	Rated Current for outgoing	A	1250	
	Rated Current for Power Transformer	A	1250	
	Rated Current for Bus coupler (Double Bus) as per scope.	A	3150	
	Rated Short Circuit Breaking Current for Double Bus.	kA	40	
	Rated duration of short circuit current	sec	3	
	Rated Short Circuit Making Current for Double Bus.	kA	102	
	Rated Breaking time	Cycle	≤5	
	Opening time	Sec.	shall be mentioned	
	Closing time	Sec.	shall be mentioned	
	Rated operating Sequence	-	O-0.3 sec-CO-3 min-CO	
	Control Voltage	V	DC 110	
	AC Voltage for the Universal Motor for spring charge	V	AC 230	
	Power Consumption of Charging motor	W	Max 250	
	Power consumption of opening/trip coil	W	Max 300	
	Nos. of Trip coils	Nos.	2	
20.	Three position disconnecter Switch (Both Motor and Manual)			
	Type/ Model	-	Shall be mentioned	
	Rated Voltage	kV	36	
	Rated Current for incoming as per scope	A	2500	

	Rated Current for outgoing	A	1250	
	Rated Current for Power Transformer	A	1250	
	Rated Current for Bus coupler (Double Bus) as per scope.	A	3150	
	Rated short time current for Double Bus.	kA	40	
	Short time current rated duration	Sec	3	
	Switch Position	-	close, open, earth	
	Electrical and Mechanical interlock	-	As per IEC 62271-200	
	Mechanical Endurance Class	-	Shall be mentioned	
21.	Current Transformer :			
	Type	-	Ring core/block type with sensor	
	Rated Voltage	kV	36	
	Accuracy Class, Metering	-	0.2 S	
	Accuracy Class, Protection	-	5P20	
	Rated Current Ratio for incoming as per scope	A	1200-2400/5-5A	
	Rated Current Ratio (for outgoing, Station Auxiliary Feeder)	A	400-800/5-5A	
	Rated Current Ratio for (Bus Coupler; Double Bus as per scope)	A	1600-3200/5-5A	
	Rated Current Ratio (for power transformer panel)	A	400-800/5-5-5A	
	Burden for metering	VA	20 (at max CT ratio)	
	Burden for protection	VA	20 (at max CT ratio)	
	Extended Current Rating for metering	A	120 % of rated Current	
	Instrument Security factor (metering)	-	< 5	
	R _{CT} at 75 ⁰ C			
	(a) Measuring Core	mΩ	shall be mentioned	
	(b) Protection Core	mΩ	shall be mentioned	
	Knee Point Minimum Voltage (Supported by Calculation)			
	(a) Measuring Core	V	shall be mentioned	
	(b) Protection Core	V	shall be mentioned	
	Rated frequency	Hz	50	
	CT burden shall meet the Short Circuit Current (31.5 kA, 3 Sec) (Supported by Calculation)	-	Yes	
22	33 kV Cable Compartment: (For Incoming/Outgoing & Transformer Feeder)			
	Material	-	Highly Conductive Copper	
	Bus bar type	-	Double	
	Cross Section	mm ²	Min 2500 for 3150A Bus or	

			(As per IEC62271)	
	Nominal Current	A	3150	
	Cable connection as per scope	-	3x1Cx800mm ² ,1x1Cx500mm ² (Incoming/Outgoing & Transformer Feeder Panels), 3Cx95 mm ² for Auxiliary x-former XLPE armoured copper cable per phase as per scope of works section 6. Cable termination plug and socket with all accessories required for cable termination, suitable for terminating with proper cable support shall be provided. One spare cable connection facility for each GIS panel and Sealing/cap for unused cable termination shall also to be provided.	
23.	Bus Voltage Transformer :			
	Type/ Model	-	Shall be mentioned	
	Number of Phase	-	Single Phase	
	Rated Primary Voltage	kV	33/√3	
	Rated Secondary Voltage	V	110/√3	
	Rated burden	VA	20	
	Accuracy class (Metering & Protection)	-	0.2 & 3P	
	LV Compartment	-	IP40	
24	Line Voltage Transformer :			
	Type/ Model	-	Shall be mentioned	
	Number of Phase	-	Single Phase	
	Rated Primary Voltage	kV	33/√3	
	Rated Secondary Voltage	V	110/√3	
	Rated Burden	VA	20	
	Accuracy class (Metering & Protection)	-	0.2 & 3P	
25.	SF6 Safety and life			
	SF6 Pressure	KPa	Shall be mentioned	
	Rated pressure at 20 degree C	KPa	Shall be mentioned	
	Bursting Pressure	KPa	Shall be mentioned	
	Gas leakage rate/year (Supported by Type Test report)	KPa	≤0.1%	
	Safety indication	-	To be incorporated	
	Capacitive voltage indicator	-	In the front of the panel	
	Gas pressure Manometer	-	As per IEC 62271-1	
	Bus Bar Gas pressure Manometer	-	As per IEC 62271-1	
	Life/ Endurance of switchgear switches			
	c) Circuit Breakers	-	As per IEC 62271-100	
	d) Disconnectors & Earthing switches	-	As per IEC 62271-102	
	Alarm level for insulation	Kpa	140	
	Rated filling level for insulation	KPa	150	

26.	Dimension and Weight			
	Height	mm	Shall be mentioned	
	Width	mm	Shall be mentioned	
	Depth	mm	Shall be mentioned	
	Weight including Circuit Breaker	Kg.	Shall be mentioned	
27.	Construction :			
	b) Stainless steel tank	-	Shall be mentioned	
	b) Equipped with disconnecter and earthing switch. The earthing switch shall have full fault-making capacity.	-	Shall be mentioned	
	c) Each gas filled compartment shall be equipped with density sensors giving alarm by low gas density.	-	Shall be mentioned	
28.	Degree of Protection			
	Enclosure	-	IP3X	
	HV Compartment	-	IP65	
	LV Compartment	-	IP40	
29.	Insulation level :			
	AC withstand voltage 1min. dry	kV	70	
	Impulse Withstand, full wave	kV	170	
30.	Type Test Report (as per IEC 62271-200)			
	Lightning Impulse Voltage Withstand tests	-	Shall be submitted	
	Power frequency withstand tests	-	Shall be submitted	
	Temperature/ Gas pressure Rise Tests.	-	Shall be submitted	
	Measurement of resistance of the main circuit.	-	Shall be submitted	
	Short circuit performance tests	-	Shall be submitted	
	Mechanical Endurance tests.	-	Shall be submitted	
	Arc fault test	-	Shall be submitted	
	Gas Leakage Test	-	Shall be submitted	
E. Protection Control & Metering (Transformer Feeder)				
31.	Differential and Restricted Earth Fault Relay			
	Manufacturer's Name	-	ABB- Sweden, Switzerland, Finland/ Siemens -Germany/ Schneider-France /UK / Alstom (UK/France)/ NR, China/ SEL, USA.	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Numerical programmable	

	Maximum through fault at which the protective equipment is stable with recommend settings:			
	a) Earth faults	rating % of CT rating	Shall be mentioned	
	b) Phase faults		Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	ms	Shall be mentioned	
	The Relay shall be IEC 61850 protocol type.	-	Yes	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	There shall be total 42 BI in Transformer Feeder Panel	
	No of Binary Output (Minimum)	-	There shall be total 32 BO in Transformer Feeder Panel	
	No of Communication Ports ix) Electrical x) Optical	-	Shall be mentioned with type.	
	Protection Functions	-	Differential and Restricted earth fault protection (for a Two winding transformer considering Vector group of Dyn11) and other mandatory functions	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Range of current setting : (c) Earth Faults (d) Phase Faults	% of CT rating	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	
	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	Percentage of current setting at which relay will reset.	%	Shall be mentioned	
	The relay shall have IEC 61850 communication Protocol	-	Yes	
32.	Over Current & Earth Fault Protection Relay			

	Manufacture's Name Country of Origin	-	ABB- Sweden, Switzerland, Finland / Siemens -Germany/ Schneider-France /UK/ Alstom (UK/France)/ NR, China/ SEL, USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of relay	-	Numerical programmable Multifunction	
	Range of current setting:	-		
	a) Phase element	% of CT	Shall be mentioned	
	b) Each fault element	rating	Shall be mentioned	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	There shall be total 42 BI in Transformer Feeder Panel	
	No of Binary Output (Minimum)	-	There shall be total 32 BO in Transformer Feeder Panel	
	No of Communication Ports xi) Electrical xii) Optical	-	Shall be mentioned with type.	
	Protection Function	-	Non-Directional O/C, E/F Other Necessary Functions.	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	
	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	Drop off to Pick up ratio	%	Shall be mentioned	
	Reset time after removal of fault current	Sec	Shall be mentioned	
	The relay shall have IEC 61850 communication Protocol	-	Yes	
33	Trip Circuit Supervision (TCS) Relay (Separate Relay for each trip coil)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	

	Type of Relay	-	Shall be mentioned	
34	Trip Relay (Separate Relay) for Differential and O/C & E/F			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
	Operating Time	ms	<10	
	Operating Coil Voltage- 110V DC	-	Yes	
	Self-reset type for O/C, E/F protection	-	Yes	
	Hand & Electrical reset type for Differential, REF and Transformer Self-protection	-	Yes	
35	Separate Auxiliary Flag Relays for Transformer self-protection (OTA, OTT, WTA, WTT, BA, BT, OLTC Surge, PRD for main tank & OLTC.			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
36	Annunciator			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Windows	nos.	30	
	Built in buzzer and buttons for accept, mute, test, reset, etc.	-	Yes	
	AC /DC Dual Supply Provision	-	Yes	
37	Control Switch			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Separate TNC/Discrepancy switch and Local Remote (L/R) selector switch	-	Yes	
F. Protection Control & Metering (Incoming/Outgoing Feeder & Bus Coupler Panel)				
38.	Over Current & Earth Fault Protection Relay			
	Manufacture's Name Country of Origin	-	ABB- Sweden, Switzerland, Finland/ Siemens -Germany/ Schneider-France /UK/ Alstom -(UK/France)/ NR- China/ SEL- USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of relay	-	33kV Incoming/ Outgoing line feeders numerical relay shall have both directional and non-directional O/C & E/F protection	

			(IDMT, DMT, Inst.) feature with monitoring functions” 33kV Bus coupler feeders numerical relay shall have non-directional O/C & E/F protection (IDMT, DMT, Inst.) and synchro check feature with monitoring functions.	
	Range of current setting :	-		
	a) Phase element	% of	Shall be mentioned	
	b) Each fault element	CT rating	Shall be mentioned	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	24 for line Feeder, 32 for Bus Coupler	
	No of Binary Output (Minimum)	-	24 for line Feeder, 24 for Bus Coupler	
	No of Communication Ports	-	Shall be mentioned with type.	
	i) Electrical			
	ii) Optical			
	Protection Function	-	Directional and Non-Directional O/C, E/F, Over/ Under Voltage, Over and Under Frequency, Sync Check And Other Necessary Functions.	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Drop off to Pick up ratio	-	Shall be mentioned	

	Reset time after removal of fault current	-	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	
	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	The relay shall have IEC 61850 communication Protocol	-	Yes	
39	Trip Circuit Supervision (TCS) Relay (Separate Relay for each trip coil)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
40	Trip Relay (Separate Relay)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
	Operating Time	ms	<10	
	Self-reset type for O/C, E/F protection	-	Yes	
	Operating Coil Voltage- 110V DC	-	Yes	
41	Annunciator			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Windows	nos.	14	
	Built in buzzer and buttons for accept, mute, test, reset, etc.	-	Yes	
	AC /DC Dual Supply Provision	-	Yes	
42	Control Switch			
	Manufacture's Name	-		
	Country of Origin	-		
	Manufacture's Model no.	-		
	Separate TNC/Discrepancy switch and Local Remote (L/R) selector switch	-	Yes	
43	Metering and Instrumentation (for Incoming/Outgoing, Power Transformer & Bus Coupler feeder)			
	a) Energy Meter (Multi Tariff Programmable Meter) (N.B. Not applicable for Bus Coupler Panel)			
	Manufacture's Name	-	Shall be mentioned	
	Manufacture's Country		European Country/ North American Country/Japan/ Australia	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Numerical programmable	
	Class of Accuracy	-	0.2 S	

b) VOLT METERS with Selector Switch			
	Manufacturer's Name and Country	-	Shall be mentioned
	Manufacture's Model no.	-	Shall be mentioned
	Type of Meter	-	Analogue, 90 degree scale range
	Class of Accuracy	-	1.0
	Bus Coupler panel shall have 2 nos. voltmeter with seven (7) position voltage selector switch	-	To be provided
c) Ampere Meters			
	Manufacturer's Name and Country	-	Shall be mentioned
	Manufacture's Model no.	-	Shall be mentioned
	Type of Meter	-	Analogue, 240 degree scale range
	Class of Accuracy	-	1.0
	Separate A-meter for each phase	-	Yes
G. Station Auxiliary Transformer Switchgear Unit			
44.	Manufacturer's Name & Address	-	To be mentioned
45.	Manufacturer country of origin	-	USA/UK/EU/Japan/ South Korea/Malaysia
46.	Type	-	Shall be mentioned
47.	Rated nominal Voltage	kV	33
48.	Rated Voltage	kV	36
49.	Material of Bus-Bar	-	HDHC Copper
50.	Rated Current for Main Bus		
	Double Bus (As per scope)	Amps	3150
51.	Cross Section of bus bar	mm ²	Min 2500 for 3150A Bus or (As per IEC62271)
52.	Rated symmetrical short circuit breaking current for Double Bus	KA	40
53.	Short time current rated duration	Sec.	3
54.	Circuit Breaker :		
	Manufacturer's model no. of vacuum interrupter	-	Shall be mentioned
	Rated Voltage	kV	36
	Rated Current	A	1250
	Rated Short Ckt. Breaking Current	kA	31.5
	Rated duration of short circuit current	sec	3
	Rated Short CKt. Making Current	kA	80
	Rated Breaking time	Cycle	≤5
55.	TPS (DS-ES) (motor & manually operated)		
	Rated Maximum Voltage	kV	36

	Operating Mechanism	-	Shall be mentioned	
	Insulating media	-	SF6	
	Rated Current	A	1250	
	Rated short time current	kA	31.5	
	Short time current rated duration	Sec	3	
	Switch Position	-	close, open, earth	
	Electrical and Mechanical interlock	-	As per IEC 62271-200	
	Mechanical Endurance Class	-	Shall be mentioned	
56.	Insulation level :			
	AC withstand voltage 1min. dry	kV	70	
	Impulse Withstand, full wave	kV	170	
58.	Degree of Protection			
	Enclosure	-	IP3X	
	HV Compartment	-	IP65	
	LV Compartment	-	IP40	
59.	Dimension and Weight			
	Height	mm	Shall be mentioned	
	Weight	mm	Shall be mentioned	
	Depth	mm	Shall be mentioned	
60.	Type Test Report (as per IEC 62271-200)			
	Lightning Impulse Voltage Withstand tests	-	Shall be submitted	
	Power frequency withstand tests	-	Shall be submitted	
	Temperature/Gas pressure Rise Tests.	-	Shall be submitted	
	Measurement of resistance of the main circuit.	-	Shall be submitted	
	Short circuit performance tests	-	Shall be submitted	
	Mechanical Endurance tests.	-	Shall be submitted	
	Arc fault test	-	Shall be submitted	
	Gas Leakage Test	-	Shall be submitted	
H. Protection Control & Metering for station transformer				
61	Over Current and Earth Fault Protection Relay			
	Manufacture's Name Country of Origin	-	ABB- Sweden, Switzerland, Finland/ Siemens –Germany/ Schneider-France /UK / Alstom (UK/France)/ NR, China/ SEL, USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of relay	-	Numerical programmable, multifunction with both directional and	

			non-directional O/C & E/F protection (IDMT, DMT, Inst.) feature and monitoring functions.	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	24	
	No of Binary Output (Minimum)	-	24	
	No of Communication Ports xiii) Electrical xiv) Optical	-	Shall be mentioned with type.	
	Protection Function	-	Non-Directional O/C, E/F Other Necessary Functions.	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Range of Current Setting c) Phase Fault Element d) Earth Fault Element	-	Shall be mentioned	
	Range of timing settings	-	Shall be mentioned	
	Drop off to Pick up ratio	-	Shall be mentioned	
	Reset time after removal of fault current	-	Shall be mentioned	
	Burden of Relay At 20 time CT rating.	VA	Shall be mentioned	
	The relay shall have IEC 61850 communication Protocol.	-	Yes	
62	Trip Circuit Supervision (TCS) Relay (Separate Relay)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	

	Type of Relay	-	Shall be mentioned	
63	Trip Relay (Separate Relay)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
64	Annunciator			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Windows	nos.	14	
	Built in buzzer and buttons for accept, mute, test, reset, etc.	-	Yes	
	AC /DC Dual Supply Provision	-	Yes	
65	Metering			
	a) Energy Meter (Multi Tariff Programmable Meter)			
	Manufacture's Name	-	Shall be mentioned	
	Manufacture's Country	-	European Country/ North American Country/Japan/ Australia	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Numerical	
	Class of Accuracy	-	0.2 S	
	b) Volt Meters			
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Analogue, 90 degree scale range	
	Class of Accuracy	-	1.0	
	c) Ampere Meters			
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Analogue, 240 degree scale range	
	Class of Accuracy	-	1.0	
	Separate A-meter for each phase	-	Yes	
66	Marking	-	"BPDB & Contract No."	
67	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.02 Guaranteed Technical Particulars of Substation Automation System (SAS)

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

SL No.	DESCRIPTION	UNIT	BPDB REQUIREMENT	BIDDER'S GUARANTEED VALUES
1	a) Manufacturer's name & address With website, official domain email.	-	Shall be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
2	Country of Origin	-	EU/USA/CANADA/ Japan/UK	
3	Model of the Substation Automation System	-	Shall be mentioned	
4	General Requirement:			
	Communication protocol at all levels (Standards to be complied with Substation Automation system)	-	IEC61850 Fully complying with the standard.	
	Temperature range (min/max)	-	0° to 50° C	
	Relative humidity	-	20 to 90 % non-condensing	
	Base of Station HMI	-	Active X	
	System performance and inter-operability test Among ABB, Siemens, Alstom, Schneider, NR and SEL IEDs done in the system verification center. (Supported by Test Report)	-	Yes	
	Control IEDs and protection IEDs are from same manufacturer	-	Yes	
	Intelligent Electronic Devices (IED's)			
	Manufacturer's name & address with official email address		Shall be mentioned	
	Type or Model		Shall be mentioned	
	Serial communication interface included		YES (IEC61850)	
	Protection & Control IED's connected to same bus		Yes	
	Self-monitoring		To be provided	
	Display of measured values		To be provided	
	Remote parameterization		To be provided	
	Disturbance record upload & analysis		To be provided	
	Availability Calculation shall be furnished for each equipment & as well as for the entire system		To be provided with Bid.	
	Number of years of proven field experience of offered system.	-	5 Years	
	(Note: Proof of experience should be			

	furnished. The components used in the offered system and those with field experience should be the same)			
	Engineering, Assembling and Wiring of Automation Panel/Cubicle shall be done from the origin of the manufacturer of the system	-	Yes	
	Dimensions of cubicle (Width x Depth x Height)	-	Shall be mentioned	
	Floor load	-	max. 600 N/m ²	
	Design life of Substation Automation System	-	≥ 20 Years	
	Availability of the Spare parts of the system shall be ensured for duration of design life		Yes	
	Manufacturers quality assurance system	-	ISO 9001/9002 or equivalent	
5	Station Level Equipment:			
	Station Computer	-	Industrial PC	
	MTBF (Mean time between Failures)	Hrs	Shall be mentioned	
	MTTR (Mean time to repair)	Hrs	Shall be mentioned	
	Dual Station Computers Provided in redundant hot standby configuration	-	Yes	
	Hot standby takeover time	-	Seconds	
	Number of years of proven field experience of offered software	-	5 Yrs	
	Operating System	-	Windows	
	All standard picture as per technical specification included in HMI	-	To be provided	
	Process Status Display & Command Procedures	-	To be provided	
	Event processing as per technical specification	-	To be provided	
	Alarm processing as per technical specification	-	To be provided	
	Reports as per technical specification	-	To be provided	
	Trend Display as per technical specification	-	To be provided	
	User Authority levels as per spec	-	To be provided	
	System supervision & monitoring as per technical specification	-	To be provided	
	Automatic sequence control as per technical specification	-	To be provided	
	High quality SCD file complete with ICD files & station topology	-	To be provided	
	Operator Work Station (Master/Backup workstation) shall have separately connection to different Ethernet switch	-	Yes	
6	Gateway to Central Control Room (2 nos.)			
	Number of years of proven field experience of offered unit	Yrs	5 Yrs	
	Insulation tests	-	IEC60255-5	
	Fast disturbance tests	-	IEC 61000-4-4, Class 4	
	Industrial environment	-	EN 50081-2, Class	

			A	
	Industrial grade hardware with no moving parts	-	To be provided	
	Design life of offered equipment	-	20Yrs	
	Communication channel with associates/peripherals (Main & redundant connection)	-	To be provided	
	CPU	-	To be provided	
	DC/DC Supply	-	To be provided	
	Redundant Power supply	-	To be provided	
	MTBF (Mean time between Failures)	-	Hrs	
	MTTR (Mean time to repair)	-	Hrs	
	The Master slave Licenses for SCADA and SAS communication in the gateway shall be activated	-	To be provided	
7	Station Bus:			
	Physical Medium connection with associates (Main & redundant communication)	-	Glass fiber optic with Flexible steel armoring	
8	Inter bay Bus:			
	Physical Medium connection with associates (Main & redundant communication)	-	Glass fiber optic with Flexible steel armoring	
9	Printer Server			
	MTBF	Hrs	Shall be mentioned	
11	Hard Copy Color Printer			
	MTBF	Hrs	Shall be mentioned	
12	Master Clock – GPS (Global Positioning System) Receiver:			
	Name of the manufacturer	-	Shall be mentioned	
	Manufacturer's address	-	Shall be mentioned	
	Model	-	Shall be mentioned	
	MTBF	Hrs	Shall be mentioned	
13	Bay Control Unit-33 kV; Bay control function shall be provided in the O/C & E/F relay for each bay/feeder, which will be the part of GIS Panel. However, Separate Bay control unit beside O/C & E/F relay is also acceptable.			
	Manufacturer's name & address	-	Shall be mentioned	
	Type or Model	-	Shall be mentioned	
	Country of Manufacture	-	Shall be mentioned	
	Number of years of proven field experience of offered unit	Yrs	5	
	Type of Bay controller offered	-	HV	
	Separate Bay control unit is provided for each bay & feeder or Bay Control function is provided in the O/C & E/F relay	-	Shall be mentioned	
	Single bit dependence	-	No	

	Control functionality implementation in software with Select before Operate provision for Open-Execute & Close-Execute, Interlocks and other necessary information	-	To be provided	
	Bay & Station Wide Synchro check function ❖ Maximum Voltage difference ❖ Maximum Frequency difference ❖ Maximum Phase difference	Volt Hz Angle	Specify range Specify range Specify range	
	Double command blocking	-	Yes	
	Independent settable parameter groups	-	To be provided	
	Local Display Unit	-	To be provided	
	Sequence of event recorder ❖ Events ❖ Time resolution	Nos. ms	Specify 1	
	Disturbance recorder function	-	To be provided	
	Comprehensive self-supervision	-	To be provided	
	Battery free backup of events and disturbance records	-	Yes	
	Insulation tests	-	IEC60255-5	
	Fast disturbance test	-	IEC61000-4-4,Class4	
	MTBF	Hrs	Shall be mentioned	
	MTTR	Hrs	Shall be mentioned	
	Temperature range: IED's ❖ Operation ❖ Transport and storage	°C °C	-10 to +50 -10 to +70	
	Relative humidity: ❖ Operating max./min ❖ Transport and storage	% %	93 93	
14	Bay Control Unit-11 kV: Bay control function shall be provided in the O/C & E/F relay for each bay/feeder, which will be the part of GIS Panel. However, Separate Bay control unit besides O/C & E/F relay is also acceptable.			
	Manufacturer's name & address	-	Shall be mentioned	
	Type or Model	-	Shall be mentioned	
	Country of Manufacture	-	Shall be mentioned	
	Number of years of proven field experience of offered unit	Yrs	5	
	Type of Bay controller offered	-	MV	
	Separate Bay control unit is provided for each bay & feeder or Bay Control function is provided in the O/C & E/F relay	-	Shall be mentioned	
	Single bit dependence	-	No	
	Control functionality implementation in software with Select before Operate provision for Open-Execute & Close-Execute, Interlocks and other necessary information	-	To be provided	
	Bay & Station Wide Synchro check function ❖ Maximum Voltage difference	Volt	Specify range	

	❖ Maximum Frequency difference ❖ Maximum Phase difference	Hz Angle	Specify range Specify range	
	Double command blocking	-	Yes	
	Independent settable parameter groups	-	To be provided	
	Local Display Unit	-	To be provided	
	Sequence of event recorder ❖ Events ❖ Time resolution	Nos. ms	Specify 1	
	Disturbance recorder function	-	To be provided	
	Comprehensive self-supervision	-	To be provided	
	Battery free backup of events and disturbance records	-	Yes	
	Insulation tests	-	IEC60255-5	
	Fast disturbance test	-	IEC61000-4-4,Class4	
	MTBF	Hrs	Shall be mentioned	
	MTTR	Hrs	Shall be mentioned	
	Temperature range: IED's ❖ Operation ❖ Transport and storage	°C °C	-10 to +50 -10 to +70	
	Relative humidity: ❖ Operating max./min ❖ Transport and storage	% %	93 93	
15	Ethernet Switch			
	Name of manufacturer	-	Siemens/ ABB/ CISCO/ Schneider	
	Country		Shall be mentioned	
	Model number	-	Shall be mentioned	
	Type	-	Industrial Grade, rackable 19"-24 ports	
	Redundant Power supply	-	To be provided	
	Ethernet switch shall have dual connection to each other.	-	Yes	
16	Operator Work Station (OWS)			
	Brand	-	Any International reputed brand.	
	Model	-	To be mentioned	
	Type	-	Industrial PC (Panel mounted)	
	Country of Manufacture	-	To be mentioned	
	Processor	GHz	Intel core i7 8 th generation or latest	
	Clock Speed	GHz	3.0 GHz (min), 8 MB Cache Memory(min)	

	Bus Speed	MHz	Min. 1600 MHz	
	RAM	GB	8 GB, Expandable to 16 GB	
	HDD	GB	1 TB SSD	
	Mouse	-	Same Brand USB Scroll Optical Mouse	
	Keyboard	-	Same brand USB Keyboard	
	Monitor	inch	Same brand LED 24", 1920x1080, Full HD Monitor (Installed on monitoring table/desk)	
	OS Support	-	Windows 10 Professional or latest	
	OS	-	License windows with recovery kit	
	Software	-	Licensed Anti-Virus Software	
17	Engineer Work Station (EWS)			
	Brand	-	Any International reputed brand.	
	Model	-	To be mentioned	
	Type	-	Laptop having provision for to be locked (can be mounted on the SAS panel)	
	Country of Manufacture	-	To be mentioned	
	Processor	GHz	Intel Core i7 Processor, 8 th generation or latest	
	Clock Speed	GHz	3.0 GHz (min), 8 MB L3 Cache Memory (min)	
	Bus Speed	MHz	Min. 1600 MHz	
	RAM	GB	(2x4 GB) 1 DIMM DDR4	
	HDD	GB	Min. 1 TB SSD	
	Mouse	-	Same Brand Wireless Scroll Optical Mouse	
	Keyboard	-	Integrated standard Keyboard	
	Monitor	inch	15.6", Full HD, True Life Display	
	Battery	-	6 cell lithium ion battery	
	Battery Backup	-	4 hours or higher	

			with A/C Adapter	
	OS Support	-	Windows 10 professional or latest	
	OS	-	License windows with recovery kit	
	Software (To be installed & ready)	-	All types of configuration software with licenses for SAS, Licensed Anti-Virus Software, Licensed OS & other necessary software	
18	Standard Color Printer			
	Brand	-	Any International reputed brand.	
	Model	-	To be mentioned	
	Country of Manufacturer	-	To be mentioned	
	Toner type	-	Toner and associated drum unit in single case, No starter toner.	
	Resolution	dpi	1200 × 1200 dpi (Minimum)	
	Printing Speed	ppm	62-Page-per Minute (Letter), 35 PPM (A4) (min.)	
	First Page Print Out	second	As fast as 8 seconds	
	Memory	MB	256 MB (Minimum) Expandable to 1 GB	
	Trays	-	100 sheet multi-purpose input tray, 2 x 500 sheet input tray 50-sheet face up output tray, 250-sheet face down output tray	
	Media Sizes	-	Letter, Legal, A4, A5, B5 and custom sizes	
	Media Types	-	Paper (Plain, Preprinted, Letterhead, Bond, Color, Recycled, Rough), Transparencies, Labels	
19	Firewall			

	Name of Manufacturer		To be mentioned	
	Brand		To be mentioned	
	Model/Type		To be mentioned	
	Country of Origin (Place of Manufacturing)		To be mentioned	
	IP Filtering Port Filtering MAC Filtering URL Filtering Port Forwarding DMZ Denial of Service NAT Mapping		To be provided	
	Packet throughput of at least 150 Mbps		To be mentioned	
	3DES Encryption throughput of 20 Mbps		To be mentioned	
	Support for 200 VPNs		To be mentioned	
	Maximum concurrent sessions, with AVC		To be mentioned	
	Maximum new connections per second, with AVC		To be mentioned	
	Local On-device Management		Yes	
	Application Visibility and Control (AVC)		Standard	
	Security Intelligence		Standard, with IP, URL, and DNS threat intelligence	
	Redundant Power supply	-	To be provided	
20	System Performance:			
	- Exchange of display (First reaction) - Presentation of a binary change in the process display - Presentation of an analogue change in the process display - From order to process output - From order to updated of display	-	< 1 s < 0.5 s <1 s <0.5 s <1.5 s	
21	UPS with Panel (110 V DC from Substation main DC System Source will be interfaced)	-	01 set	
22	List (Name & version) of all types of	-	To be mentioned	

	software required for SAS configuration, operation, monitoring and Remote control individually for Both OWS and EWS			
23	Marking	-	“BPDB & Contract No.”	
24	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.03 (a).Guaranteed Technical Particulars of 33 kV VCB (2500 Amps) for Sholoshohor Bay Extension.

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer’s Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
1	a) Manufacturer’s name & address With website, official domain email.	-	Shall be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2	Manufacturer’s model no.	-	To be mentioned	
3	Maximum Rated Voltage	KV	36	
4	Frequency	Hz	50	
5	Rated Normal current	A	2500A	
6	No. of phase	-	3	
7	No. of break per phrase	-	To be mentioned	
8	Interrupting medium	-	Vacuum	
9	Manufacturer's name and country of vacuum interrupter	-	To be mentioned	
10	Manufacturer's model no. of vacuum interrupter	-	To be mentioned	
11	Class of Circuit Breaker (Supported by Test Report from independent laboratory)	-	E2M2 or better	
12	Designation of Internal Arc Classification (Supported by Test Report from independent laboratory)	-	IAC AFLR 31.5 kA, 1 sec	
13	Impulse withstand on 1.2/50 μ s wave	KV	170	
14	Power Frequency Test Voltage (Dry), at 50Hz, 1 min.	KV	70	
15	Short time withstand current, 3 second, rms	KA	31.5	

16	Breaking capacity: a) Symmetrical, rms b) Asymmetrical, rms	KA KA	31.5 As per IEC	
17	Short circuit making current, peak	KA	80	
18	First phase to clear factor	-	To be mentioned	
19	Rated transient recovery voltage at 100% rated short circuit breaking current	KVp	To be mentioned	
20	Rated line charging breaking current	A	To be mentioned	
21	Rated cable charging breaking current	A	To be mentioned	
22	Rated out of phase breaking current	A	To be mentioned	
23	Is circuit breaking restrike free?	Yes/No	Yes	
24	Trip coil current	A	To be mentioned	
25	Trip coil voltage	V, DC	110	
26	Is the circuit breaker trip free?	Yes/No	Yes	
27	Type of arc contacts or arc control Device	-	To be mentioned	
28	Main Contact : a) Type of contact b) Material of contract surfaces c) Contract resistance	- - $\mu\Omega$	To be mentioned To be mentioned Less than 40	
29	Does magnetic effect of load Currents increase contact pressure?	Yes/ No	To be mentioned	
30	Length of each break/ phase	mm	To be mentioned	
31	Length of stroke	mm	To be mentioned	

32	Weight of circuit breaker unit complete, without operating mechanism and structure	Kg	To be mentioned	
33	Weight of circuit breaker complete with all fittings as in service.	Kg	To be mentioned	
34	Maximum shock load imposed on floor or foundation when opening under fault conditions (state compression or tension)	N	To be mentioned	
35	Maximum pressure rise in circuit Breaker due to making or breaking of Rated current in outer chamber	KN/m ²	To be mentioned	
36	Routine pressure test on circuit Breaker tanks or chamber	KN/m ²	To be mentioned	
37	Design pressure type test on circuit Breaker tanks or chamber	KN/m ²	To be mentioned	
Operating Particulars :				
38	a) Opening time: without current at 100% of rated breaking current	sec.	0.05 (maximum)	
	b) Breaking time	Cycle	≤5	
	c) Closing time	ms	To be mentioned	
39	Maximum arc duration of any duty Cycle as per latest revision of relevant IEC standard	ms At...%	To be mentioned	
40	Current at which maximum arc duration occurs (critical current)	A	To be mentioned	
41	Make time	ms	To be mentioned	
42	Minimum time for arc extinction to Contract remark when adapted for auto re-closing	ms	To be mentioned	
43	Time from closing of control switch to completion of closing stroke during fault making	ms	To be mentioned	
Constructional Features :				
44	Is an external series break Incorporated in the breaker?	Yes/ No	To be mentioned	
45	Is any device used to limit transient Recovery voltage?	Yes/ No	To be mentioned	
46	Method of closing	-	To be mentioned	
47	Method of tripping	-	To be mentioned	
48	Number of close/ trip operation possible on one spring charge	Nos.	To be mentioned	
49	Rated voltage of spring winding motor for closing	V.AC	230	

50	Spring winding motor current	A	To be mentioned	
51	Closing release coil current	A	To be mentioned	
52	Closing release coil voltage	V.DC	110	
53	Minimum clearance in air :			
	a) Between phase	mm	370	
	b) Phase to earth	mm	325	
	c) Across circuit breaker poles	mm	To be mentioned	
	d) Live conductor to ground level	mm	To be mentioned	
	e) Live insulator to ground level	mm	To be mentioned	
54	Material of tank or chamber	-	To be mentioned	
55	Material of moving contact tension rod	-	To be mentioned	
56	Period of time equipment has been in commercial operation	Year	To be mentioned	
57	No .of tripping coil	Nos.	2	
58	Circuit breaker terminal connectors	-	Copper	
59	Creepage distance (min)	mm/KV	25	
60	Method of indicating VCB ON/ OFF	Mech.& Elect.	To be mentioned	
61	Life of interrupter	Years	To be mentioned	
62	Pressure in vacuum tube for VCB	Bar	To be mentioned	
63	Guaranteed nos. of operation for vacuum Interrupter :			
	a) at rated Current switching (Supported by Test Report from independent laboratory)	Nos.	10,000	
	b) at Short circuit current switching	Nos.	≥ 50	
64	Rated operating sequence	-	O-0.3sec- CO-3m-CO	

65	All current carrying parts of VCB Shall be made of	-	Copper	
66	Standard	-	IEC-60056/ IEC-62271-100	
67	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Note: All exposed MS parts should be Hot Dip Galvanized

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.03 (b). Guaranteed Technical Particulars of 33 kV VCB (1600 Amps) for Kalurghat Bay Extension.

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad.

Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
1	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2	Manufacturer's model no.	-	To be mentioned	
3	Maximum Rated Voltage	KV	36	
4	Frequency	Hz	50	
5	Rated Normal current	A	1600A	
6	No. of phase	-	3	
7	No. of break per phrase	-	To be mentioned	
8	Interrupting medium	-	Vacuum	
9	Manufacturer's name and country of vacuum interrupter	-	To be mentioned	
10	Manufacturer's model no. of vacuum interrupter	-	To be mentioned	
11	Class of Circuit Breaker (Supported by Test Report from independent laboratory)	-	E2M2 or better	
12	Designation of Internal Arc Classification (Supported by Test Report from independent laboratory)	-	IAC AFLR 31.5 kA, 1 sec	

13	Impulse withstand on 1.2/50 μ s wave	KV	170	
14	Power Frequency Test Voltage (Dry), at 50Hz, 1 min.	KV	70	
15	Short time withstand current, 3 second, rms	KA	31.5	
16	Breaking capacity: a) Symmetrical, rms b) Asymmetrical, rms	KA KA	31.5 As per IEC	
17	Short circuit making current, peak	KA	80	
18	First phase to clear factor	-	To be mentioned	
19	Rated transient recovery voltage at 100% rated short circuit breaking current	KVp	To be mentioned	
20	Rated line charging breaking current	A	To be mentioned	
21	Rated cable charging breaking current	A	To be mentioned	
22	Rated out of phase breaking current	A	To be mentioned	
23	Is circuit breaking restrike free?	Yes/No	Yes	
24	Trip coil current	A	To be mentioned	
25	Trip coil voltage	V, DC	110	
26	Is the circuit breaker trip free?	Yes/No	Yes	
27	Type of arc contacts or arc control Device	-	To be mentioned	
28	Main Contact : a) Type of contact b) Material of contract surfaces c) Contract resistance	- - $\mu\Omega$	To be mentioned To be mentioned Less than 40	
29	Does magnetic effect of load Currents increase contact pressure?	Yes/ No	To be mentioned	
30	Length of each break/ phase	mm	To be mentioned	

31	Length of stroke	mm	To be mentioned	
32	Weight of circuit breaker unit complete, without operating mechanism and structure	Kg	To be mentioned	
33	Weight of circuit breaker complete with all fittings as in service.	Kg	To be mentioned	
34	Maximum shock load imposed on floor or foundation when opening under fault conditions (state compression or tension)	N	To be mentioned	
35	Maximum pressure rise in circuit Breaker due to making or breaking of Rated current in outer chamber	KN/m ²	To be mentioned	
36	Routine pressure test on circuit Breaker tanks or chamber	KN/m ²	To be mentioned	
37	Design pressure type test on circuit Breaker tanks or chamber	KN/m ²	To be mentioned	
Operating Particulars :				
38	a) Opening time: without current at 100% of rated breaking current	sec.	0.05 (maximum)	
	b) Breaking time	Cycle	≤5	
	c) Closing time	ms	To be mentioned	
39	Maximum arc duration of any duty Cycle as per latest revision of relevant IEC standard	ms At...%	To be mentioned	
40	Current at which maximum arc duration occurs (critical current)	A	To be mentioned	
41	Make time	ms	To be mentioned	
42	Minimum time for arc extinction to Contract remark when adapted for auto re-closing	ms	To be mentioned	
43	Time from closing of control switch to completion of closing stroke during fault making	ms	To be mentioned	
Constructional Features :				
44	Is an external series break Incorporated in the breaker?	Yes/ No	To be mentioned	
45	Is any device used to limit transient Recovery voltage?	Yes/ No	To be mentioned	
46	Method of closing	-	To be mentioned	
47	Method of tripping	-	To be mentioned	
48	Number of close/ trip operation possible on one spring charge	Nos.	To be mentioned	
49	Rated voltage of spring winding motor for	V.AC	230	

	closing			
50	Spring winding motor current	A	To be mentioned	
51	Closing release coil current	A	To be mentioned	
52	Closing release coil voltage	V.DC	110	
53	Minimum clearance in air :			
	a) Between phase	mm	370	
	b) Phase to earth	mm	325	
	c) Across circuit breaker poles	mm	To be mentioned	
	d) Live conductor to ground level	mm	To be mentioned	
	e) Live insulator to ground level	mm	To be mentioned	
54	Material of tank or chamber	-	To be mentioned	
55	Material of moving contact tension rod	-	To be mentioned	
56	Period of time equipment has been in commercial operation	Year	To be mentioned	
57	No .of tripping coil	Nos.	2	
58	Circuit breaker terminal connectors	-	Copper	
59	Creepage distance (min)	mm/KV	25	
60	Method of indicating VCB ON/ OFF	Mech.& Elect.	To be mentioned	
61	Life of interrupter	Years	To be mentioned	
62	Pressure in vacuum tube for VCB	Bar	To be mentioned	
63	Guaranteed nos. of operation for vacuum Interrupter :			
	a) at rated Current switching (Supported by Test Report from independent laboratory)	Nos.	10,000	
	b) at Short circuit current switching	Nos.	≥ 50	
64	Rated operating sequence	-	O-0.3sec-	

			CO-3m-CO	
65	All current carrying parts of VCB Shall be made of	-	Copper	
66	Standard	-	IEC-60056/ IEC-62271-100	
67	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Note: All exposed MS parts should be Hot Dip Galvanized

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.04. Guaranteed Technical Particulars for 33 KV Protection Control and Metering Panel

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

SI No	Description	Unit	BPDB's Requirement	Bidders Guaranteed value
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2.	Manufacturer's Model no.	-	To be mentioned	
3.	System nominal voltage	kV	33	
4.	Maximum System Voltage	kV	36	
5.	Rated Frequency	Hz	50	

A. Protection Control & Metering (Transformer Feeder) Not Applicable				
6.	Differential Relay			
	Manufacturer's Name	-	ABB- (Sweden/ Switzerland/ Finland)/ Siemens-(Germany)/ Alstom-(France/UK)/ Schneider-(France/UK)/ NR, China/ SEL, USA	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Numerical programmable	
	Maximum through fault at which the protective equipment is stable with recommend settings:			
	a) Earth faults	rating %	Shall be mentioned	
	b) Phase faults	of CT rating	Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	ms	Shall be mentioned	
	The Relay shall be IEC 61850 protocol type.	-	Yes	
7.	Restricted Earth Fault Relay (in built function of differential relay)			
	Manufacture's Name & Country of Origin	-	ABB- (Sweden/ Switzerland/Finland)/ Siemens-(Germany)/ Alstom-(France/UK)/ Schneider-(France/UK)/ NR - China/ SEL- USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Numerical programmable	
	Range of current setting:	-	Shall be mentioned	
	a) Phase element	% of CT	Shall be mentioned	
	b) Earth fault element	rating	Shall be mentioned	
	Earth fault element Range of timing settings at 10 time CT rating	Sec	Shall be mentioned	
	Burden of relay at 10 time CT rating	VA	Shall be mentioned	
	Percentage of current setting at which relay will reset.	%	Shall be mentioned	
	The Relay shall be IEC 61850 protocol type.	-	Yes	
8	Over Current & Earth Fault Protection Relay			
	Manufacture's Name Country of Origin	-	ABB- (Sweden/Switzerland/ Finland)/ Siemens(Germany)/ Alstom-(France/UK)/	

			Schneider-(France/UK) / NR, China/ SEL, USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of relay	-	Numerical programmable Multifunction	
	The Relay shall be IEC 61850 protocol type.	-	Yes	
	Range of current setting :			
	a) Phase element	% of CT rating	Shall be mentioned	
	b) Earth fault element		Shall be mentioned	
	Range of timing settings at 10 time CT rating	Sec	Shall be mentioned	
	Burden of relay at 10 time CT rating	VA	Shall be mentioned	
	Percentage of current at which relay will reset	%	Shall be mentioned	
	Reset time after removal of 10 times CT rated current	Sec	Shall be mentioned	
9	Separate Auxiliary Flag Relays for Transformer self-protection (OTA, OTT, WTA, WTT, BA, BT, OLTC Surge, PRD for main tank & OLTC).			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no	-	Shall be mentioned	
	Type of Relays	-	Shall be mentioned	
10	Trip Circuit Supervision (TCS) Relay (Separate Relay for each trip coil)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
11	Trip Relay (Separate Relay) for Differential and O/C & E/F			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Operating Time	ms	<10	
	Self-reset type for O/C, E/F protection	-	Yes	
	Hand & Electrical reset type for Differential, REF and Transformer Self- protection	-	Yes	
	Operating coil voltage 110V DC	-	Yes	
12	Annunciator			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Windows	nos.	30 or More.	
	Built in buzzer and buttons for accept, mute, test, reset, etc.	-	Yes	
	AC/DC Dual Supply Provision	-	Yes	
13	Control Switch			

	Manufacture's Name& Country	-	Shall be mentioned	
	Manufacture's Model/Type No.	-	Shall be mentioned	
	Separate TNC/Discrepancy switch and Local Remote (L/R) selector switch	-	Yes	
B. Protection Control & Metering (Line Feeder)				
15	Over Current & Earth Fault Protection Relay with Directional feature			
	Manufacture's Name Country of Origin	-	ABB-(Sweden/Switzerland/ Finland)/Siemens-(Germany)/ Alstom-(France/UK)/ Schneider-(France/UK)/ NR, China/ SEL, USA	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of relay	-	Numerical, programmable, multifunction with both directional and non- directional O/C & E/F protection (IDMT, DMT, Inst.) feature and monitoring functions.	
	Directional Feature can be activated/de-activated	Yes/No	Yes	
	The relay shall have IEC 61850 communication Protocol.	-	Yes	
	Range of current setting :			
	a) Phase element	% of CT rating	Shall be mentioned	
	b) Earth fault element		Shall be mentioned	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	24 for line Feeder, 32 for Bus Coupler	
	No of Binary Output (Minimum)	-	24 for line Feeder, 24 for Bus Coupler	
	No of Communication Ports xv) Electrical xvi) Optical	-	Shall be mentioned with type.	
	Protection Function	-	Directional and Non- Directional O/C, E/F, Over/ Under Voltage, Over and Under Frequency, Sync Check And Other Necessary Functions.	

	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Drop off to Pick up ratio	-	Shall be mentioned	
	Reset time after removal of fault current	-	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	
	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	Percentage of Current setting at which relay will reset	%	Shall be mentioned	
	Reset time after removal of 10 time CT rated current for: a) Phase element (100%) b) E/F element (40%)	Sec Sec	Shall be mentioned	
16	Trip Circuit Supervision (TCS) Relay (Separate Relay for each trip coil)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Relay	-	Shall be mentioned	
17	Trip Relay (Separate Relay)			
	Manufacture's Name	-	Shall be mentioned	
	Country of Origin	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Operating Time	ms	<10	
	Self-reset type for O/C, E/F protection	-	Yes	
	Operating coil voltage 110V DC	-	Yes	
18	Annunciator			
	Manufacture's Name & Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Windows	nos.	14	
	Built in buzzer and buttons for accept, mute, test, reset, etc.	-	Yes	
	AC/DC Dual Supply Provision	-	Yes	
19	Control Switch			
	Manufacture's Name & Country	-	Shall be mentioned	
	Manufacture's Model/Type No.	-	Shall be mentioned	
	Separate TNC/Discrepancy switch and Local Remote (L/R) selector switch	-	Yes	
20	Metering and Instrumentation			
20.1	Energy Meter (Multi Tariff Programmable)			

	Meter)			
	Manufacture's Name	-	Shall be mentioned	
	Manufacture's Country		European Country/ North American Country/ Japan/ Australia	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Numerical programmable Multifunction	
	Class of Accuracy	-	0.2S	
20.2	Volt Meters with Selector Switch			
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Analogue, 90 degree scale range	
	Class of Accuracy	-	1.0	
20.3	AMPERE METERS			
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of Meter	-	Analogue, 240 degree scale range	
	Class of Accuracy	-	1.0	
	Separate A-meter for each phase	-	Yes	
21	Marking	-	"BPDB & Contract No."	
22	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.05 Guaranteed technical particulars of 110v 3x5(6)A, 3-phase, 4-wire, 3-element, solid state indoor type multi tariff programmable meter

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Required Specification	Manufacture's particulars
1	Reference Standard	-	Relevant ANSI / IEC Standard	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	

3	Manufacturer's type & model	-	Shall be mentioned	
4	Construction/connection	-	3-Phase 4-wire solidly grounded neutral	
5	Installation	-	Indoor installation in A socket [for socket type]	
6	Number of element	-	3 (Three)	
7	Rated Voltage	Volt	110V	
8	Minimum Biasing Voltage	Volt	40V	
9	Variation of Frequency	%	± 2%	
10	Variation of Voltage	%	+ 10, -20%	
11	Accuracy class		Accuracy class: 0.2s (point two S)	
12	Rated Current			
	i)	Nominal Current	A	= 5
	ii)	Maximum Current	A	≥ 6
13	Resister Type		LCD Display	
14	Number of Digits (Integer with Decimal)	Nos.	8 with 3 (Programmable)	
15	Starting Current	ma	0.1% of Nominal Current	
16	Losses at Nominal Load	Watt	Shall be mentioned	
17	Meter Constant	Imp./	Shall be mentioned	
18	Integration Period	-	30 (Thirty) Minutes	
	Resetting Period	-	1 (one) month	
	Cumulative MD transfer	-	Built in	
	Cycle Timing Device	-	Built in	
19	Size of the Digit of Display	E x H in mm	4 x 8	
20	No. of Terminal	Nos.	10 (Ten) min	
21	Type of socket and country of origin	-	To be mentioned	
22	Battery Service life and shelf Life (minimum)	Year	10 (ten) & 15 (fifteen)	
23	Year of manufacture		Shall be mentioned	
24	List of Recommended spare parts (if any)	any	Shall be mentioned	
25	Warranty	Year	3 (three)	
26	Meter Service Life (Min)	Year	15 (fifteen)	
27	Weight of meter	Kg	Shall be mentioned	
28	Dimensions	mm x mm x mm	Shall be mentioned	

29	Outlines, Drawings & Leaflets		Shall be mentioned	
30	Performance Curve for Balanced & Unbalanced load		Shall be mentioned	
31	Meter sealing condition		Hermetically or Ultrasonic welded	
32	a) Country of Origin b) Place of Manufacture c) Place of Testing		Shall be mentioned	
33	Memory Storage		Shall be mentioned by putting Yes/ No.	
	i) Equipment Identification Code			
	ii) Security code			
	iii) Access code			
	iv) Number of Power Interruption with Date & Time			
	V Latest Power Failure- Time & Date			
	Vi Event logs			
	vii) Cumulative kWh, kVarh (Q ₁ + Q ₄) Reading for previous two months			
	viii) Load profile with 30 min interval at least 90 days for:			
		KWh, kVarh (Q ₁ +Q ₄)		
	Phase Voltage or V _h			
	Phase Amps or Ah			

Metering and Indication				
34.	KWh Meter			
34.1	Manufacture's Country	-	European Country/ North American Country/Japan/ Australia	
34.2	Manufacture's Model no.	-	To be mentioned	

34.3	Type of meter	-	Numerical programmable multifunction	
34.4	Class of accuracy	-	0.2S	
35	Indication Volt Meters			
35.1	Manufacturer's Name and Country	-	To be mentioned	
35.2	Manufacture's Model no.	-	To be mentioned	
35.3	Type of meter	-	Analogue	
35.4	Class of Accuracy	-	To be mentioned	
36	Indication Ampere Meters			
36.1	Manufacturer's Name and Country	-	To be mentioned	
36.2	Manufacture's Model no.	-	To be mentioned	
36.3	Type of meter	-	Analogue, 240° Scale Range	
36.4	Class of Accuracy	-	To be mentioned	
36.5	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.06 (a).Guaranteed Technical Particulars of 33kV Off-Load Isolator with Earth Blade

(To be filled up by the Manufacturer in Manufacturer's Letterhead Pad with appropriate data, Otherwise bid shall be rejected. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer' s Guaranteed Particulars
General Description of Disconnecting Switch				
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2.	Manufacturer's Model	-	To be mentioned	
3.	Frequency	Hz	50	
4.	System Nominal Voltage	kV	33	
5.	System Maximum Voltage	kV	36	
6.	Basic Insulation Level	kV	170	
7.	Rated Normal Current	A	2500	
8.	Power Frequency Withstand Voltage (for 1 min)	kV	70	
9.	Rated short time withstands current (for 3sec.)	kA	31.5	
10.	Installation	-	Outdoor	
11.	Type	-	Single Vertical Break	
12.	Construction	-	Open	
13.	Mounting Position	-	Vertical	
14.	Number of Pole	nos.	3 (Three)	
15.	No. of break per pole	nos.	One	
16.	Air gap between pole of phase	mm	1000	
17.	Insulator Material	-	Porcelain	
18.	Creepage distance of Insulator	mm/KV	25	
19.	Current density at the minimum cross Section of a) Moving Blade b) Terminal Pad c) Contacts d) Terminal Connector	Amps/ Sq.mm	To be mentioned	
20.	Maximum Temp. rise of current carrying parts when carrying rated current continuously (deg. C)		To be mentioned	
Contacts:				
21.	Materials of the current carrying path		Copper with Nickel Plating	
22.	Contract Resistance for DS & ES	μΩ	Less than 50	
23.	Contact Area:			

23.1	Moving Blade for DS	mm ²	10x60 mm copper flat bar, length 750±20 mm -02 Nos per phase	
23.2	Moving Blade for ES	mm ²	10x60 mm copper flat bar, length 500±15 mm -02 Nos per phase	
23.3	Terminal Pad	mm ²	12x100 mm Copper flat bar -02 Nos per phase	
24.	Contact type		Spring loaded contact	
25.	Operation	-	Gang	
26.	Type of main DS operating mechanism	-	Manual	
27.	Number of main DS operating mechanism per set	Nos	1	
28.	Type of Earth Switch operating mechanism	-	Manual	
29.	Number of Earth Switch operating mechanism per set	Nos	1	
30.	Nos. of Auxiliary Contracts (NO/NC) For Isolator& Earth Switch	-	Isolator- 4NO-4NC Earth switch – 4NO-4NC	
31.	Locking facility in the operating box in both close and open position	-	Yes	
32.	Mechanical Interlocking facility between main DS and ES	-	Yes	
33.	Operating GI Pipe Dimensions:	-		
33.1	For main DS	-	OD- 44 mm, ID – 36 mm, Length – 6 meter	
33.2	For Earth Switch	-	OD- 44 mm, ID – 36 mm, Length – 6 meter	
34.	MS Solid Square Shaft Dimensions for gang operation (Hot Dip Galvanized)	-		
34.1	For main DS	-	To be mentioned	
34.2	For Earth Switch	-	To be mentioned	
35.	Total weight of Isolator	Kg	To be mentioned	
36.	Total weight of earth switch	Kg	To be mentioned	
37.	Total weight of Unit	Kg	To be mentioned	
38.	Outline Dimensional & Cross-section Drawings of Offered type 33KV Isolator & Mounting Structure Arrangement	-	To be submitted	
39.	Manufacturer's Printed Catalogue describing Specification & Technical Data of Offered type Equipment.	-	To be mentioned	
40.	Standard		IEC-62271-102	

41.	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	
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Note: All exposed MS parts should be Hot Dip Galvanized

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.06 (b).Guaranteed Technical Particulars of 33kV Off-Load Isolator with Earth Blade

(To be filled up by the Manufacturer in Manufacturer's Letterhead Pad with appropriate data, Otherwise bid shall be rejected. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer' s Guaranteed Particulars
General Description of Disconnecting Switch				
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2.	Manufacturer's Model	-	To be mentioned	
3.	Frequency	Hz	50	
4.	System Nominal Voltage	kV	33	
5.	System Maximum Voltage	kV	36	
6.	Basic Insulation Level	kV	170	
7.	Rated Normal Current	A	1600	
8.	Power Frequency Withstand Voltage (for 1 min)	kV	70	
9.	Rated short time withstand current (for 3sec.)	kA	31.5	
10.	Installation	-	Outdoor	
11.	Type	-	Single Vertical Break	
12.	Construction	-	Open	
13.	Mounting Position	-	Vertical	
14.	Number of Pole	nos.	3 (Three)	
15.	No. of break per pole	nos.	One	
16.	Air gap between pole of phase	mm	1000	
17.	Insulator Material	-	Porcelain	
18.	Creepage distance of Insulator	mm/KV	25	

19.	Current density at the minimum cross Section of a) Moving Blade b) Terminal Pad c) Contacts d) Terminal Connector	Amps/ Sq.mm	To be mentioned	
20.	Maximum Temp. rise of current carrying parts when carrying rated current continuously (deg. C)		To be mentioned	
Contacts:				
21.	Materials of the current carrying path		Copper with Nickel Plating	
22.	Contract Resistance for DS & ES	$\mu\Omega$	Less than 50	
23.	Contact Area:			
23.1	Moving Blade for DS	mm ²	6x70 mm copper flat bar, length 750±20 mm -02 Nos per phase	
23.2	Moving Blade for ES	mm ²	6x70 mm copper flat bar, length 500±15 mm -02 Nos per phase	
23.3	Terminal Pad	mm ²	12x60 mm Copper flat bar -02 Nos per phase	
24.	Contact type		Spring loaded contact	
25.	Operation	-	Gang	
26.	Type of main DS operating mechanism	-	Manual	
27.	Number of main DS operating mechanism per set	Nos	1	
28.	Type of Earth Switch operating mechanism	-	Manual	
29.	Number of Earth Switch operating mechanism per set	Nos	1	
30.	Nos. of Auxiliary Contracts (NO/NC) For Isolator& Earth Switch	-	Isolator- 4NO-4NC Earth switch – 4NO-4NC	
31.	Locking facility in the operating box in both close and open position	-	Yes	
32.	Mechanical Interlocking facility between main DS and ES	-	Yes	
33.	Operating GI Pipe Dimensions:			
33.1	For main DS	-	OD- 42 mm, ID – 36 mm, Length – 6 meter	
33.2	For Earth Switch	-	OD- 42 mm, ID – 36 mm, Length – 6 meter	
34.	MS Solid Square Shaft Dimensions for gang operation (Hot Dip Galvanized)			
34.1	For main DS	-	To be mentioned	

34.2	For Earth Switch	-	To be mentioned	
35.	Total weight of Isolator	Kg	To be mentioned	
36.	Total weight of earth switch	Kg	To be mentioned	
37.	Total weight of Unit	Kg	To be mentioned	
38.	Outline Dimensional & Cross-section Drawings of Offered type 33KV Isolator & Mounting Structure Arrangement	-	To be submitted	
39.	Manufacturer's Printed Catalogue describing Specification & Technical Data of Offered type Equipment.	-	To be mentioned	
40.	Standard		IEC-62271-102	
41.	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Note: All exposed MS parts should be Hot Dip Galvanized

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.07 (a).Guaranteed Technical Particulars of 33 kV Off-Load Isolator without Earth Blade

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
General Description of Disconnecting Switch				
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2.	Manufacturer's Model	-	To be mentioned	
3.	Frequency	Hz	50	

4.	System Nominal Voltage	kV	33	
5.	System Maximum Voltage	kV	36	
6.	Basic Insulation Level	kV	170	
7.	Rated Normal Current	A	2500	
8.	Power Frequency Withstand Voltage (for 1 min)	kV	70	
9.	Rated short time withstand current (for 3sec.)	kA	31.5	
10.	Installation	-	Outdoor	
11.	Type	-	Single Vertical Break	
12.	a) Construction	-	Open	
	b) Mechanical Endurance Class	-	M1 (Minimum)	
13.	Mounting Position	-	Vertical	
14.	Number of Pole	nos.	3 (Three)	
15.	No. of break per pole	nos.	One	
16.	Air gap between pole of phase	mm	1000	
17.	Insulator Material	-	Porcelain	
18.	Creepage distance of Insulator	mm	To be mentioned	
19.	Current density at the minimum cross Section of a) Moving Blade b) Terminal Pad c) Contacts d) Terminal Connector	Amps/ Sq.mm	To be mentioned	
20.	Maximum Temp. rise of current carrying parts when carrying rated current continuously (deg. C)		To be mentioned	
Contacts:				
21.	Materials of the current carrying path		Copper with Nickel Plating	
22.	Contact Resistance	$\mu\Omega$	Less than 50 $\mu\Omega$	
23.				

23.1	Moving Blade	mm ²	10x60 mm copper flat bar, length 750±20 mm -02 Nos per phase	
23.2	Terminal Pad	mm ²	12x100 mm Copper flat bar -02 Nos per phase	
24.	Contact type		Spring loaded contact	
25.	Operation	-	Gang	
26.	Type of main DS operating mechanism	-	Manual	
27.	Number of main DS operating mechanism per set	Nos	1	
28.	Nos. of Auxiliary Contracts (NO/NC) For Isolator	-	Isolator- 4NO-4NC	
29.	Locking facility in the operating box in both and open position	-	Yes	
30.	Operating GI Pipe Dimensions :	-		
	For main DS	-	OD- 44 mm, ID – 36 mm, Length – 6 meter	
31.	MS Solid Square Shaft Dimensions for gang operation (Hot Dip Galvanized):	-		
	For main DS	-	To be mentioned	
32.	Total weight of Isolator	Kg	To be mentioned	
33.	Total weight of Unit	Kg	To be mentioned	
34.	Outline Dimensional & Cross-section Drawings of Offered type 33KV Isolator & Mounting Structure Arrangement	-	To be submitted	
35.	Manufacturer's Printed Catalogue describing Specification & Technical Data of Offered type Equipment.	-	To be mentioned	

36.	Standard		IEC-62271-102	
37.	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Note: All exposed MS parts should be Hot Dip Galvanized

Seal & Signature of the Manufacturer	Seal & Signature of the Bidder
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8.07 (b).Guaranteed Technical Particulars of 33 kV Off-Load Isolator without Earth Blade

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer' s Guaranteed Particulars
General Description of Disconnecting Switch				
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2.	Manufacturer's Model	-	To be mentioned	
3.	Frequency	Hz	50	
4.	System Nominal Voltage	kV	33	
5.	System Maximum Voltage	kV	36	
6.	Basic Insulation Level	kV	170	
7.	Rated Normal Current	A	1600	
8.	Power Frequency Withstand Voltage (for 1 min)	kV	70	
9.	Rated short time withstand current (for 3sec.)	kA	31.5	
10.	Installation	-	Outdoor	
11.	Type	-	Single Vertical Break	
12.	a) Construction	-	Open	
	b) Mechanical Endurance Class	-	M1 (Minimum)	
13.	Mounting Position	-	Vertical	
14.	Number of Pole	nos.	3 (Three)	
15.	No. of break per pole	nos.	One	
16.	Air gap between pole of phase	mm	1000	

17.	Insulator Material	-	Porcelain	
18.	Creepage distance of Insulator	mm	To be mentioned	
19.	Current density at the minimum cross Section of a) Moving Blade b) Terminal Pad c) Contacts d) Terminal Connector	Amps/ Sq.mm	To be mentioned	
20.	Maximum Temp. rise of current carrying parts when carrying rated current continuously (deg. C)		To be mentioned	
Contacts:				
21.	Materials of the current carrying path		Copper with Nickel Plating	
22.	Contract Resistance	$\mu\Omega$	Less than 50 $\mu\Omega$	
23.				
23.1	Moving Blade	mm^2	6x70 mm copper flat bar, length 750 \pm 20 mm -02 Nos per phase	
23.2	Terminal Pad	mm^2	12x60 mm Copper flat bar -02 Nos per phase	
24.	Contact type		Spring loaded contact	
25.	Operation	-	Gang	
26.	Type of main DS operating mechanism	-	Manual	
27.	Number of main DS operating mechanism per set	Nos	1	
28.	Nos. of Auxiliary Contracts (NO/NC) For Isolator	-	Isolator- 4NO-4NC	
29.	Locking facility in the operating box in both and open position	-	Yes	
30.	Operating GI Pipe Dimensions :	-		

	For main DS	-	OD- 42 mm, ID – 36 mm, Length – 6 meter	
31.	MS Solid Square Shaft Dimensions for gang operation (Hot Dip Galvanized):	-		
	For main DS	-	To be mentioned	
32.	Total weight of Isolator	Kg	To be mentioned	
33.	Total weight of Unit	Kg	To be mentioned	
34.	Outline Dimensional & Cross-section Drawings of Offered type 33KV Isolator & Mounting Structure Arrangement	-	To be submitted	
35.	Manufacturer's Printed Catalogue describing Specification & Technical Data of Offered type Equipment.	-	To be mentioned	
36.	Standard		IEC-62271-102	
37.	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Note: All exposed MS parts should be Hot Dip Galvanized

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.0 GUARANTEED TECHNICAL PARTICULARS OF 33 KV OFF-LOAD FUSED ISOLATOR FOR BUS PT

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's guaranteed Particulars
General Description of Disconnecting Switch				
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	c) Country of Origin		To be mentioned	
2.	Application of the Disconnecting Switch		For BUS PT	
3.	Manufacturer's Model designation	-	To be mentioned	
4.	Frequency	Hz	50	
5.	System Nominal Voltage	kV	33	
6.	System Maximum Voltage	kV	36	
7.	Basic Insulation Level	kV	170	
8.	Rated Normal Current	A	400	
9.	Power Frequency Withstand Voltage (for 1 min)	kV	70	
10.	Rated short time withstand current (for 3sec.)	kA	31.5	
11.	Installation	-	Outdoor	
12.	Type	-	Single Vertical Break Offload Fused Isolator	
13.	Construction	-	Open	
14.	Mounting Position	-	Vertical	

15.	Number of Pole	nos.	3 (Three)	
16.	No. of break per pole	nos.	One	
17.	Air gap between pole of phase	mm	1000	
18.	Insulator Material	-	Porcelain	
19.	Creepage distance of Insulator	mm	To be mentioned	
20.	Current density at the minimum cross Section of a) Moving Blade b) Terminal Pad c) Contacts d) Terminal Connector	Amps/ Sq.mm	To be mentioned	
21.	Maximum Temp. rise of current carrying parts when carrying rated current continuously (deg. C)		To be mentioned	
Contacts				
22.	Materials of the current carrying path		Copper with Nickel Plating	
23.	Contact Resistance		Less than 50 $\mu\Omega$	
24.	Contact Area			
24.1	Moving Blade	mm ²	5x30 mm copper flat bar, length 810±20 2 Nos per phase	
24.2	Terminal Pad	mm ²	6x40 mm Copper bar flat 2 Nos per phase	
25.	Contact type		Spring loaded contact	
Operating Mechanism				
26.	Operation	-	Gang	
27.	Type of main DS operating mechanism	-	Manual	
28.	Number of main DS operating mechanism per set	Nos	1	

29.	Nos. of Auxiliary Contracts (NO/NC) For Isolator	-	Isolator- 4NO-4NC	
30.	Locking facility in the operating box in both and open position		Yes	
31.	Operating GI Pipe Dimensions			
	For main DS		OD- 42 mm, ID – 36 mm, Length – 6 meter	
32.	MS Solid Square Shaft Dimensions for gang operation (Hot Dip Galvanized)			
33.	For main DS		32x32x3600 mm	
34.	Total weight of Unit	Kg	To be mentioned	
Fuse Description				
35.	Rated Fuse Voltage	kV	33	
36.	Fuse type	-	Drop Out Fuse Barrel with Link	
37.	Rated fuse link normal current	A	1 -2 Amperes	
38.	Rated fuse link interrupting current	kA	31.5 kA, RMS Symmetrical	
39.	Fuse link type	No	Two element, slow/fast unit	
40.	Fuse holder type	-	Heavy duty, sealed cap with eye at both ends of fuse holder	
41.	Fuse link co-ordination	-	Shall co-ordinate with existing system protective equipment	
42.	Outline Dimensional & Cross-section Drawings of Offered type 33KV Isolator & Mounting Structure Arrangement	-	To be mentioned	
43.	Manufacturer's Printed Catalogue describing Specification & Technical Data of Offered type Equipment.	-	To be mentioned	
44.	Standard		IEC-62271-102	
45.	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Note: All exposed MS parts should be Hot Dip Galvanized

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.9. (a) Guaranteed Technical Particulars of 33 kV outdoor type single phase current Transformer for SHOLOSHOHOR BAY EXTENSION.

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
1	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2	Manufacturer's Model No.	-	To be mentioned	
3	Application	-	Metering and Protection	
4	Type	-	Induction	
5	Installation	-	Outdoor	
6	Construction	-	Sealed Tank	
7	Insulation	-	Oil	
8	Number of Phase	-	Single	
9	Rated Frequency	Hz	50	
10	Mounting	-	On Supporting Structure	
11	Primary rated voltage (Phase to Phase)	kV	33	
12	Maximum System Voltage (Phase to Phase)	kV	36	
13	System Earthing	-	Effectively Earthed	
14	Basic Insulation Level (1.2/50 Micro-Sec.)	kV	170	
15	Power frequency withstand voltage (1 Min. 50 Hz.)	kV	70	
16	Ratio for 33KV Line feeder:	A	1200-2400/5-5A	
17	Type of Winding:			
	a) Primary	-	Single Winding	
	b) Secondary	-	Double (1 protection & 1 measuring)/Triple winding (2 protection & 1 measuring)	
18	Accuracy Class:			
	a) for measurement	-	0.2 S	
	b) for Protection	-	5P20	
19	R _{CT} at 75°C:			
	a) measuring core	mΩ	To be mentioned	
	b) protection core	mΩ	To be mentioned	
20	Knee point voltage (Supported by Calculation)			

	For Measuring Core	V	To be mentioned	
	For Protection Core	V	To be mentioned	
21	Burden:			
	a) for measurement	VA	30	
	b) for Protection	VA	30	
22	Short Time Current Rating for 3 Sec.	kA	31.5	
23	Extended Current Rating (% of rated current)	%	120	
24	Over Current Rating	A	<10	
25	Creepage Distance	mm/kV (Min.)	25	
26	Rated accuracy limit factor	-	20	
27	Bushing	-	Porcelain outdoor type	
28	Standard	-	IEC 61869-1 & IEC 61869-2	
29	CT Burden shall meet the short circuit current (31.5 kA, 3 Sec)	-	Yes	
30	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

**Seal & Signature
of the Manufacturer**

**Seal & Signature
of the Bidder**

8.9.(b)Guaranteed Technical Particulars of 33 kV outdoor type single phase current Transformer for KALURGHAT BAY EXTENSION.

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
1	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2	Manufacturer's Model No.	-	To be mentioned	
3	Application	-	Metering and Protection	
4	Type	-	Induction	
5	Installation	-	Outdoor	
6	Construction	-	Sealed Tank	
7	Insulation	-	Oil	
8	Number of Phase	-	Single	
9	Rated Frequency	Hz	50	
10	Mounting	-	On Supporting Structure	
11	Primary rated voltage (Phase to Phase)	kV	33	
12	Maximum System Voltage (Phase to Phase)	kV	36	
13	System Earthing	-	Effectively Earthed	
14	Basic Insulation Level (1.2/50 Micro-Sec.)	kV	170	
15	Power frequency withstand voltage (1 Min. 50 Hz.)	kV	70	
16	Ratio for 33KV Line feeder:	A	600-1200/5-5A	
17	Type of Winding:			
	a) Primary	-	Single Winding	
	b) Secondary	-	Double (1 protection & 1 measuring)/Triple winding (2 protection & 1 measuring)	
18	Accuracy Class:			
	a) for measurement	-	0.2 S	
	b) for Protection	-	5P20	
19	R _{CT} at 75°C:			
	a) measuring core	mΩ	To be mentioned	
	b) protection core	mΩ	To be mentioned	
20	Knee point voltage (Supported by Calculation)			
	For Measuring Core	V	To be mentioned	
	For Protection Core	V	To be mentioned	
21	Burden:			
	a) for measurement	VA	30	
	b) for Protection	VA	30	
22	Short Time Current Rating for 3 Sec.	kA	31.5	
23	Extended Current Rating (% of rated current)	%	120	
24	Over Current Rating	A	<10	
25	Creepage Distance	mm/kV		

		(Min.)	25	
26	Rated accuracy limit factor	-	20	
27	Bushing	-	Porcelain outdoor type	
28	Standard	-	IEC 61869-1 & IEC 61869-2	
29	CT Burden shall meet the short circuit current (31.5 kA, 3 Sec)	-	Yes	
30	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

**Seal & Signature
of the Manufacturer**

**Seal & Signature
of the Bidder**

8.10 Guaranteed Technical Particulars of 33 kV Outdoor Type Single Phase Potential Transformer

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
1	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2	Manufacturer's Model No.	-	To be mentioned	
3	Type	-	Induction Type	
4	Ratio	V	33000/ $\sqrt{3}$:110/ $\sqrt{3}$:110/ $\sqrt{3}$	
5	No. of phase	Nos.	Single Phase	
6	Total capacitance at 100 Hz	PF	To be mentioned	
7	50 Hz 1 (One) minute withstand voltage wet	KV	To be mentioned	
8	Impulse withstand (1.2/50 micro sec. wave)	KV	170	
9	Rated burden per phase	VA	30VA	
10	Class of accuracy	-	0.2+3P	
11	Temperature co-efficient of ratio per °C	-	To be mentioned	
12	System earthing	-	Effectively Earthed	
13	Creepage Distance	mm/kV	25 (min)	
14	Maximum errors with 5% primary voltage:			
	a) Ratio	%	To be mentioned	
	b) Phase angle	minutes	To be mentioned	
15	Total weight complete	Kg	To be mentioned	
16	Standard	-	IEC 61869-1 & IEC 61869-3	
17	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

**Seal & Signature
of the Manufacturer**

**Seal & Signature
of the Bidder**

8.11 Guaranteed Technical Particulars of 33KV Single Phase Lightning Arrester

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
01	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
02	Country of Origin		To be mentioned	
03	Place of manufacture		To be mentioned.	
04	Manufacturer's model No.	-	To be mentioned	
05	Type of the Arrester	-	Metal Oxide (ZnO), Gapless-Outdoor (Single Unit,)	
06	Rated Arrester Voltage	kV	36	
07	Continuous Operating Voltage (COV, Uc)	kV	22- 27.5	
08	Nominal Discharge Current (8/20micro sec)	KA	10	
09	Type of Lightning Arrester housing	-	Porcelain/polymer (Hydrophobic silicon)	
10	Power Frequency withstand voltage of the Arrester Housing, Dry & Wet	kV rms	70 (Dry) & 70 (Wet)	
11	Impulse withstand Voltage of the Arrester Housing.	kV (peak)	170	
12	Lightning Impulse Residual Voltage (8/20 micro-second wave)	kV (peak)	80 or better	
13	Maxm. Steep Current Impulse Residual Voltage at 10 KA of 1 micro second front time.	kV (peak)	85 or better	
14	High Current Impulse Withstand Value (4/10 micro second)	KA	100 or better	
15	Temporary Over voltage capability:			
16	a) 0.1 Second	kV (peak)	Shall be mentioned	
	b) 1.0 Second	kV (peak)	Shall be mentioned	
	c) 10 Second	kV (peak)	Shall be mentioned	
	d) 100 Second	kV (peak)	Shall be mentioned	
	Leakage Current at rated voltage	mA	< 1 mA	
17	Total Creepage distance (minimum)	mm/ kV	31	
18	Overall dimension :			
19	a) Height	mm	Shall be mentioned	
	b) Diameter	mm	Shall be mentioned	
	Total weight of Arrester	Kg.	Shall be mentioned	
20	Line discharge class	-	Shall be mentioned	
21	Short Circuit Current Withstand duration	Sec	31.5kA, 1 sec	

22	Minimum Energy Discharge capability (KJ/KV) at rated voltage	-	5	
23	Min. Bending load (kgm)		500	
24	Surge Counter /Monitor		Shall be provided	
25	Cable for Connecting Surge Counter		Shall be provided	
26	Reference Standard		IEC 60099-4	
27	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.12 Guaranteed Technical Particulars of 11KV Single Phase Lightning Arrester

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
01	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
02	Country of origin		To be mentioned.	
03	Place of manufacture		To be mentioned.	
04	Manufacturer's model No.	-	To be mentioned	
05	Type of the Arrester	-	Metal Oxide (ZnO), Gapless-Outdoor (Single Unit.)	
06	Rated Arrester Voltage	kV	9	
07	Continuous Operating Voltage (COV, U _c)	kV	8- 10 kV	
08	Nominal Discharge Current (8/20micro sec)	KA	5	
09	Type of Lightning Arrester housing	-	Porcelain/polymer (Hydrophobic silicon)	
10	Power Frequency withstand voltage of the Arrester Housing, Dry & Wet	kV rms	≥ 35 kV (Dry) & 30 kV (Wet)	
11	Impulse withstand Voltage of the Arrester Housing.	kV (peak)	≥75 kV (peak)	
12	Lightning Impulse Residual Voltage (8/20 micro-second wave)	kV (peak)	35 kV (peak)	
13	Temporary Over voltage capability:			
14	a) 0.1 Second	kV (peak)	To be mentioned	
	b) 1.0 Second	kV (peak)	To be mentioned	
	c) 10 Second	kV (peak)	To be mentioned	

	d) 100 Second	kV (peak)	To be mentioned	
	Leakage Current at rated voltage	mA	< 1 mA	
15	Total Creepage distance (minimum)	mm/ kV	25	
16	Overall dimension :			
17	a) Height	mm	To be mentioned	
	b) Diameter	mm	To be mentioned	
	Total weight of Arrester	Kg.	To be mentioned	
18	Line discharge class	-	Shall be mentioned	
19	Short Circuit Current Withstand duration	Sec	25kA, 1 sec	
20	Minimum Energy Discharge capability (KJ/KV) at rated voltage	-	Shall be provided	
21	Min. Bending load (kgm)		Shall be provided	
22	Reference Standard	-	IEC 60099-4	
23	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

**Seal & Signature
of the Manufacturer**

**Seal & Signature
of the Bidder**

8.13 Guaranteed Technical Particulars of 11kV Gas Insulated Switchgear with Protection and Control Equipment

(To be filled up by the Manufacturer in Manufacturer's Letterhead Pad with appropriate data, Otherwise bid shall be rejected. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

	DESCRIPTION	UNIT	BPDB REQUIREMENT	BIDDER'S GUARANTEED VALUES
	TRANSFORMER INCOMING SWITCHGEAR UNITS :			
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
2.	Manufacturer country of origin		USA/UK/EU/Japan/ South Korea/Malaysia	
3.	Type/ Model		Shall be mentioned	
4.	Applied Standard		Latest version of IEC 62271 fully complied	
5.	Rated nominal Voltage	kV	11	
6.	Rated maximum Voltage	kV	12	
7.	Rated Frequency	Hz	50	
8.	Rated Current for main bus	A	2500	
9.	Cross section of Bus bar	mm ²	2000 mm ² or as per IEC62271	
10.	Material of Bus-Bar		HDHC Copper	
11.	Rated short time current	KA	25	
12.	Short time current rated duration	Sec.	3	
13.	Rated normal current : Incoming feeder from Transformer	 A	 2500 A	
	a)Pressure relief device is integrated with each gas chamber and pressure relief duct up to		Yes	

	outside the room			
	b)Percentage of Gas leakage per year of each gas filled compartment (same as mentioned in Type Test)		<0.1%	
14	Mimic diagram is depicted in front Of switch gear panel		Yes	
15	ElectricalandMechanicalinterlockbetweenCircuitbreaker,isolatorandearthswitch		Yes	
16	Capacitive Voltage Indicator		Yes	
17.	Circuit Breaker :			
	Type		VCB	
	Class of Circuit Breaker (through necessary Type test)		E2M2 or better	
	Insulation media		SF ₆	
	Interrupting media		Vacuum	
	Rated Voltage	kV	12	
	Rated Current	A	2500	
	Rated Short Ckt. Breaking Current	KA	25	
	Rated Short Ckt. Making Current	KA	63.5	
	Rated Breaking time	Cycle	≤5	
	Opening time	Sec.	Shall be mentioned	
	Closing time	Cycle	≤5	
	Rated operating Sequence		0-0.3 sec-CO-3 min-CO	
	Nos. of Trip coils	-	2	
	Manufacturer's name and country	-	Shall be mentioned	

	Of origin of Vacuum interrupter (Shall be same as mentioned in Type Test Report)			
	Manufacturer's model no. of vacuum interrupter		Shall be mentioned	
	Guaranteed no. of operation for Vacuum interrupter			
	a) Vacuum interrupter normal condition at rated current switching	nos.	Min 10000	
	b) Vacuum interrupter in short circuit condition i.e. at the short circuit current switching	nos.	≥ 50	
	Control Voltage	V	DC 110	
	AC Voltage for the Universal Motor for spring charge	V	AC 240	
	Power Consumption of Charging motor	W	max 240	
	Power consumption of closing coil	W	Shall be mentioned	
	Power consumption of opening coil	W	Shall be mentioned	
18.	Three position disconnecter Switch (Motor and manually operated)			
	Type		Shall be mentioned	
	Rated Voltage	KV	12	
	Rated Current	A	2500	
	Rated short time current	KA	25	
	Short time current rated duration	Sec.	3	
	Switch Position		open, close, earth	
	Electrical and Mechanical interlock		As per IEC 62271-200	

19.	Current Transformer :			
	Rated Voltage	KV	12	
	Accuracy Class, Metering		0.2 & F.S. < 5	
	Accuracy Class, Protection		5 P20	
	Rated Current ratio:- Transformer Incoming Feeder	A	900-1800/5-5-5A	
	Burden for metering	VA	15 (at max CT ratio)	
	Burden for protection	VA	15 (at max CT ratio)	
	Extended Current Rating for metering	A	120% of rated Current	
	Type	-	Ring Core/Block type with sensor	
	Knee Point Voltage (Minimum) (Supported by Calculation) a) Measuring Core b) Protection Core	V V	Shall be mentioned Shall be mentioned	
	CT Burden shall meet the short circuit current(25kA, 3s) (Supported by Calculation)	-	Yes	
19.1	Voltage Transformer:			
	Number of Phase		Single Phase	
	Rated primary Voltage	KV	11/ $\sqrt{3}$	
	Rated secondary voltage	V	110/ $\sqrt{3}$	
	Rated Burden	VA	20	
	Accuracy Class (Metering & Protection core)		0.2 & 3P	
	Type		Resin Cast	
	Mounting on incoming panel at bus		Yes	

20	OVER CURRENT & EARTH FAULT PROTECTION RELAY			
	Manufacturer's Name Country of Origin	-	ABB- Sweden, Switzerland, Finland /Siemens -Germany/ Schneider-France /UK/Alstom(UK/France)/ NR, China/SEL, USA	
	Manufacture's model no.	-	Shall be mentioned	
	Type of relay	-	Numerical programmable	
	The relay shall have IEC 61850 communication Protocol.		Yes	
	Directional Feature can be activated/de-activated	Yes/No	Yes	
	Range of current setting : ➤ Phase element ➤ Each fault element	% of CT rating	Shall be mentioned Shall be mentioned	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	32	
	No of Binary Output (Minimum)	-	32	
	No of Communication Ports xvii) Electrical xviii) Optical	-	Shall be mentioned with type.	
	Protection Function	-	Directional and Non-Directional O/C, E/F, Over/ Under Voltage, Over and Under Frequency Sync Check and Other Necessary Functions.	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	

	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	
	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	Drop off to Pick up ratio	%		
	Reset time after removal of fault current			
	a) Phase element (100%)	Sec	Shall be mentioned	
	b) E/F element (40%)	Sec	Shall be mentioned	
20.1	SEPARATE STANDBY EARTH FAULT PROTECTION			

20.1	Manufacture's name & country	-	ABB- (Sweden/ Switzerland/ Finland) / Siemens- (Germany)/ Alstom- (France/UK)/ Schneider- (France/UK) / NR, China/SEL USA.	
20.2	Manufacture's model no.	-	To be mentioned	
20.3	Type of relay	-	Numerical programmable with all necessary features	
20.4	Range of current setting : a) Phase element (% of CT rating) b) Earth fault element (% of CT rating)	% %	To be mentioned To be mentioned	
20.5	Range of timing settings	Sec	To be mentioned	
20.6	Burden of relay at 20 time CT rating	VA	To be mentioned	
20.7	Percentage of current setting at which relay will reset	%	To be mentioned	
20.8	Reset time after removal of 10 time CT rated current for : a) Phase element (100%) b) E/F element (40%)	Sec Sec	To be mentioned To be mentioned	
21	Trip Relays			
	Manufacturer's Name and Country		To be mentioned	
	Manufacturer's Model/type No.		To be mentioned	
	Operating Times		<10	
	Self-reset type for O/C, E/F protection		Yes	
22	Trip Circuit Supervision Relay			
	Manufacture's name & country of relay		To be mentioned	
	Manufacture's model no.		To be mentioned	
23	METERING KWh Meter			

	Manufacture's Name	-	Shall be mentioned	
	Manufacture's Country		European Country/ North American Country/Japan/Australia.	
	Manufacture's Model no.		Shall be mentioned	
	Type of meter		Numerical programmable	
	Class of accuracy		0.2 S	
24	INDICATION VOLT & AMPERE METERS			
	Manufacturer's Name and Country			
	Manufacture's Model no.		Shall be mentioned	
	Type of meter		Analogue	
	Class of Accuracy		1.0	
	Separate A-meter for each phase		Yes	
26	Annunciator			
	Manufacture's Name		Shall be mentioned	
	Country of Origin		Shall be mentioned	
	Manufacture's Model no.		Shall be mentioned	
	Windows	nos.	16	
	Built in buzzer and buttons for accept, mute, test, reset, etc.		Yes	
27	Cable Compartment :			
	Rated Current	A	2500	
	Cable connection		2x 1C×630mm ² / Phase XLPE armoured copper cable plug-socket with all accessories required for termination with proper cable support shall be provided. Sealing/cap for unused cable termination shall	

			also to be provided.	
	Capacitive Voltage Indicator		Shall be incorporated in the front side of the panel	
28	Insulation level :			
	AC withstand voltage 1 min. dry	KV	28	
	Impulse Withstand, full wave	KV	75	
29	Degree of Protection			
	Enclosure		IP3X	
	HV Compartment		IP65	
	LV Compartment		IP40	
	Cable Compartment		IP40	
30	Earthing Switch :			
	Type		Shall be mentioned	
	Short Time Current, 3 secs	KA	Shall be mentioned	
31	Dimension and Weight			
	Height	mm	Max. 2200	
	Width	mm	shall be mentioned	
	Depth	mm	shall be mentioned	
	Weight including Circuit Breaker	Kg.	shall be mentioned	
BUS COUPLER (WITH RISER) SWITCHGEAR UNIT :				
32	a) Manufacturer's Name & Address		Shall be mentioned	
	b) Manufacturer country of origin		Shall be mentioned	
33	Type/ Model		Shall be mentioned	
34	Applied Standard		Shall be mentioned	
35	Rated nominal Voltage	kV	11	
36	Rated Maximum Voltage	kV	12	

37	a) Rated Current for main bus	A	2500	
	b) Cross section of Bus bar	mm ²	2000 mm ² for 2500A or as per IEC62271	
38.	Material of Bus-Bar		HDHC Copper	
39.	Rated short time current	KA	25	
40.	Short time current rated duration	Sec.	3	
	a) Pressure relief device is integrated with each gas chamber and pressure relief duct up to outside the room		Yes	
	b) Percentage of Gas leakage per year of each gas filled compartment (same as mentioned in Type Test)		<0.1%	
41	Mimic diagram is depicted in front Of switchgear panel		Yes	
42	Electrical and Mechanical interlock between Circuit breaker, isolator and earth switch		Yes	
43	Circuit Breaker :			
	Type		VCB	
	Insulation media		SF ₆	
	Interrupting media		Vacuum	
	Class of Circuit Breaker (through necessary Type test)		E2M2 or better	
	Rated Voltage	KV	12	
	Rated Current	A	2500	
	Rated Short Ckt. Breaking Current	KA	25	

	Rated Short Ckt. making Current	KA	63.5	
	Rated Breaking time	Cycle	≤ 5	
	Opening time	Sec.	Shall be mentioned	
	Closing time	Sec.	shall be mentioned	
	Control Voltage	V	DC 110	
	AC Voltage for the Universal Motor for spring charge	V	AC 240	
	Nos. Of Trip coils	-	2	
	Manufacturer's name and country Of origin of Vacuum interrupter (Shall be same as mentioned in Type Test Report)	-	Shall be mentioned	
	Manufacturer's model no. of vacuum interrupter		Shall be mentioned	
	Guaranteed no. of operation for Vacuum interrupter:			
	a) Vacuum interrupter normal condition at rated current switching	nos.	Min 10000	
	b) Vacuum interrupter in short circuit condition i.e. at the short circuit current switching	nos.	≥ 50	
44.	Three position disconnecter Switch (Motor and manually operated)			
	Type		Shall be mentioned	
	Rated Voltage	KV	12	
	Rated Current	A	2500	
	Rated short time current	KA	25	
	Short time current rated duration	Sec.	3	
	Switch Position		close, open, earth	

	Electrical and Mechanical interlock		As per IEC 62271-200	
45.	Current Transformer :			
	Rated Voltage	kV	12	
	Accuracy Class, Metering		0.2 & F.S. < 5	
	Accuracy Class, Protection		5P20	
	Rated Current ratio	A	900-1800/5-5	
	Burden	VA	15	
	Rated frequency	Hz	50	
	Type	-	Ring Core/Block type with sensor	
	Knee Point Voltage (Minimum) (Supported by Calculation)			
	c) Measuring Core	V	Shall be mentioned	
	d) Protection Core	V	Shall be mentioned	
	CT Burden shall meet the short circuit current(25kA, 3s) (Supported by Calculation)	-	Yes	
46.	Insulation level :			
	AC withstand voltage 1 min. dry	kV	28	
	Impulse Withstand, full wave	kV	75	
47.	Degree of Protection			
	Enclosure		IP3X	
	HV Compartment		IP65	
	LV Compartment		IP40	
	Cable Compartment		IP40	
48	Earthing Switch :			
	Type		Shall be mentioned	
	Short Time Current, 3 secs	KA	Shall be mentioned	
49	Dimension and Weight			

	Height	mm	Max. 2200	
	Width	mm	shall be mentioned	
	Depth	mm	shall be mentioned	
	Weight including Circuit Breaker	Kg.	shall be mentioned	
50	OVER CURRENT & EARTH FAULT PROTECTION RELAY			
	Manufacturer's Name Country of Origin	-	ABB- Sweden, Switzerland, Finland /Siemens -Germany/ Schneider-France /UK/Alstom(UK/France)/ NR, China/SEL, USA	
	Manufacture's model no.	-	Shall be mentioned	
	Type of relay	-	Numerical programmable	
	The relay shall have IEC 61850 communication Protocol.		Yes	
	Directional Feature can be activated/de-activated	Yes/No	Yes	
	Range of current setting : ➤ Phase element ➤ Each fault element	% of CT rating	Shall be mentioned Shall be mentioned	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	32	
	No of Binary Output (Minimum)	-	24	
	No of Communication Ports xix) Electrical xx) Optical	-	Shall be mentioned with type.	

	Protection Function	-	Directional and Non-Directional O/C, E/F, Over/ Under Voltage, Over and Under Frequency Sync Check and Other Necessary Functions.	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	
	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	Drop off to Pick up ratio	%		
	Reset time after removal of fault current			
	a) Phase element (100%)	Sec	Shall be mentioned	
	b) E/F element (40%)	Sec	Shall be mentioned	

51	Trip Relay			
	Manufacturer's Name and Country		To be mentioned	
	Manufacturer's Model/type No.		To be mentioned	
	Operating Times		<10	
	Self-reset type for O/C, E/F protection		Yes	
52	Trip Circuit Supervision Relay			
	Manufacture's name & country of relay		To be mentioned	
	Manufacture's model no.		To be mentioned	
53	INDICATION AMPERE METERS			
	Manufacturer's Name and Country	-	Shall be mentioned	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of meter	-	Analogue	
	Class of Accuracy	-	1.0	
	Separate A-meter for each phase	-	Yes	
54	INDICATION VOLT METERS			
	Manufacturer's Name and Country	-		Shall be mentioned
	Manufacture's Model no.	-		Shall be mentioned
	Type of meter	-		Analogue
	Class of Accuracy	-	1.0	
	2 nos. voltmeter with seven (7) position voltage selector switch for observing two (2) bus's bus voltage	-	Yes	
55	Control Switch			
	Manufacture's Name & Country		Shall be mentioned	
	Manufacture's Model/Type No.		Shall be mentioned	

	Separate TNC/Discrepancy switch and Local Remote (L/R) selector switch		Yes	
56	Annunciator			
	Manufacture's Name		Shall be mentioned	
	Country of Origin		Shall be mentioned	
	Manufacture's Model no.		Shall be mentioned	
	Windows	nos.	12	
	Built in buzzer and buttons for accept, mute, test, reset, etc.		Yes	
11 kV OUTGOING FEEDER SWITCHGEAR UNITS :				
57.	a) Manufacturer's Name & Address		Shall be mentioned	
	b) Manufacturer country of origin		USA/UK/EU/Japan/ South Korea/Malyasia	
58	Type/ Model		Shall be mentioned	
59	Applied Standard		Shall be mentioned	
60	Rated nominal Voltage	kV	11	
61.	Rated maximum Voltage	kV	12	
62.	Material of Bus-Bar		HDHC Copper	
63.	a) Rated Current for main bus	A	2500	
	b) Cross section of Busbar	mm ²	2000 mm ² or as per IEC62271	
64	Rated short time current	KA	25	
65	Short time current rated duration	Sec.	3	
66	Circuit Breaker :			
	Type		VCB	
	Insulation media		SF ₆	

	Interrupting media		Vacuum	
	Rated Voltage	KV	12	
	Rated Current	A	630	
	Rated Short Ckt. Breaking Current	KA	25	
	Rated Short CKt. making Current	KA	63.5	
	Rated Breaking time	Cycle	≤5	
	Opening time	Sec.	To be mentioned	
	Closing time	Sec.	To be mentioned	
	Rated operating Sequence		0-0.3 sec-CO-3 min-CO	
	Control Voltage	V	DC 110	
	AC Voltage for the Universal Motor for spring charge	V	AC 240	
	Nos. Of Trip coils	-	2	
	Manufacturer's name and country Of origin of Vacuum interrupter (Shall be same as mentioned in Type Test Report)	-	Shall be mentioned	
	Manufacturer's model no. of vacuum interrupter		Shall be mentioned	
	Guaranteed no. of operation for Vacuum interrupter:			
	a) Vacuum interrupter normal condition at rated current switching	nos.	Min 10000	
	b) Vacuum interrupter in short circuit condition i.e. at the short circuit current switching	nos.	≥ 50	
67.	Three position disconnecter Switch (Motor and manually			

	operated)			
	Type		Shall be mentioned	
	Rated Voltage	KV	12	
	Rated Current	A	630	
	Rated short time current	KA	25	
	Short time current rated duration	Sec.	3	
	Switch Position		close, open, earth	
	Electrical and Mechanical interlock		As per IEC 62271-200	
68	Current Transformer :			
	Rated Voltage	KV	12	
	Accuracy Class, Metering		0.2 & F.S. < 5	
	Accuracy Class, Protection		5P20 (if burden is 20VA) or 5P30 (if burden is 15VA)	
	Rated Current ratio	A	200-400/5-5A	
	Burden	VA	15 / 20	
	Rated frequency	Hz	50	
	Type	-	Ring Core/Block type with sensor	
	Knee Point Voltage (Minimum) (Supported by Calculation) e) Measuring Core f) Protection Core	V V	Shall be mentioned Shall be mentioned	
	CT Burden shall meet the short circuit current(25kA, 3s) (Supported by Calculation)	-	Yes	
69	OVER CURRENT & EARTH FAULT PROTECTION RELAY			
	Manufacturer's Name	-	ABB- Sweden, Switzerland, Finland /Siemens -Germany/	

	Country of Origin		Schneider-France /UK/Alstom(UK/France)/ NR, China/SEL, USA	
	Manufacture's model no.	-	Shall be mentioned	
	Type of relay	-	Numerical programmable	
	The relay shall have IEC 61850 communication Protocol.		Yes	
	Directional Feature can be activated/de-activated	Yes/No	Yes	
	Range of current setting : ➤ Phase element ➤ Each fault element	% of CT rating	Shall be mentioned Shall be mentioned	
	Relay Nominal operating voltage	-	110Vdc	
	Relay CT Current rating	-	5A	
	No of Binary Input (Minimum)	-	24	
	No of Binary Output (Minimum)	-	24	
	No of Communication Ports xxi) Electrical xxii) Optical	-	Shall be mentioned with type.	
	Protection Function	-	Directional and Non-Directional O/C, E/F, Over/Under Voltage, Over and Under Frequency Sync Check and Other Necessary Functions.	
	Relay Configuration Software (Name, Manufacturer, Version, License Requirement (with name and version))	-	Shall be mentioned	
	Maximum time delay between initiation of fault and energize of breaker trip circuit.	-	Shall be mentioned	
	Range of timing settings	Sec	Shall be mentioned	

	Burden of relay at 20 time CT rating	VA	Shall be mentioned	
	Drop off to Pick up ratio	%		
	Reset time after removal of fault current			
	a) Phase element (100%)	Sec	Shall be mentioned	
	b) E/F element (40%)	Sec	Shall be mentioned	

70	Trip relay			
	Manufacturer's Name and Country		To be mentioned	
	Manufacturer's Model/type No.		To be mentioned	
	Operating Times		<10	
	Self-reset type for O/C, E/F protection		Yes	
71	Trip Circuit Supervision Relay			
	Manufacture's name & country of relay		To be mentioned	
	Manufacture's model no.		To be mentioned	
72	METERING KWh Meter			
	Manufacture's Name & Country	-	Shall be mentioned	
	Manufacture's Country		European Country/ North American Country/Japan/Australia.	
	Manufacture's Model no.	-	Shall be mentioned	
	Type of meter	-	Numerical programmable	
	Class of accuracy	-	0.2 S	
73	INDICATION AMPERE METERS			
	Manufacturer's Name and Country	-		

	Manufacture's Model no.	-	Shall be mentioned	
	Type of meter	-	Analogu e	
	Class of Accuracy	-	1.0	
	Separate A-meter for each phase	-	Yes	
74	Control Switch			
	Manufacture's Name & Country		Shall be mentioned	
	Manufacture's Model/Type No.		Shall be mentioned	
	Separate TNC/Discrepancy switch and Local Remote (L/R) selector switch		Yes	
75	Annunciator			
	Manufacture's Name		Shall be mentioned	
	Country of Origin		Shall be mentioned	
	Manufacture's Model no.		Shall be mentioned	
	Windows	nos.	12	
	Built in buzzer and buttons for accept, mute, test, reset, etc.		Yes	
76	Cable Compartment :			
	Rated Current	A	Shall be mentioned	
	Cable connection		3C x 185 mm ² XLPE armoured copper cable with provision for 1 nos./ feeder Panel. Copper cable plug-socket with all accessories required for termination with proper cable support shall be provided. Sealing/cap for unused cable termination shall also to be provided.	

	Capacitive Voltage Indicator		Shall be incorporated in the front side of the panel	
77.	Insulation level :			
	AC withstand voltage I min. dry	KV	28	
	Impulse Withstand, full wave	KV	75	
78.	Degree of Protection and safety indicator			
	Enclosure		IP3X	
	HV Compartment		IP65	
	LV Compartment		IP40	
	Cable Compartment		IP40	
79.	Earthing Switch :			
	Type		Shall be mentioned	
	Short Time Current, 3 sec.	KA	Shall be mentioned	
80.	Bus bar :			
	Material		Copper	
	Cross Section	mm ²	2000	
81.	Dimension and Weight			
	Height	mm	Max2200	
	Width	mm	Shall be mentioned	
	Depth	mm	Shall be mentioned	
	Weight including Circuit Breaker	Kg.	Shall be mentioned	
82	# The PCM Panel for all feeders shall be complied all the technical specification mentioned in Section-7.	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.14 Guaranteed Technical Particulars of Ni-Cd Battery (110 V DC)

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's guaranteed Particulars
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	c) Country of Origin		To be mentioned	
2.	Manufacturer's model no.	-	To be mentioned	
3.	Type	-	Nickel Cadmium Alkaline (enclosed type)	
4.	Operating Voltage	V	110 DC	
5.	Continuous Discharge Current at rate of 10 hour & Final Cell Voltage 1.1 Volt	Amp	10	
6.	Short Time Discharge Current at rate of 2 hour & Final Cell Voltage 1.1 Volt	Amp	50	
7.	Electrolyte type	-	To be mentioned	
8.	Capacity at 5 hour rate	Ah	≥160	
9.	Discharge Voltage	Volt	1.0 to 1.14 V Per Cell	
10.	Charging Voltage (Float)	Volt	1.4 V Per Cell	
11.	Number of cells	Nos.	92 nos. + 5 nos. Spare	
12.	Nominal Voltage per cell	Volt	1.2	
13.	Charging Voltage (Boost)	Volt	1.75 V Per Cell	
14.	Normal float charge rate	A	To be mentioned	
15.	Maximum boost charge rate	A	To be mentioned	
16.	Amp hour efficiency at : a) 10 hour rate b) 1 hour rate	% %	To be mentioned To be mentioned	
17.	Size of cell	mm	To be mentioned	
18.	Weight of cell and electrolyte	kg	To be mentioned	
19.	Standard	-	As per Latest Edition of applicable IEC- 60623	
20.	Specific gravity of electrolyte	-	To be mentioned	
21.	Release pressure for valve regulated type	kg/m ²	To be mentioned	
22.	Volume of electrolyte per cell	ml	To be mentioned	
23.	Volume of reserve electrolyte per cell	ml	To be mentioned	
24.	No of electrode plates per cell	Nos.	To be mentioned	

25.	Type of racks & Dimension (a)Height (b)Width (c)Depth	-	To be mentioned	
26.	Cell dimension: (a) Height (b) Width (c) Depth	mm mm mm	To be mentioned	
27.	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.15 Guaranteed Technical Particulars of Battery Charger

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's guaranteed Particulars
1.	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
2.	Year of Manufacturing	Yr.	Not before 2023	
3.	Country of Origin		To be mentioned	
4.	Manufacturer's model no.	-	To be mentioned	
5.	Rated Input voltage range	V AC	415 V \pm 10%	
6.	Rated Frequency	Hz	50 Hz (\pm 3%),	
7.	No of Phase	-	03	
8.	Control	-	Shall be mentioned	
9.	Communication module for station automation	-	Shall be provided	
10.	Rectifier type	-	Silicon	
11.	Nominal output voltage	V DC	110	
12.	Chargingoperating control	-	Boost and floating charge, automatic with manual operation	
13.	Output current	A DC	\geq 100	
14.	Continuous current rating	-	110 % of rated current	
15.	Efficiency	-	\geq 85% at full load @ Nominal AC Input	
16.	Voltage regulation	-	\leq \pm 1 %	
17.	Ripple voltage	-	\leq 2 % rms	
18.	Float charging voltage	V/Cell	1.35 to 1.45 (programmable)	
19.	Boost charging voltage	V/Cell	1.6 to 1.75 (programmable)	
20.	Boost charging time	hour	programmable	
21.	Operating temperature	$^{\circ}$ C	0 to 50	
22.	Humidity	%	95	
23.	Audible noise	dB	\leq 65	

24.	Facilities for paralleling with another charger	-	Shall be provided	
25.	Protection against surge voltage	-	Shall be provided	
26.	Protection against reverse polarity	-	Shall be provided	
27.	Provision for current limiting	-	Shall be provided	
28.	Dropping Diodes unit at in the output circuit during Boost Mode	-	Yes	
29.	Provision of constant voltage charge 90V -130V	-	Shall be provided	
30.	Provision of showing earth leakage current by analog meter	-	Shall be provided	
31.	Battery Temperature compensation	-	Shall be incorporated.	
32.	Alarm annunciator independent of the microprocessor	-	Shall be provided	
33.	Analog/Digital meters for voltage and current measurement of input, output and battery power	-	Shall be provided	
34.	Dimension	-	Shall be mentioned	
35.	Output voltage range a) normal charge b) Float charge c) boost charge	V DC V DC V DC	110 V ± 1% 128 V ± 1% 156 V ± 1%	
36.	Normal/ boost charge independent units?	Yes/ No	To be mentioned	
37.	Rated Battery Ah @ C ₅ rate	Ah	≥160	
38.	Type of AVR	-	Static	
39.	Installation Break Down Voltage	KV	2kV for 1 Minute	
40.	Type of rectifier	Thyristor	To be mentioned	
41.	MCCB Rating			
	For AC input	A	25 (Min.)	
	For DC main Output	A	125 (Min.)	
	For DC Battery Output	A	63 (Min.)	
42.	Standard	-	As per Latest Edition of applicable IEC-60146	
43.	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

44.	Charger controller shall have IEC61850 communication protocol for SAS implementation. All the measurement data, controlling & operation facility of the charger shall be available at SAS.	-	Yes	
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Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.16 GUARANTEED TECHNICAL DATA SCHEDULE FOR 33/11KV, 20/26MVA POWER TRANSFORMER

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's Guaranteed Particulars
1.	RATING AND PERFORMANCE			
1.1	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Manufacturer's country of Origin		To be mentioned	
	c) Year of Manufacturing	Yr.	Not before 2023	
1.2	Manufacturer's Model no.	-	To be mentioned	
1.3	Continuous maximum rating (ONAN / ONAF)	MVA	20/26	
1.4	No. of phases	Nos.	3	
1.5	Rated frequency	Hz	50	
1.6	Normal transformation ratio at No-load and Principal Tap	kV	33/11.55	
1.7	Rated HT voltage (phase to phase)	kV	33	
1.8	Maximum HT voltage (phase to phase)	kV	36	
1.9	Rated LT voltage (phase to phase)	kV	11	
1.10	Maximum LT voltage (phase to phase)	kV	12	
1.11	Installation	-	Outdoor	
1.12	Type of Transformer	-	Core, Conservator, Oil immersed	
1.13	Direction of normal power flow	-	HT-LT	
1.14	No of windings	Nos.	2	
1.15	Bushing materials	-	Porcelain	

1.16	Type of cooling	-	ONAN/ONAF	
1.17	Coolant	-	Type- A, Unused insulating mineral oil, free from PCB (polychlorinated biphenyl)	
1.18	Type of earthing	-	Effectively earth	
1.19	Type of base	-	On wheels with adequate size and length of rails and fixing arrangement	
1.20	Phase connection: a) 33 KV winding with bushing CT b) 11KV winding with bushing CT	- - -	Delta Star	
1.21	Vector group	-	Dyn11	
1.22	Neutral to be brought out : a) HT b) LT	- -	Nil Yes	
1.23	Basic Insulation Level (BIL) : a) High voltage winding b) Low voltage winding	KV KV	170 75	
1.24	Max. Temp. Rise over 40 ⁰ C of ambient (at CMR & normal tap change position) supported by Design Calculation sheet (to be enclosed) on the basis of Design Data:-			
	a) Winding Temp. Rise	⁰ C	65	
	b) Top Oil Temp. Rise	⁰ C	55	
TEST VOLTAGE :				

1.25	Impulse front wave test voltage (1.2/50 micro sec. wave shape) : a) High voltage side b) low voltage side	kV kV	170 75	
1.26	Power Frequency withstand test voltage for 1 (one) minute : a) High voltage side b) Low voltage side	kV kV	70 28	
1.27	Short circuit MVA available : a) at 33 KV b) at 11KV	MVA MVA	1800 500	
1.28	Impedance voltage at 75 °C and at normal ratio and rated frequency and at ONAN condition (supported by type test report).	%	8.5%	
1.29	All windings shall have uniform insulations	-	Yes	
2.	VOLTAGE CONTROL (OLTC)			
2.1	Type of Tap Changer control	-	On load auto regulation and remote & manual control	
2.2	OLTC, MDU & AVR Manufacturer's name & country	-	MR Germany/ABB, Sweden/HM, China	
	c) Year of Manufacturing	Yr.	Not before 2023	
2.3	Model Number		Shall be mentioned	
2.4	Nos. of tapping	-	17	
2.5	Tapping steps	-	±10% in steps of	

			1.25% 17 tapping (i.e. 33±8x1.25%)	
2.6	HV or LV winding	-	HV winding	
2.7	Power Frequency withstand test voltage between first and last contracts of the selector switch between diverter and switch contract.	kV	75	
2.8	Rated Voltage for control circuit		Shall be mentioned	
2.9	Power Supply for control motor		Shall be mentioned	
3.	GENERAL			
3.1	Manufacturer's Name & Address		To be mentioned	
3.2	Material of core & grading		To be mentioned	
3.3	Core Loss/ Kg, supported by Characteristic Curve (to be submitted)		To be mentioned	
3.4	Thickness of core, mm		To be mentioned	
3.5	Core Dia, mm		To be mentioned	
3.6	Total weight of core, Kg		To be mentioned	
3.7	Maximum flux density in iron at normal voltage and frequency and at normal ratio (ONAF condition) a) Cores b) Yokes	Tesla Tesla	< 1.7 To be mentioned	
3.8	Magnetizing current (approx.)	%	To be mentioned	
3.9	a) No load losses at rated voltage, ratio and frequency (supported by type test report).	KW	12 – 20	

	b) Full Load losses at rated voltage, normal ratio & frequency in ONAN condition at 75°C.	KW	To be mentioned	
	c) Full Load losses at rated voltage, normal ratio & frequency in ONAF condition at 75°C (supported by type test report).	KW	90 – 120	
	d) Auxiliary Losses	KW	To be mentioned	
	e) Total Loss (a+c+d)	KW	To be mentioned	
3.10	Maximum current density in core at CMR	A/mm ²	To be mentioned	
3.11	Simultaneous operating conditions under which maximum flux density is attained: a) Frequency b) Voltage- HV LV c) Tap d) Load	Hz KV KV - MVA and P.F.	To be mentioned To be mentioned To be mentioned To be mentioned	
3.12	Maximum flux density in iron under conditions entered on line 3.7	Tesla	To be mentioned	
3.13	(a) Maximum current density in HV winding at Continuous Maximum Running (CMR) (b) Cross section of HV winding	A/mm ² mm ²	< 2.5	
3.14	(a) Maximum current density in LV winding at Continuous Maximum Running (CMR)	A/mm ²	< 2.5	

	(b) Cross section of LV winding	mm ²		
4.	DETAILS OF CONSTRUCTION			
4.1	Types of winding: a) HV b) LV	-	To be mentioned	
4.2	Copper Conductor's Manufacturer Name & Address		To be mentioned	
4.3	Material of windings	-	copper	
4.4	Winding resistance of : a) H.T. winding, b) L.T. winding,	Ohm. Ohm.	To be mentioned To be mentioned	
4.5	Current density of : a) H.T. winding, Amps/sq. mm b) L.T. winding, Amps/sq. mm	A/mm ² A/mm ²	< 2.5 < 2.5	
4.6	Outer, Inner & Mean dia of copper winding: a) H.T. winding, b) L.T. winding,	mm mm	To be mentioned To be mentioned	
4.7	Size of Copper conductor/bar : a) H.T. winding SWG, dia. in mm / area in mm ² b) L.T. winding SWG, area in mm ²		To be mentioned To be mentioned	
4.8	Number of Turns : a) HT winding. b) LT winding	nos. nos.	To be mentioned To be mentioned	

4.9	Copper weight of windings :			
	a) HT winding	Kg	To be mentioned	
	b) LT winding	Kg	To be mentioned	
4.10	Total weight of copper windings	Kg	To be mentioned	
4.11	Insulation Class	-	To be mentioned	
	Insulation Material		To be mentioned	
	Insulation Weight		To be mentioned	
	Type of insulation of :			
	a) Tapping			
	b) Tapping connections			
	c) Core bolts			
	d) Core bolt washers			
	e) Side plates			
	f) Core laminations			
4.12	Type of winding connections (crimped or brazed)	-	To be mentioned	
4.13	Thickness of transformer tank:			
	b) Top	mm	To be mentioned	
	c) Sides	mm	To be mentioned	
	d) Bottom	mm	To be mentioned	
4.14	Vacuum withstand capability of the tank			
	Main tank	Kpa		
	Conservator	Kpa		
	Radiators	Kpa		
4.15	Provision of tank earthing and Core earthing	-	Yes	

4.16	Bladder / Air bag in Conservator	-	Yes	
4.17	Material used for gaskets for oil tight joints	mm	To be mentioned	
5.	RADIATORS			
5.1	Thickness of radiator plates/ cooling tubes	mm	To be mentioned	
5.2	Equipment for ON cooling state a) radiators on main tank	-	To be mentioned	
5.3	Number of radiators per transformer	Nos.	To be mentioned	
5.4	Rating of each radiator bank	KW	To be mentioned	
5.5	Power of each fan	KW	To be mentioned	
5.6	Nos. of fans	Nos.	To be mentioned	
6.	Oil Volume and Weight			
6.1	Type of oil		Type- A, Unused insulating mineral oil, free from PCB (polychlorinated biphenyl)	
6.2	Manufacturer Name of oil		Shall be mentioned	
6.3	Breakdown Voltage at 2.5mm gap between electrodes		>50 kV	
6.4	Appearance		Liquid and free from suspended matter or sediment	
6.5	Density at 20 ⁰ C		0.895 g/cm ³ (maximum)g/cm ³ (maximum)	
6.6	Flash point (Closed cup)		140 ⁰ C (minimum)	
6.7	Kinematics Viscosity at -15 ⁰ C		800 cSt. (Maximum)	

6.8	Kinematics Viscosity at 20 ⁰ C		40 cSt. (Maximum)	
6.9	Pour point		-30 ⁰ C (maximum)	
6.10	Neutralization value		0.3 mg KOH/g (maximum)	
6.11	Neutralization value after oxidation		0.40 mg KOH/g (maximum)	
6.12	Total sludge after oxidation		0.05% weight (maximum)	
6.13	PCB Content		Free from PCB	
6.14	Water content		25ppm (maximum)	
6.15	Total oil required including cooler system	Litres	To be mentioned	
6.16	Volume of oil above of the top yoke	Litres	To be mentioned	
6.17	Total volume of conservator	Litres	To be mentioned	
6.18	Weight of core and winding assembly	Tones	To be mentioned	
6.19	Weight of each oil cooler bank complete with oil if mounted separately from transformer	Tones	To be mentioned	
6.20	Total weights of complete transformer, including attached radiators, voltage regulating equipment ,all fittings and oil	Tones	To be mentioned	
6.21	Weight of transformer arranged for transport	Tones	To be mentioned	
6.22	Brief description of transformer or parts thereof subjected to short-circuit test or for which short-circuit calculations are available	-	To be mentioned	
7.	TRANSFORMER BUSHING INSULATORS			
7.1	Manufacture's name & country	-	To be mentioned	
7.2	Insulator material	-	Porcelain	
7.3	Bushing housing		Porcelain	

7.4	Bushing Current Rating at 75°C	A	To be mentioned	
7.5	Insulator type and rated voltage	-	To be mentioned	
7.6	Pitch circle diameter and drilling of flange	mm approx .	To be mentioned	
7.7	Length of Insulator (overall)	mm	To be mentioned	
7.8	Weight of Insulator	kg	To be mentioned	
7.9	One minute 50 Hz dry withstand routine test voltage	KV	To be mentioned	
7.10	Lightning Impulse flashover voltage (1.2/50 wave)	KV	To be mentioned	
7.11	Full wave Lightning Impulse Voltage withstand	KV	To be mentioned	
7.12	50 Hz wet withstand voltage across arcing horns	KV	To be mentioned	
7.13	Under oil flashover voltage type test	KV	To be mentioned	
7.14	Total creepage distance of shedding	mm	Min. 25mm per KV	
7.15	Protected creepage distance of shedding	mm	To be mentioned	
7.16	Rated Short circuit Current withstand capability		31.5kA, 3 sec.	
8.	BUSHING CTS 33 KV FOR DIFFERENTIAL PROTECTION			
8.1	Manufacturer's name & country	-	To be mentioned	
8.2	Rated Voltage		33KV	
8.3	Rated maximum Voltage		36KV	
8.4	Ratio	A	600/5	
8.5	Rated output	VA	30 VA	

8.6	Accuracy class	-	5P20	
8.7	Electrical Clearance from phase to phase	mm	To be mentioned	
8.8	Electrical Clearance phase to earth	mm	To be mentioned	
9.	BUSHING CTS 11 KV FOR DIFFERENTIAL PROTECTION			
9.1	Manufacturer's name & country	-	To be mentioned	
9.2	Rated voltage	KV	11	
9.3	Rated maximum voltage	KV	12	
9.4	Ratio	A	1800/5	
9.5	Rated output	VA	30 VA	
9.6	Accuracy class	-	5P20	
10.	NEUTRAL BUSHING CTS 11 KV FOR SEF & REF PROTECTION			
10.1	Manufacturer's name & country	-	To be mentioned	
10.2	Rated voltage	KV	11	
10.3	Rated maximum voltage	KV	12	
10.4	Ratio	A	1800/5/5	
10.5	Rated output	VA	30 VA	
10.6	Accuracy class	-	5P20	
11.0	Oil Temperature Indicator			
	Manufacturer Name		To be mentioned	
	Alarm contact		01No	
	Trip Contact		01No	
	Alarm & Trip Range			
12.0	Winding Temperature Indicator			

	Manufacturer Name		To be mentioned	
	Alarm contact		01No	
	Trip Contact		01No	
	Alarm & Trip Range			
13.0	Dial Thermometer			
	Alarm Contact		01No	
	Trip Contact		01No	
14.0	Buchholz relay (Both for main tank & OLTC)		Yes/No	
	Manufacturer Name		To be mentioned	
	Make/Model Number		To be mentioned	
	Alarm contact		01No	
	Trip Contact		01No	
15.0	PRD (Both for main tank & OLTC)		Yes/No	
	Manufacturer Name		To be mentioned	
	Make/Model Number		To be mentioned	
	Alarm contact		01No	
	Trip Contact		01No	
16.0	Is terminal permanent terminal marking provided?		Yes/No	
17.0	Parallel operation of identical transformer		Required	
18.0	Marshalling Box		Shall be provided	
19.0	Silica Gel Breather		Shall be provided	
20.0	Guaranteed Noise level as per IEC 551	db		
21.0	Harmonics			

	R.M.S. value of the fundamental current	Amp.	To be mentioned	
	R.M.S. value of 3rd harmonics current	Amp	To be mentioned	
	R.M.S. value of 5th harmonics current	Amp	To be mentioned	
22.0	Type of paint applied internally		To be mentioned	
23.0	Type of paint applied externally		To be mentioned	
24.0	Type of weatherproof anti rust material primer		To be mentioned	
25.0	Dimension of the transformer			
	Length	mm	To be mentioned	
	Width	mm	To be mentioned	
	Height	mm	To be mentioned	
26.0	Standard		Design, Manufacture , Testing, Installation and performance shall be in accordance to the latest edition of the IEC 60076	
28.	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	
29.	Oil level indicator device for the transformer main tank.		Yes	

**Seal & Signature
of the Manufacturer**

**Seal & Signature
of the Bidder**

8. 17 Guaranteed Technical Particulars for 33/ 0.415 KV, 3-Phase, 250kVA Station Auxiliary Transformer

(To be filled up by the Manufacturer in Manufacturer's Letterhead Pad with appropriate data, Otherwise bid shall be rejected. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	BPDB'S Requirement	Manufacturer's Guaranteed Data
1	a) Manufacturer's name & address With website, official domain email.	To be mentioned	
	b) Year of Manufacturing	Not before 2023	
	a) Manufacturer's name & address With website, official domain email.	To be mentioned	
2	Manufacturer's Type & Model No.	To be mentioned	
3	KVA Rating	250	
4	Number of Phases	3	
5	Rated frequency, Hz	50	
6	Rated primary voltage, KV	33	
7	Rated no load sec. voltage, V	415	
8	Vector group	Dyn11	
9	Highest system voltage of :		
	a) Primary winding, KV	36	
	b) Secondary winding, V	457	
10	Basic insulation level, KVp	170	
11	Power frequency withstand voltage, KV		
	a) HT Side	70	
	b) LT Side	2.5	
12	Type of cooling	ONAN	
13	Max. Temp. Rise over 40°C of ambient supported by Calculation (to be submitted) of Load Loss, Temperature Rise and Heat Dissipation by Radiator on the basis of Design Data:		
	a) Windings deg. C	65	
	b) Top oil deg. C	55	
14	Type of primary tapping off load, %	+3x2.5%, 0, -3x 2.5%	
15	Percentage Impedance at 75°C, %(supported by type test report)	5%	
16	No-load loss, Watts(supported by type test report)	812	
17	Load losses at rated full load at 75°C, Watts(supported by type test report)	3637	
18	Magnetising current at normal voltage, Amps	To be mentioned	
19	Efficiency at 75°C and 100% load :		
	a) at 1.0 power factor, %	To be mentioned	
	b) at 0.8 power factor, %	To be mentioned	
20	Efficiency at 75°C and 75% load :		
	a) at 1.0 power factor, %	To be mentioned	
	b) at 0.8 power factor, %	To be mentioned	

Sl. No.	Description	BPDB'S Requirement	Manufacturer's Guaranteed Data
21	Efficiency at 75°C and 50% load :		
	a) at 1.0 power factor, %	To be mentioned	
	b) at 0.8 power factor, %	To be mentioned	
22	Efficiency at 75°C and 25% load :		
	a) at 1.0 power factor, %	To be mentioned	
	b) at 0.8 power factor, %	To be mentioned	
23	Regulation at full load :		
	a) at 1.0 power factor, %	To be mentioned	
	b) at 0.8 power factor, %	To be mentioned	
Transformer Oil :			
24	a) Type of oil	Mineral Insulating Oil	
	b) Manufacturer's Name & Address	To be mentioned	
25	Total weight of oil, Kg	To be mentioned	
26	Breakdown Voltage at 2.5mm gap between electrodes	> 50 kV	
Transformer Core :			
27	Manufacturer's Name & Address	To be mentioned	
28	Total weight of core, Kg	To be mentioned	
29	Material of core & grading	To be mentioned	
30	Core Loss/ Kg, supported by Characteristic Curve& Core Manufacturer's Brochure	To be mentioned	
31	Thickness of core, mm	To be mentioned	
32	Core Dia, mm	To be mentioned	
33	Max. magnetic flux density, Tesla	< 1.7	
Transformer Windings :			
34	Copper Conductor's Manufacturer Name & Address	To be mentioned	
35	Material of windings	copper	
36	Winding resistance of :		
	a) H.T. winding, Ohm. (per phase at 75° C)	To be mentioned	
	b) L.T. winding, milli-Ohm. (per phase at 75° C)	To be mentioned	
37	Current density of :		
	a) H.T. winding, Amps/sq. mm	To be mentioned	
	b) L.T. winding, Amps/sq. mm	To be mentioned	
38	Outer, Inner & Mean dia of copper winding:		
	a) H.T. winding, mm	To be mentioned	
	b) L.T. winding, mm	To be mentioned	
39	Size of Copper Conductor :		
	a) H.T. winding SWG, dia. in mm & area in mm ²	To be mentioned	
	b) L.T. winding SWG, area in mm ²	To be mentioned	
40	Number of Turns :		
	a) HT winding, nos.	To be mentioned	
	b) LT winding, nos.	To be mentioned	
41	Copper weight of windings :		

Sl. No.	Description	BPDB'S Requirement	Manufacturer's Guaranteed Data
	a) HT winding, Kg	To be mentioned	
	b) LT winding, Kg	To be mentioned	
42	Total weight of copper windings, Kg	To be mentioned	
43	Dimension of Transformer :		
	a) Width, mm(supported by type test report)	To be mentioned	
	b) Length, mm(supported by type test report)	To be mentioned	
	c) Height, mm(supported by type test report)	To be mentioned	
	d) Tank Sheet thickness of top, bottom & side, mm	To be mentioned	
	e) Total weight of transformer tank, Kg	To be mentioned	
44	a) Total weight of active part (core, coil and other accessories), Kg	To be mentioned	
	b) Total weight of complete Transformer including fittings & oil, Kg	To be mentioned	
45	Type of breathings	To be mentioned	
46	Name of relevant IEC or other Equivalent Standards for Design, manufacture, testing and performance.	To be mentioned	
47	Drawing :		
	a) General Arrangement & Outline Dimensions	To be submitted	
	b) Internal Construction Details/ Sectional drawing of active parts including Insulation arrangement	To be submitted	
	c) HT & LT Bushings with dimension & current ratings	To be submitted	
	d) Cross-section & Dimensional drawing of Core & Windings	To be submitted	
	e) Radiator with detail dimensional drawing	To be submitted	
	f) Tap changer with dimension & current ratings.	To be submitted	
48	Routine Test Report :		
	a) Measurement of turn ratio test.	To be submitted	
	b) Vector group test.	To be submitted	
	c) Measurement of winding resistance.	To be submitted	
	d) Measurement of insulation resistance.	To be submitted	
	e) Measurement of no load loss & no-load current.	To be submitted	
	f) Measurement of impedance voltage & load loss.	To be submitted	
	g) Dielectric withstands Tests.	To be submitted	
	h) Transformer oil test (including Tan delta).	To be submitted	
49	Type Tests report along with details test result and drawings for 33/0.415KV, 250KVA, 3-Phase, Dyn11 Distribution Transformer from an independent testing Laboratory/ Institute as per IEC 60076.		
	a) Impulse Voltage Withstands test.	To be submitted	

Sl. No.	Description	BPDB'S Requirement	Manufacturer's Guaranteed Data
	b) Temperature Rise test.	To be submitted	
50	Short-circuit Tests Report for the offered 33/0.415KV, 250KVA, 3-Phase, Dyn11 Distribution Transformer as per relevant IEC with detail test results & drawings from reputed independent testing Laboratory/ Institution or detail calculation on the basis of design data by the manufacturer.	To be submitted	
51.	Manufacturer must comply all the features of Technical Specification (Section 7)	Yes	

Manufacturer's Seal & Signature

Bidder Seal & Signature

8.18 Guaranteed Technical Particulars for Single-Core, 800 mm² 33 kV XLPE

Insulated Copper Cable

(To be filled up by the Manufacturer in Manufacturer's Letterhead Pad with appropriate data, Otherwise bid shall be rejected. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item		1CX800 mm ² 33 kV XLPE Insulated Copper Cables	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Address of the Manufacturer		Shall be mentioned	
4	Standard		Performance, Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent	

			International standards.	
5.	Country of Origin		Shall be mentioned	
6.	VOLTAGE Voltage between phases of three Phase circuit U U _{max}	kV kV	33 36	
7.	CORES Number of Cores	No.	one	
8.	Manufacturing Process		CCV/VCV	
9.	CONDUCTOR material cross sectional area Min. No. & Dia of wires	mm ² Nos./mm	Electrolytic annealed copper 800 91/ To be mentioned	
10.	CONDUCTOR SCREEN Material Nominal Thickness Diameter over screen	mm mm	semi-conducting XLPE 0.8 To be mentioned	
11.	INSULATION Material Type of dry curing Nominal Thickness Diameter of over Insulation	mm mm	XLPE Inert gas 8.0 To be mentioned	
12.	CORE SCREEN Material		semi-conducting XLPE	

	Nominal Thickness	mm	0.5	
	Diameter over screen	mm	To be mentioned	
13	METALLIC SCREEN Number and diameter of copper screen strands or Copper Wire with helically applied Copper Tape	No./mm or No./mm with Thickness of tape	Based on Design Calculation	
14.	SEPARATION SHEATH Material Thickness of bedding	mm	To be Mentioned 1.6	
15.	Armour ARMOUR Number & diameter of aluminum wire or Thickness of Corrugated Aluminum sheath	No./mm or mm	Based on Design Calculation	
16.	OUTER COVERING Material Minimum average thickness	mm	Black extruded MDPE 2.8	
17.	COMPLETED CABLE Overall diameter Weight per metre Maximum drum length	mm kg m	To be mentioned 9.8 500	
18.	CABLE DRUMS Material Overall diameter	mm	Steel To be mentioned	

	Width	m	To be mentioned	
	Gross weight (with cable)	kg	To be mentioned	
19.	CONTINUOUS CURRENT CARRYING CAPACITY Based on the conditions specified: One circuit Two circuits Three circuits In Air One circuit	A A A A	950 787 685 1240	
20.	PERMISSIBLE OVERLOAD In Service Conditions For a period of	% Hours	To be mentioned To be mentioned	
21.	MAXIMUM CONDUCTOR TEMPERATURE Laid direct in ground Drawn into ducts Erected in air	°C °C °C	90 90 90	
22.	CONDUCTOR SHORT CIRCUIT CURRENT Carrying capacity for one second, Cable load as above prior to Short circuit and final conductor Temperature of 250°C`	KA	114.4	

23.	METALLIC LAYER/SHEATH EARTH FAULT CURRENT Carrying capacity for one second, Cable loaded as above prior to Earth fault	KA	40(with detail calculation)	
24.	MINIMUM RADIUS OF BEND Around which cable can be laid	m	20 times of overall diameter of cable	
25.	MAXIMUM DC RESISTANCE Per km of cable at 20°C of conductor of metallic layer	ohm ohm	0.0221 To be mentioned	
26.	MAXIMUM AC RESISTANCE Of conductor per km of cable at Maximum conductor temperature	ohm	0.051	
27..	INSULATION RESISTANCE Per km of cable per core at 20°C at maximum rated temperature	Megohm Megohm	400 40	
28.	EQUIVALENT STAR REACTANE Per km of 3 phase circuit at Nominal frequency	Ohm/K m	0.103	
29.	MAXIMUM ELECTROSTATIC CAPACITANCE Per Km of cable	μF	0.307	
30.	MAXIMUM INDUCED VOLTAGE			

	On metallic layer/sheath Under fault condition	V	To be mentioned	
31.	MAXIMUM CHARGING CURRENT Per core per metre of cable at Nominal voltage U_0	mA	To be mentioned	
32.	MAXIMUM DIELECTIC LOSS Of cable per metre of 3 phase circuit when laid direct in the ground at nominal voltage U_0 and normal frequency at maximum conductor Temperature	W/m	0.33	
33.	METALLIC SHEATH LOSS Of cable per metre of 3 phase circuit, At nominal voltage U_0 , normal frequency And at the specified current rating	W	To be mentioned	
34.	MAXIMUM PULLING TENSION	kg	To be mentioned	
35.	Manufacturer must comply all the features of Technical Specification (Section 7) .		Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.19 Guaranteed Technical Particulars of Single-Core, 500 mm² 33 kV XLPE Insulated Copper Cable

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	1CX500 mm ² 33 kV XLPE Insulated Copper Cables	
2	Manufacturer's name & address With website, official domain email.	-	To be mentioned	
3	Year of Manufacturing	Yr.	Not before 2023	
4	Standard	-	Performance, Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5.	Country of Origin	-	Shall be mentioned	
6.	VOLTAGE Voltage between phases of three Phase circuit U U _{max}	kV kV	33 36	
7.	Manufacturing Process		CCV/VCV	
8.	CORES Number of Cores	No.	one	
9.	CONDUCTOR material cross sectional area Min. No. & Dia of wires	mm ² Nos./mm	Electrolytic annealed copper 500 61/ To be mentioned	
10.	CONDUCTOR SCREEN Material Nominal Thickness Diameter over screen	mm mm	semi-conducting XLPE 0.8 To be mentioned	
11.	INSULATION Material Type of dry curing Nominal Thickness Diameter of over Insulation	mm mm	XLPE Inert gas 8.0 To be mentioned	
12.	CORE SCREEN Material		semi-conducting XLPE	

	Nominal Thickness Diameter over screen	mm mm	0.5 To be mentioned	
13.	METALLIC SCREEN Number and diameter of copper screen strands or Copper Wire with helically applied Copper Tape	No./mm or No./mm with Thickness of tape	Based on Design Calculation	
14.	SEPARATION SHEATH Material Thickness of bedding	 mm	 To be mentioned 1.6	
15.	ARMOUR Number & diameter of amour wire or Thickness of Corrugated Aluminum sheath	No./mm or mm	Based on Design Calculation	
16.	OUTER COVERING Material Minimum average thickness	 mm	 Black extruded MDPE 2.6	
17.	COMPLETED CABLE Overall diameter Weight per metre Maximum drum length	mm kg m	52 6.2 500	
18.	CABLE DRUMS Material Overall diameter Width Gross weight (with cable)	 mm m kg	Steel To be mentioned To be mentioned To be mentioned	
19.	CONTINUOUS CURRENT CARRYING CAPACITY Based on the conditions specified: One circuit Two circuits Three circuits In Air One circuit	 A A A A	 702 579 504 877	
20.	PERMISSIBLE OVERLOAD In Service Conditions For a period of	% Hours	To be mentioned To be mentioned	
21.	MAXIMUM CONDUCTOR TEMPERATURE			

	Laid direct in ground	°C	90	
	Drawn into ducts	°C	90	
	Erected in air	°C	90	
22.	CONDUCTOR SHORT CIRCUIT CURRENT Carrying capacity for one second, Cable load as above prior to Short circuit and final conductor Temperature of 250°C`	KA	71.5	
23.	METALLIC LAYER/SHEATH EARTH FAULT CURRENT Carrying capacity for one second, Cable loaded as above prior to Earth fault	KA	40 (with detail calculation)	
24.	MINIMUM RADIUS OF BEND Around which cable can be laid	m	20 times of overall diameter of cable	
25.	MAXIMUM DC RESISTANCE Per km of cable at 20°C of conductor of metallic layer	ohm ohm	0.0366 To be mentioned	
26.	MAXIMUM AC RESISTANCE Of conductor per km of cable at Maximum conductor temperature	ohm	0.051	
27.	INSULATION RESISTANCE Per km of cable per core at 20°C at maximum rated temperature	Megohm Megohm	400 40	
28.	EQUIVALENT STAR REACTANE Per km of 3 phase circuit at Nominal frequency	Ohm/K m	0.122	
29.	MAXIMUM ELECTROSTATIC CAPACITANCE Per Km of cable	µF	0.307	
30.	MAXIMUM INDUCED VOLTAGE On metallic layer/sheath Under fault condition	V	To be mentioned	
31.	MAXIMUM CHARGING CURRENT Per core per metre of cable at Nominal voltage U _o	mA	To be mentioned	
32.	MAXIMUM DIELECTIC LOSS			

	Of cable per metre of 3 phase circuit when laid direct in the ground at nominal voltage U_0 and normal frequency at maximum conductor Temperature	W/m	0.33	
33.	METALLIC SHEATH LOSS Of cable per metre of 3 phase circuit, At nominal voltage U_0 , normal frequency And at the specified current rating	W	To be mentioned	
34.	MAXIMUM PULLING TENSION	kg	3500 Kg	
35	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.20 Guaranteed Technical Particulars of 11kV, XLPE, 3C x 185mm² COPPER CABLE

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	3C x185 mm ² 11 kV XLPE Insulated Copper Cables	
2	Manufacturer's name & address With website, official domain email.	-	To be mentioned	
3	Year of Manufacturing	Yr.	Not before 2023	
4	Standard	-	Performance, Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
	Country of Origin	-	To be mentioned	
5.	VOLTAGE Voltage between phases of three Phase circuit U U _{max}	kV kV	11 12	
6.	CORES Number of Cores	No.	Three	
	Manufacturing Process		To be mentioned	
7.	CONDUCTOR material cross sectional area Min. No. & Dia of wires	mm ² Nos./mm	Electrolytic annealed copper 185 37/ To be mentioned	
8.	CONDUCTOR SCREEN Material Nominal Thickness Diameter over screen	mm mm	semi-conducting XLPE 0.5 To be mentioned	
9.	INSULATION Material Type of dry curing Nominal Thickness Diameter of over Insulation	mm mm	XLPE Inert gas 3.4 To be mentioned	
10.	CORE SCREEN			

	Material Nominal Thickness Diameter over screen	mm mm	semi-conducting XLPE 0.5 To be mentioned	
11.	METALLIC SCREEN Number and diameter of copper screen strands or Copper Wire with helically applied Copper Tape	No./mm or No./mm with Thickness of tape	Based on Design Calculation	
12.	INNER JACKET Material Nominal Thickness External diameter	mm mm	PVC 1.7 To be mentioned	
13.	ARMOUR Number & diameter of amour wire or Thickness of Corrugated Aluminium sheath	No./mm or mm	Based on Design Calculation	
14.	OUTER COVERING Material Minimum average thickness	mm	Black extruded MDPE 3.1	
15.	COMPLETED CABLE Overall diameter Weight per metre Maximum drum length	mm kg m	64 7.8 250	
16.	CABLE DRUMS Material Overall diameter Width Gross weight (with cable)	mm m kg	Steel To be mentioned To be mentioned To be mentioned	
17.	CONTINUOUS CURRENT CARRYING CAPACITY Based on the conditions specified: One circuit Two circuits Three circuits In Air One circuit	A A A A	403 329 285 440	
18.	PERMISSIBLE OVERLOAD In Service Conditions For a period of	% Hours	To be mentioned To be mentioned	
19.	MAXIMUM CONDUCTOR			

	TEMPERATURE Laid direct in ground Drawn into ducts Erected in air	°C °C °C	90 90 90	
20.	CONDUCTOR SHORT CIRCUIT CURRENT Carrying capacity for one second, Cable load as above prior to Short circuit and final conductor Temperature of 250°C`	KA	26.5	
21.	METALIC SCREEN EARTH FAULT CURRENT Carrying capacity for one second, Cable loaded as above prior to Earth fault	KA	25 (with detail calculation)	
22.	MINIMUM RADIUS OF BEND Around which cable can be laid	m	20 times of overall diameter of cable	
23.	MAXIMUM DC RESISTANCE Per km of cable at 20°C of conductor of metallic layer	ohm ohm	0.0.0991 To be mentioned	
24.	MAXIMUM AC RESISTANCE Of conductor per km of cable at Maximum conductor temperature	ohm	0.129	
25.	INSULATION RESISTANCE Per km of cable per core at 20°C at maximum rated temperature	Megohm Megohm	400 40	
26.	EQUIVALENT STAR REACTANE Per km of 3 phase circuit at Nominal frequency	Ohm/Km	0.103	
27.	MAXIMUM ELECTROSTATIC CAPACITANCE Per Km of cable	µF	0.412	
28.	MAXIMUM INDUCED VOLTAGE On metallic layer/sheath Under fault condition	V	To be mentioned	
29.	MAXIMUM CHARGING CURRENT Per core per metre of cable at Nominal voltage Uo	mA	To be mentioned	

30.	MAXIMUM DIELECTIC LOSS of cable per metre of 3 phase circuit when laid direct in the ground at nominal voltage Uo and normal frequency at maximum conductor Temperature	W/m	0.44	
31.	METALLIC SHEATH LOSS Of cable per metre of 3 phase circuit, At nominal voltage Uo, normal frequency And at the specified current rating	W	To be mentioned	
32.	MAXIMUM PULLING TENSION	kg	1295 Kg	
33	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.21 Guaranteed Technical Particulars of Termination Kit all type XLPE COPPER CABLE

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

(A) Straight-through joint box for 33KV XLPE, 1-Core, 500 mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
i	Application	For 33KV, 1-core, XLPE 500 mm ² Copper Conductors	
ii	Installation	For underground horizontal mounting	
iii	System	33KV, effectively earthed system	
iv	Cable conductor	500 mm ² 1-core, Copper Conductors	
v	Construction	The joint shall be proof against ingress of moisture and water	
vi	Kit content	<ul style="list-style-type: none"> - Compression ferrules - Valid filling tape - Heat shrinkable stress control tubing - Truck resistant sealant tape - Heat shrinkable high voltage insulating tape - Heat shrinkable black/red dual wall - Estomeric tube - Roll spring - Heat shrinkable outer jacket tube - Cable preparation kit - Solderless earth connection kit - Misc. other material - Installation instructions 	-

(B) Indoor Termination Kits for 33KV, XLPE, 1-Core, 500 mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
i	Application	For 33KV, 1-core, XLPE 500 mm ² Copper	

		Conductors	
ii	Installation	For Indoor switchgear terminations	
iii	System	33KV, effectively earthed system	
iv	Cable conductor	500 mm ² 1-core, Copper Conductors	
v	Kit content	<ul style="list-style-type: none"> - Heat shrinkable high voltage insulating and non-tracking tubing - Heat shrinkable stress control tubing - Stress relieving mastic strip - Truck resistant sealant tape - Cable preparation kit - Solderless earth connection kit - Compression lugs for 500 mm² Copper Conductors - Installation instructions 	-

(C) Outdoor Termination Kits for 33KV, XLPE, 1-Core, 500 mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
i	Application	For 33KV, 1-core, XLPE 500 mm ² Copper Conductors	
ii	Installation	For outdoor installation on poles/structures	
iii	System	33KV, effectively earthed system	
iv	Cable conductor	500 mm ² 1-core Copper Conductors	
v	Kit content	<ul style="list-style-type: none"> - Heat shrinkable high voltage insulating and non-tracking tubing - Heat shrinkable stress control tubing - Stress relieving mastic strip - Truck resistant sealant tape - Heat shrinkable truck resistant rain skirt - Support insulator - Cable preparation kit - Solderless earth connection kit - Compression lugs for 500 mm² Copper Conductors - Support insulators Tee Brackets 	-

		- Installation instructions	
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(D) Straight-through joint box for 33KV XLPE, 3-Core, 95 mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
i	Application	For 33KV, 3-core, XLPE 95 mm ² Copper Conductors	
ii	Installation	For underground horizontal mounting	
iii	System	33KV, effectively earthed system	
iv	Cable conductor	95 mm ² 3-core, Copper Conductors	
v	Construction	The joint shall be proof against ingress of moisture and water	
vi	Kit content	<ul style="list-style-type: none"> - Compression ferrules - Valid filling tape - Heat shrinkable stress control tubing - Truck resistant sealant tape - Heat shrinkable high voltage insulating tape - Heat shrinkable black/red dual wall - Estomeric tube - Roll spring - Heat shrinkable outer jacket tube - Cable preparation kit - Solderless earth connection kit - Misc. other material - Installation instructions 	-

(E) Indoor Termination Kits for 33KV, XLPE, 3-Core, 95 mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
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i	Application	For 33KV, 3-core, XLPE 95mm ² Copper Conductors	
ii	Installation	For Indoor switchgear terminations	
iii	System	33KV, effectively earthed system	
iv	Cable conductor	95 mm ² 3-core, Copper Conductors	
v	Kit content	<ul style="list-style-type: none"> - Heat shrinkable high voltage insulating and non-tracking tubing - Heat shrinkable stress control tubing - Stress relieving mastic strip - Truck resistant sealant tape - Cable preparation kit - Solderless earth connection kit - Compression lugs for 3X95 mm² Copper Conductors - Installation instructions 	-

(F) Outdoor Termination Kits for 33KV, XLPE, 3-Core, 95mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
i	Application	For 33KV, 3-core, XLPE 95 mm ² Copper Conductors	
ii	Installation	For outdoor installation on poles/structures	
iii	System	33KV, effectively earthed system	
iv	Cable conductor	95 mm ² 3-core Copper Conductors	
v	Kit content	<ul style="list-style-type: none"> - Heat shrinkable high voltage insulating and non-tracking tubing - Heat shrinkable stress control tubing - Stress relieving mastic strip - Truck resistant sealant tape - Heat shrinkable truck resistant rain skirt - Support insulator - Cable preparation kit - Solderless earth connection kit - Compression lugs for 3X95 mm² Copper Conductors 	-

		- Support insulators Tee Brackets - Installation instructions	
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(J) Straight-through joint box for 11KV XLPE, 3-Core, 185 mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
i	Application	For 11KV, 3-core, XLPE 185 mm ² Copper Conductors	
ii	Installation	For underground horizontal mounting	
iii	System	11KV, effectively earthed system	
iv	Cable conductor	185 mm ² 3-core, Copper Conductors	
v	Construction	The joint shall be proof against ingress of moisture and water	
vi	Kit content	<ul style="list-style-type: none"> - Compression ferrules - Valid filling tape - Heat shrinkable stress control tubing - Truck resistant sealant tape - Heat shrinkable high voltage insulating tape - Heat shrinkable black/red dual wall - Estomeric tube - Roll spring - Heat shrinkable outer jacket tube - Cable preparation kit - Solderless earth connection kit - Misc. other material - Installation instructions 	-

(K) Indoor Termination Kits for 11KV, XLPE, 3-Core, 185mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
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i	Application	For 11KV, 3-core, XLPE 185mm ² Copper Conductors	
ii	Installation	For Indoor switchgear terminations	
iii	System	11KV, effectively earthed system	
iv	Cable conductor	185 mm ² 3-core, Copper Conductors	
v	Kit content	<ul style="list-style-type: none"> - Heat shrinkable high voltage insulating and non-tracking tubing - Heat shrinkable stress control tubing - Stress relieving mastic strip - Truck resistant sealant tape - Cable preparation kit - Solderless earth connection kit - Compression lugs for 3x185 mm² Copper Conductors - Installation instructions 	-

(L) Outdoor Termination Kits for 11KV, XLPE, 3-Core, 185mm² Copper cable

Item No.	Description of Items	Purchaser's Requirement	Manufacturer's Particulars
i	Application	For 11KV, 3-core, XLPE 185 mm ² Copper Conductors	
ii	Installation	For outdoor installation on poles/structures	
iii	System	11KV, effectively earthed system	
iv	Cable conductor	185 mm ² 3-core Copper Conductors	
v	Kit content	<ul style="list-style-type: none"> - Heat shrinkable high voltage insulating and non-tracking tubing - Heat shrinkable stress control tubing - Stress relieving mastic strip - Truck resistant sealant tape - Heat shrinkable truck resistant rain skirt - Support insulator - Cable preparation kit - Solderless earth connection kit - Compression lugs for 3x180 mm² Copper Conductors - Support insulators Tee Brackets 	-

		- Installation instructions	
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Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

**8.22 GUARANTEED TECHNICAL PARTICULARS FOR Three-Core, 95 mm²33 kV
XLPE INSULATED COPPER CABLES**

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad.
Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item		3CX95mm ² 11kV XLPE Insulated Copper Cables	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard		Performance, Design and Testing shall be in accordance to the BS, IEC, BDS or Equivalent International Standard.	
	Country of Origin		To be mentioned	
5	VOLTAGE Voltage between phase of three Phase circuit U U _{max}	kV kV	11 12	
	Manufacturing Process		CCV/VCV	
6	CORES Number of Cores	No.	Three	
7	CONDUCTOR Material Cross Sectional Area Min. No. & Diameter of Wires	mm ² Nos./mm	Electrolytic Annealed Copper 95 15/To be mentioned	
8	CONDUCTOR SCREEN Material Nominal Thickness Diameter over Screen	mm mm	Semi-Conducting XLPE 0.80 To be mentioned	
9	INSULATION Material Type of Dry Curing Nominal Thickness Diameter over Insulation	mm mm	XLPE Inert Gas 8.00 To be mentioned	
10	INSULATION SCREEN Material Nominal Thickness Diameter over Screen	mm mm	Semi-Conducting XLPE 0.50 To be mentioned	
11	METAL SCREEN Number and Diameter of Copper Screen Strands Or Copper Wire with Helically Applied Copper Tape	No./mm No./mm	Based on Design Calculation Based on Design Calculation	
12	SEPARATION SHEATH Material Thickness of Bedding	mm	To be mentioned 1.80	

13	ARMOUR Number & Diameter of Armour Wire Or Thickness of Corrugated Aluminum Sheath	No./mm mm	Based on Design Calculation Based on Design Calculation	
14	OUTER COVERING Material Minimum Average Thickness	mm	Black Extruded MDPE 3.10	
15	COMPLETED CABLE Overall Diameter Weight per Meter Maximum Drum Length	mm kg m	92.90 10.05 500	
16	CABLE DRUMS Material Overall Diameter Width Gross Weight (with cable)	mm mm kg	Steel To be mentioned To be mentioned To be mentioned	
17	CONTINUOUS CURRENT CARRYING CAPACITY Based on the conditions specified: One Circuit Two Circuit Three Circuit In Air: One Circuit	A A A A	239 191 165 279	
18	PERMISSIBLE OVERLOAD In Service Conditions For a period of	% Hours	To be mentioned To be mentioned	
19	MAXIMUM CONDUCTOR TEMPERATURE Laid Direct in Ground Drawn into Ducts Erected in Air	°C °C °C	90 90 90	
20	CONDUCTOR SHORT CIRCUIT CURRENT Carrying Capacity for One Second, Cable Load as above prior to Short Circuit and Final Conductor Temperature of 250°C	kA	13.59	
21	METALLIC LAYER/SHEATH EARTH FAULT CURRENT Carrying Capacity for One Second, Cable Loaded as above prior to Earth Fault	kA	Min. 40 (with detail calculation)	
22	MINIMUM RADIUS OF BEND Around which Cable can be Laid	m	15 times of overall diameter of cable	
23	MAXIMUM DC RESISTANCE Per km of Cable at 20°C: of Conductor of Metallic Layer	ohm ohm	0.193 To be mentioned	
24	MAXIMUM AC RESISTANCE Of Conductor per km of Cable at Maximum Conductor Temperature	ohm	0.247	

25	INSULATION RESISTANCE Per km of Cable per Core: At 20°C At Maximum Rated Temperature	Megohm Megohm	400 40	
26	EQUIVALENT STAR REACTANCE Per km of 3 Phase Circuit at Nominal Frequency	ohm/km	0.128	
27	MAXIMUM ELECTROSTATIC CAPACITANCE Per km of Cable	μF	0.165	
28	MAXIMUM INDUCED VOLTAGE On Metallic Layer/Sheath Under Fault Condition	V	To be mentioned	
29	MAXIMUM CHARGING CURRENT Per Core per Meter of Cable at Nominal Voltage U ₀	mA	To be mentioned	
30	MAXIMUM DIELECTRIC LOSS Of Cable per Meter of 3 Phase Circuit when Laid Direct in the Ground at Nominal voltage U ₀ and Nominal Frequency at Maximum Conductor Temperature	W/m	0.0748	
31	METALLIC SHEATH LOSS Of Cable per Meter of 3 Phase Circuit, At Nominal Voltage U ₀ , Normal Frequency and at the Specified Current Rating	W	To be mentioned	
32	MAXIMUM PULLING TENSION	kg	To be mentioned	
33	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.23 Guaranteed Technical Particulars for Single-Core, 630 mm² 11 kV XLPE Insulated Copper Cable

(To be filled up by the Manufacturer in Manufacturer's Letterhead Pad with appropriate data. Otherwise bid shall be rejected. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item		1CX630 mm ² 11 kV XLPE Insulated Copper Cables	
2	a) Manufacturer's name & address with website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard		Performance, Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5.	Country of Origin			
6.	VOLTAGE Voltage between phases of three Phase circuit U U _{max}	kV kV	11 12	
7.	Manufacturing Process		CCV/VCV	
8.	CORES Number of Cores	No.	one	
9.	CONDUCTOR material cross sectional area Min. No. & Dia of wires	mm ² Nos./m m	Electrolytic annealed copper 630 61/ To be mentioned	
10.	CONDUCTOR SCREEN Material Nominal Thickness Diameter over screen	mm mm	semi-conducting 0.8 To be mentioned	
11.	INSULATION Material Type of dry curing Nominal Thickness Diameter of over Insulation	mm mm	XLPE Inert gas 3.8 To be mentioned	
12.	INSULATION SCREEN Material Nominal Thickness Diameter over screen	mm mm	semi-conducting 0.5 To be mentioned	

13.	METALLIC SCREEN Number and diameter of copper screen strands or Copper Wire with helically applied Copper Tape	No./mm or No./mm with Thickne ss of tape	Based on Design Calculation	
14.	SEPARATION SHEATH Material Thickness of bedding	mm	To be mentioned 1.2	
15.	ARMOUR Number & diameter of amour wire or Thickness of Corrugated Aluminium sheath	No./mm or mm	Based on Design Calculation	
16.	OUTER COVERING Material Minimum average thickness	mm	Black extruded MDPE 2.5	
17.	COMPLETED CABLE Overall diameter Weight per metre Maximum drum length	mm kg m	To be mentioned 7.0 500	
18.	CABLE DRUMS Material Overall diameter Width Gross weight (with cable)	mm m kg	Steel To be mentioned To be mentioned To be mentioned	
19.	CONTINUOUS CURRENT CARRYING CAPACITY Based on the conditions specified: One circuit Two circuits Three circuits In Air One circuit	A A A A	695 564 487 858	
20.	PERMISSIBLE OVERLOAD In Service Conditions For a period of	% Hours	To be mentioned To be mentioned	
21.	MAXIMUM CONDUCTOR TEMPERATURE Laid direct in ground Drawn into ducts Erected in air	°C °C °C	90 90 90	

22.	CONDUCTOR SHORT CIRCUIT CURRENT Carrying capacity for one second, Cable load as above prior to Short circuit and final conductor Temperature of 250°C`	KA	71.5	
23.	METALIC SCREEN EARTH FAULT CURRENT Carrying capacity for one second, Cable loaded as above prior to Earth fault	KA	25 (with detail calculation)	
24.	MINIMUM RADIUS OF BEND Around which cable can be laid	m	20 times of overall diameter of cable	
25.	MAXIMUM DC RESISTANCE Per km of cable at 20°C of conductor of metallic layer	ohm	0.0366	
26.	MAXIMUM AC RESISTANCE Of conductor per km of cable at Maximum conductor temperature	ohm	0.053	
27.	INSULATION RESISTANCE Per km of cable per core at 20°C at maximum rated temperature	Megoh m Megoh m	400 40	
28.	EQUIVALENT STAR REACTANE Per km of 3 phase circuit at Nominal frequency	Ohm/K m	0.102	
29.	MAXIMUM ELECTROSTATIC CAPACITANCE Per Km of cable	μF	0.628	
30.	MAXIMUM INDUCED VOLTAGE On metallic layer/sheath Under fault condition	V	To be mentioned	
31.	MAXIMUM CHARGING CURRENT Per core per meter of cable at Nominal voltage U _o	mA	To be mentioned	
32.	MAXIMUM DIELECTIC LOSS Of cable per meter of 3 phase circuit when laid direct in the			

	ground at nominal voltage U_0 and normal frequency at maximum conductor Temperature	W/m	0.33	
33.	METALLIC SHEATH LOSS Of cable per meter of 3 phase circuit, At nominal voltage U_0 , normal frequency And at the specified current rating	W	To be mentioned	
34.	MAXIMUM PULLING TENSION	kg	To be mentioned	
35.	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.24 GUARANTEED TECHNICAL PARTICULARS FOR FOUR CORE, 120 mm² PVC INSULATED AND PVC SHEATHED COPPER CABLE

(To be filled up by the Manufacturer in Manufacturer's Letterhead Pad with appropriated data)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item		4CX120 sq. mm PVC Insulated and PVC Sheathed Cables	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard		Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	4CX120	
6	Material	-	PVC Insulated and PVC Sheathed plain annealed copper	
7	Numbers & Diameter of wires	mm	Min. 30 Wires	
8	Shaped of conductor	-	Sector Shaped	
9	Maximum resistance at 30°C	Ω/km	0.1010	
10	Nominal thickness of insulation	mm	2.00	
11	Colour of insulation	-	Red, Yellow, Blue, Black	
12	Nominal thickness of inner sheath	mm	1.60, Black	
13	Nominal thickness of sheath	mm	2.80	
14	Colour of sheath	-	Black	

15	Approximate Outer-diameter	mm	56.30	
16	Approximate weight	kg/km	8725	
17	Continuous permissible service voltage	V	600/1000	
17	Current rating at 30°C ambient temperature in U/G	Amps	330	
18	Current rating at 35°C ambient temperature in air	Amps	350	
20	Drum wound length	M	500	
21	Net Weight	kg	Shall be mentioned	
22	Gross weight	kg	Shall be mentioned	
23	Treated Wooden Drum Standard		AWPA C1-82, C2-83, C16-82, P5-83	
24	Manufacturer must comply all the features of Technical Specification (Section 7)		Yes	

Seal and Signature of the Manufacture:

Seal and Signature of the Bidder:

8.25 Guaranteed Technical Particulars of Single-Core, 150 mm² PVC Insulated and PVC Sheathed Copper Cable.

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	1C x 150 sq. mm PVC Insulated and PVC Sheathed Cables	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	1C x 150	
6	Material	-	PVC Insulated and PVC Sheathed plain annealed copper.	
7	Numbers & Diameter of wires	Mm	Min 18 Wires	
8	Maximum DC resistance at 30 deg. C	Ω/KM	0.124	
9	Nominal thickness of insulation	Mm	1.8	
10	Nominal thickness of sheath	Mm	1.8	
11	Colour of sheath		Black	
12	Approximate outer diameter	Mm	21.9	
13	Approximate weight	Kg/KM	1640	
14	Continuous permissible service voltage	V	600/1000	
15	Current rating at 30 deg. C ambient temperature U/G	Amps	350	
16	Current rating at 35 deg. C ambient in air	Amps	405	
17	Drum wound length	M	500	
18	Net Weight	Kg	Shall be mentioned	
19	Gross weight	Kg	Shall be mentioned	
20	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ –83, C ₁₆ –82, P ₅ –83.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal and Signature
of the manufacturer:

Seal and Signature
of the Bidder:

8.26 Guaranteed Technical Particulars of Single-Core, 120 mm²PVC Insulated and PVC Sheathed Copper Cable for grounding system

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	1C x 120 sq. mm PVC Insulated and PVC Sheathed Cables	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	1C x 120	
6	Material	-	PVC Insulated and PVC Sheathed plain annealed copper.	
7	Numbers & Diameter of wires	Mm	Min 18 Wires	
8	Maximum resistance at 30 deg. C	Ω/KM	0.153	
9	Nominal thickness of insulation	Mm	1.6	
10	Nominal thickness of sheath	Mm	1.8	
11	Color of sheath		Black	
12	Approximate outer diameter	Mm	20.0	
13	Approximate weight	Kg/KM	1340	
14	Continuous permissible service voltage	V	600/1000	
15	Current rating at 30 deg. C ambient temperature U/G	Amps	310	
16	Current rating at 35 deg. C	Amps	350	

	ambient in air			
17	Drum wound length	M	500	
18	Net Weight	Kg	Shall be mentioned	
19	Gross weight	Kg	Shall be mentioned	
20	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ –83, C ₁₆ –82, P ₅ –83.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

**Seal and Signature
of the manufacturer**

**Seal and Signature
of the Bidder**

8.27 Guaranteed Technical Particulars of 4CX2.5 mm² PVC Insulated and PVC Sheathed Copper Cable

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	4C x 2.5 mm ² PVC Insulated and PVC Sheathed Copper Cable with Armouring	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	4CX2.5 mm ²	
6	Material		Plain annealed Copper Cable	
7	Numbers & Diameter of Copper wires	mm	7/0.67	
8	Diameter of Steel wires	mm	1.4	
9	Thickness of Steel Tape	mm	To be mentioned	
10	Maximum resistance at 30 deg. C	Ω/KM	7.28	
11	Nominal thickness of insulation	mm	0.8 (min.)	
12	Nominal thickness of sheath	mm	1.8 (min)	
13	Colour of sheath		Black	
14	Colour of Core		Red, Yellow, Blue, Black	
15	Approximate outer diameter	mm	17	
16	Approximate weight	Kg/KM	670	
17	Drum wound length	M	1000	
18	Net Weight	Kg	Shall be mentioned	
19	Gross weight	Kg	Shall be mentioned	
20	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ –83, C ₁₆ –82,	

			P ₅ –83.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.28 Guaranteed Technical Particulars of 4CX6 mm² PVC Insulated and PVC Sheathed Copper Cable

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad.
Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	4Cx6 mm ² PVC Insulated and PVC Sheathed Copper Cable with Armouring	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	4Cx6 mm ²	
6	Material		Plain annealed Copper Cable	
7	Numbers & Diameter of Copper wires	mm	7/1.04	
8	Numbers & Diameter of Steel wires	mm	4x0.8	
9	Nominal size of Steel Tape	mm	0.25	
10	Maximum resistance at 30 deg. C	Ω/KM	3.20	
11	Nominal thickness of insulation	mm	1.0 (min.)	
12	Nominal thickness of sheath	mm	1.8 (min)	
13	Colour of sheath	-	Black	
14	Colour of Core	-	Red, Yellow, Blue, Black	
15	Approximate outer diameter	mm	21	
16	Approximate weight	Kg/KM	920	
17	Drum wound length	M	1000	
18	Net Weight	Kg	Shall be mentioned	
19	Gross weight	Kg	Shall be mentioned	

20	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ –83, C ₁₆ –82, P ₅ –83.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.29 Guaranteed Technical Particulars of 4Cx4 mm² PVC Insulated and PVC Sheathed Copper Cable

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	4Cx4 mm ² PVC Insulated and PVC Sheathed Copper Cable with Armouring	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	4Cx4 mm ²	
6	Material		Plain annealed Copper Cable	
7	Numbers & Diameter of Copper wires	mm	7/0.85	
8	Numbers & Diameter of Steel wires	mm	4x0.8	
9	Nominal size of Steel Tape	mm	0.25	
10	Maximum resistance at 30 deg. C	Ω/KM	1.90	
11	Nominal thickness of insulation	mm	1.0 (min.)	
12	Nominal thickness of sheath	mm	1.8 (min)	
13	Colour of sheath	-	Black	
14	Colour of Core	-	Red, Yellow, Blue, Black	
15	Approximate outer diameter	mm	20	
16	Approximate weight	Kg/KM	810	
17	Drum wound length	M	1000	
18	Net Weight	Kg	Shall be mentioned	
19	Gross weight	Kg	Shall be mentioned	
20	Treated Wooden Drum	-	AWPA C ₁ – 82,	

	Standard		C ₂ -83, C ₁₆ -82, P ₅ -83.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.30 Guaranteed Technical Particulars of 8Cx2.5 mm² PVC Insulated and PVC Sheathed Copper Cable

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	8Cx2.5 mm ² PVC Insulated and PVC Sheathed Copper Cable with Armouring	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	8Cx2.5 mm ²	
6	Material	-	Plain annealed Copper Cable	
7	Numbers & Diameter of Copper wires	mm	7/0.67	
8	Numbers & Diameter of Steel wires	mm	4x0.8	
9	Nominal size of Steel Tape	mm	0.25	
10	Maximum resistance at 30 deg. C	Ω/KM	1.19	
11	Nominal thickness of insulation	mm	0.8 (min.)	
12	Nominal thickness of sheath	mm	1.8 (min)	
13	Colour of sheath	-	Black	
14	Colour of Core	-	Red, Yellow, Blue, Black	
15	Approximate outer diameter	mm	24	
16	Approximate weight	Kg/KM	1140	
17	Drum wound length	M	1000	
18	Net Weight	Kg	Shall be mentioned	
19	Gross weight	Kg	Shall be mentioned	

20	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ –83, C ₁₆ –82, P ₅ –83.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.31 Guaranteed Technical Particulars of 16CX2.5 mm² PVC Insulated and PVC Sheathed Copper Cable

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad.
Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	16Cx2.5 mm ² PVC Insulated and PVC Sheathed Copper Cable with Armouring	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	16Cx2.5 mm ²	
6	Material		Plain annealed Copper Cable	
7	Numbers & Diameter of Copper wires	mm	7/0.67	
8	Numbers & Diameter of Steel wires	mm	4x0.8	
9	Nominal size of Steel Tape	mm	0.25	
10	Maximum resistance at 30 deg. C	Ω/KM	7.69	
11	Nominal thickness of insulation	mm	0.8 (min.)	
12	Nominal thickness of sheath	mm	1.8 (min)	
13	Colour of sheath		Black	
14	Colour of Core		Red, Yellow, Blue, Black	
15	Approximate outer diameter	mm	25	
16	Approximate weight	Kg/KM	1430	
17	Drum wound length	M	1000	
18	Net Weight	Kg	Shall be mentioned	

19	Gross weight	Kg	Shall be mentioned	
20	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ –83, C ₁₆ –82, P ₅ –83.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.32 Guaranteed Technical Particulars of 24Cx2.5 mm² PVC Insulated and PVC Sheathed Copper Cable

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	24Cx2.5 mm ² PVC Insulated and PVC Sheathed Copper Cable with Armouring	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
3	Country of Origin		To be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, BDS or equivalent International standards.	
5	Cable Size	mm ²	24Cx2.5 mm ²	
6	Material		Plain annealed Copper Cable	
7	Numbers & Diameter of Copper wires	mm	7/0.67	
8	Numbers & Diameter of Steel wires	mm	4x0.8	
9	Nominal size of Steel Tape	mm	0.25	
10	Maximum resistance at 30 deg. C	Ω/KM	7.69	
11	Nominal thickness of insulation	mm	0.8 (min.)	
12	Nominal thickness of sheath	mm	1.8 (min)	
13	Colour of sheath	-	Black	
14	Colour of Core	-	Red, Yellow, Blue, Black	
15	Approximate outer diameter	mm	28	
16	Approximate weight	Kg/K M	1730	
17	Drum wound length	M	1000	
18	Net Weight	Kg	Shall be mentioned	
19	Gross weight	Kg	Shall be mentioned	
20	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ –83, C ₁₆ –82,	

			P ₅ -83.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.33 Guaranteed Technical Particulars of ACSR MARTIN

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	ACSR MARTIN	
2	Name of the Manufacturer	-	Shall be mentioned	
3	Address of the Manufacturer	-	Shall be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, IEC, ASTM, BDS or equivalent International standards.	
5	Installation	-	Overhead	
6	Type	-	Stranded	
7	Material	-	Hard drawn Aluminium steel reinforced	
8	Overall diameter	mm	36.17	
9	Nominal cross sectional area of conductor	mm ²	772.10	
10	Number/diameter of Aluminium Strand	No./m m	54/4.02	
11	Nominal Aluminium cross sectional area	mm ²	685.40	
12	Number/diameter of Steel Strand	No./m m	19/2.41	
13	Nominal Steel cross sectional area	mm ²	86.70	
14	Weight of conductor	Kg/K M	2590	
15	Drum wound length	M	500	
16	Net weight	Kg	Shall be mentioned	
17	Gross weight	Kg	Shall be mentioned	
18	Maximum DC Resistance of Conductor at 20 °C	Ω/KM	0.0425	
19	Minimum breaking Load of Conductor	Kg	min 11400	
20	Maximum working tension of conductor	KN	Shall be mentioned	
21	Current rating at 35°C rise over 40°C ambient temperature (75°C)	Amps.	Shall be mentioned	
22	Practical (final) modulus of elasticity	hbar	7700	
23	Co-efficient of linear expansion	/°C	shall be mentioned	
24	Aluminum to Steel Ratio		Shall be mentioned	
25	Lay length for Outermost Layer of Aluminium	mm	Shall be mentioned	
26	Lay direction for Outermost Layer of Aluminium	-	Right hand	
27	Lay ratio for Outermost Layer of	-	10-14	

	Aluminium			
28	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ –83, C ₁₆ –82, P ₅ –83.	
29	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.34 Guaranteed Technical Particulars for Disc Insulator

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Purchaser's Requirement	Manufacturer's Particulars
01.	Name of the Item	Disc Insulator	
02.	a) Manufacturer's name & address With website, official domain email.	To be mentioned	
	b) Year of Manufacturing	Not before 2023	
	C) Country of Origin	To be mentioned	
03.	Manufacturer's Code No.	To be mentioned	
04.	Standard	Performance, Design and Testing shall be in accordance to the BS, IEC, ASTM, BDS or equivalent International standards.	
05.	Installation	Overhead	
06.	Type	Disc	
07.	Material	Porcelain	
08.	Creepage Distance	292 mm	
09.	Flash over voltage Power Frequency, Dry Power Frequency, Wet	78 kV 45 kV	
10.	Withstand Voltage Power Frequency, Dry Power Frequency, Wet	70 kV 40 kV	
11.	Power Frequency Puncture Voltage	110 kV	
12.	50% Impulse flashover Positive	120 kV	
13.	50% Impulse flashover Negative	125 kV	
14.	Mechanical Failing Load	70 KN	
15.	Nominal Diameter	255 mm	
17.	Minimum Spacing	146 mm	
18.	Dry Arching Distance minimum	171 mm	
19.	Coupling Size	16 mm	
20.	Weight in Kg	To be mentioned	
21.	Manufacturer must comply all the features of Technical Specification (Section 7)	Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.35 Guaranteed Technical Particulars of 33 KV Bus bar insulator string

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's guaranteed Particulars
1	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2	Manufacturer's model no.	-	To be mentioned	
3	Insulator material	-	Porcelain	
4	Number of units per string	Nos.	4	
5	Insulator Voltage Class	KV	15	
6	Insulator Materials		Porcelain	
7	Type of Insulator	-	Ball and socket type disc, security clip made of rod brass alloy.	
8	Creepage/ leakage distance (min.)	mm	298	
9	Total creepage distance of string	mm	850	
10	Unit Spacing	mm	146	
11	Dry Arcing distance (minimum)	mm	1968	
12	Diameter of Insulator	mm	256	
13	Withstand Voltage, Minimum : a) Power Frequency, dry (one min.) b) Power Frequency, wet (one min.) c) Impulse 1.2/50 μ sec	KV KV KV	70 40 110	
14	Flashover Voltage, Minimum : a) Power Frequency, dry b) Power Frequency, wet c) 50% Impulse 1.2/50 μ sec wave, positive or impulse 1.2/50 μ sec wave positive. d) 50% Impulse 1.2/50 μ sec wave Negative	KV KV KV KV	80 50 125 130	
15	Power Frequency Puncture Voltage, minimum	KV	110	
16	Radio Influence Voltage Data, minimum a) Power frequency test voltage RMS to Ground b) Maximum RIV at 1,000 Kc	KV μ V	10 50	

17	Minimum Mechanical Strength for Suspension :			
	a) Electro-mechanical Breaking Load	Kg	7260	
	b) Mechanical Breaking load	Kg	6800	
	c) Tension Proof Test Load	Kg	3400	
	d) Time Load Test Value	Kg	4536	
18	Minimum Mechanical Strength for Strain Stringing :			
	a) Electro-mechanical Breaking Load	Kg	11340	
	b) Mechanical Breaking load	Kg	11340	
	c) Tension Proof Test Load	Kg	3400	
	d) Time Load Test Value	Kg	4536	
19	Insulator Hardware	-	Insulator hardware for insulator strings or bus-support such shall have UTS-120 KN and galvanized as per BS-729 OR ASTM A-153.	
	Standard	-	AS per latest editions of IEC-383.	
21	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

**Seal & Signature
of the Manufacturer**

**Seal & Signature
of the Bidder**

8.36 Guaranteed Technical Particulars for H-Type Connector

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Purchaser's Requirement	Manufacturer's Particulars
Compatible for ACSR MARTIN			
1.	a) Manufacturer's name & address With website, official domain email.	To be mentioned	
	b) Year of Manufacturing	Not before 2023	
	c) Country of Origin	To be mentioned	
2.	Manufacturer's Code No.	Shall be mentioned	
3.	Applicable Standard	Design, Testing & Performance shall be in accordance to BS, IEC, BDS, ANSI, ASTM or equivalent international standards.	
4.	Installation	Outdoor and shall be installed for the above-mentioned conductor.	
5.	Type	H-Type	
6.	Material	Aluminium	
7.	Minimum Continuous Current rating at 35°C rise over 40°C ambient temperature (75°C)	362 Amps (min).	
8.	Length	112 mm	
9.	Weight of 100 nos. in Kg	Shall be mentioned	
10.	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.37 Guaranteed Technical Particulars for Guy/Earth Wire.

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	Purchaser's Requirement	Manufacturer's Particulars
1	Name of the Item	-	Guy/Earth Wire	
2	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
3	Manufacturer's Code No.	-	Shall be mentioned	
4	Standard	-	Performance Design and Testing shall be in accordance to the BS, BDS or equivalent International standards.	
5	Installation	-	Overhead/Stay	
6	Type	-	Stranded, Solid and Bare	
7	Material	-	High Strength Steel	
8	Overall diameter	Mm	9.50	
9	Number/diameter of each strand	No./mm	7/3.15	
10	Nominal cross sectional area of conductors	mm ²	54.53	
11	Weight of Guy Wire	Kg/KM	430	
12	Ultimate Tensile Strength	KN	62.75	
13	Galvanisation	-	As per ASTM B498-74, Class-A	
14	Modulus of Elasticity	Kg/mm ²	19.7 x 10 ³	
15	Coefficient of linear expansion	/°C	11.3 x 10 ⁻⁶	
16	Drum wound length	M	1500	
17	Net weight	Kg	Shall be mentioned	
18	Gross weight	Kg	Shall be mentioned	
19	Lay length	Mm	Shall be mentioned	
20	Lay direction	-	Right hand	
21	Lay ratio	-	13-18	
22	Treated Wooden Drum Standard	-	AWPA C ₁ – 82, C ₂ – 83, C ₁₆ –82, P ₅ –83.	
23	Manufacturer must comply all the	-	Yes	

	features of Technical Specification (Section 7)			
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**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.38 Guaranteed Technical Particulars for PG Clamp

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Purchaser's Requirement	Manufacturer's Particulars
Compatible for ACSR MERTIN to ACSR MERTIN			
1.	a) Manufacturer's name & address With website, official domain email.	To be mentioned	
	b) Year of Manufacturing	Not before 2023	
	c) Country of Origin	To be mentioned	
2.	Manufacturer's Code No.	Shall be mentioned	
3.	Applicable Standard	Design, Testing & Performance shall be in accordance to BS, IEC, BDS, ANSI, ASTM or equivalent international standards.	
4.	Installation	Outdoor and shall be installed for the above-mentioned conductor.	
5.	Type	Bolted Type	
6.	Material	Aluminium Alloy	
7.	Minimum Continuous Current rating at 35°C rise over 40°C ambient temperature (75°C)	362 Amps (min).	
8.	Dimension	110 mm x 45 mm	
9.	Weight of 100 nos. in Kg	Shall be mentioned	
10.	Manufacturer must comply all the features of Technical Specification (Section 7)	Yes	

**Seal and Signature
of the manufacturer:**

**Seal and Signature
of the Bidder:**

8.39 Guaranteed Technical Particulars of Steel Structure Design

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's guaranteed Particulars
1	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	c) Country of Origin		To be mentioned	
2	Maximum ratio of unsupported length of steel compression to their least radius of gyration:			
	a) Main members	mm	120	
	b) Bracing's	mm	180	
	c) Redundant	mm	180	
3	B.S. 4360 grade 43A steel or other approved standard :			
	a) Elastic limit stress in tension members	Kg/mm ²	To be mentioned	
	b) Ultimate stress in compression members (expressed as function L/R)	Kg/mm ²	$Sc = F/S [1 + 0.0001 \times (L/R)^2 / M]$	
4	B.S. 4360 grade 50C steel or other approved standard :			
	a) Elastic limit stress in tension members	Kg/mm ²	To be mentioned	
	b) Ultimate stress in compression members (expressed as function L/R)	Kg/mm ²	$Sc = F/S [1 + 0.0001 \times 66 \times (L/R)^2 / M]$	
5	Formula for calculation of ultimate stress in compression.			
	Where,			
	SC = Ultimate stress in compression	Kg/mm ²	To be mentioned	
	F = Yield strength	Kg	To be mentioned	
	S = Section	mm ²	To be mentioned	
	L/R = Length / Radius of gyration	cm	To be mentioned	
	LE = Elastic limit stress	Mg/mm ²	24 or 36	
	E = Elasticity module	Kg/mm ²	22000	
	M = Rigidity Coefficient at each end	-	To be mentioned	
	M=1 with only one bolt at each end of member	-	To be mentioned	
	M=2 with two bolts at each end of a member	-	To be mentioned	
	M=4 if L/R between 110 and 130	-	To be mentioned	
	M=3 if L/R over to 130	-	To be mentioned	
6	Minimum size of member	mm	45 x 45 x --	

7	Weight of each Column	Kg	To be mentioned	
8	Weight of each Girder	Kg	To be mentioned	
9	Total weight	Kg	To be mentioned	
10	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.40 Guaranteed Technical Particulars of Shield Wire, Earthing Grid and Earthing Electrode

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	Unit	BPDB's Requirement	Manufacturer's guaranteed Particulars
A. SHIELD WIRES				
1	a) Manufacturer's name & address With website, official domain email.	-	To be mentioned	
	b) Year of Manufacturing	Yr.	Not before 2023	
	C) Country of Origin		To be mentioned	
2	Material	-	High Strength Steel	
3	Grade of Steel	Kg	60000	
4	Nos. of Strand	Nos.	7	
5	Diameter of each strand	mm	3.05	
6	Overall diameter	mm	9.525	
7	Nominal cross-section	mm ²	35	
8	Weight per km length	Kg	407	
9	Maximum rated current (3 seconds)	A	To be mentioned	
10	Maximum working tension of main connection	Kg/m ²	To be mentioned	
11	Resistance of conductors per 1000 meters at 20 c	ohms	To be mentioned	
12	Rated Ultimate Tensile Strength	Kg/mm ²	4900	
13	Maximum permissible span length	m	To be mentioned	
14	Maximum sag under own weight of maximum span	mm	To be mentioned	
15	Co-efficient of liner expansion	cm/°C.	To be mentioned	
16	Class of Zinc Coating	-	Class-A	
17	Galvanization	-	As per BS-729 OR ASTM A-153	
B. EARTHING GRID				
1	Manufacturer's name & country	-	To be mentioned	
2	Material	-	Copper	
3	Overall diameter	mm	To be mentioned	
4	Nominal cross-section			
	a) Interconnecting the earth electrodes	mm ²	To be mentioned	
	b) Connecting equipment to mesh	mm ²	To be mentioned	
6	Area of each earthing grid	m x m	To be mentioned	
7	Depth of bedding of conductor	mm	To be mentioned	
8	Maximum earth fault current for 3 sec.	KA	20	
9	Resistance of conductors per 1000 meters at 20 ⁰ c	Ohms	To be mentioned	
C. EARTHING ELECTRODES				

1	Manufacturer's name & country	-	To be mentioned	
2	Material	-	Copper	
3	Dimensions : a) Dia b) Length	mm mm	16 4	
4	Number of electrodes per group	-	As per schedule	
5	Number of earthing point per substation	-	To be mentioned	
6	Calculated resistance of combined earth grid and points	ohm	Less than one (1)	
7	Manufacturer must comply all the features of Technical Specification (Section 7)	-	Yes	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.41 Guaranteed Technical Particulars Of Automatic Fire protection and Firefighting system with smoke and heat detectors for 33 kV and 11 kV Switchgear Room

(To be filled up appropriately, then Seal & Signed by both manufacturer and bidder on Manufacturer's Letterhead Pad. Manufacturer & Bidder has to mention only single country of origin as per ITT 6.3 for individual item. Otherwise his bid shall be non-responsive.)

Sl. No.	Description	BPDB's Requirement	Manufacturer's guaranteed Particulars
1	Manufacturer's name & country	To be mentioned	
2	Standard	To be mentioned	
3	Name of accessories and detail BOQ	To be mentioned	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder

8.42 GUARANTEED TECHNICAL PARTICULARS PORTABLE UNDER GROUND AUTOMATIC CABLE FAULT LOCATING EQUIPMENT SUITABLE FOR LOCATING FAULT ON LOW/MEDIUM/HIGH VOLTAGE POWER CABLES UP TO 33 KV CABLE NETWORK

(To be filled up by the bidder/manufacturer with appropriate data, then to be sealed and signed by both tenderer and manufacturer, otherwise the bid will be treated as non-responsive)

Sl. No.	Description	Required BPDB specifications	Manufacturer's Guaranteed Particulars
1.	Name of the Manufacturer	To be mentioned	
2.	Address of the Manufacturer	To be mentioned	
3.	Country of origin	USA/Canada/Europe/Australia/Japan/S. Korea	
4.	Country of manufacture	USA/Canada/Europe/Australia/Japan/S. Korea	
5.	Manufacturer's Model no.	To be mentioned	
6.	Scope	<ul style="list-style-type: none"> design, manufacture, assembly, testing, supply, delivery, installation & commissioning of Single-Phase Automatic Cable Fault Locating Equipment Suitable for Locating Fault on Low /Medium / High Voltage Power Cables up to 33 KV Complete with all materials and accessories for efficient and trouble-free operation. The system should support cable fault location on all types of cables such as XLPE, PVC or PILC with Al/Cu Conductors. It should be suitable for the complete range of cable types and their accessories in all voltage ranges from 415 V to 33kV. Automatic system means single knob operation to control the entire proceedings of cable fault location. 	
7.	Application	<p>The following functions should be performed and controlled via automatic centrally controlled unit by using single knob or equivalent panel. No manual selection of voltage through selector switch will be allowed.</p> <ul style="list-style-type: none"> - Integrated Insulation resistance testing - Integrated DC Testing - Pre location of Fault - Pinpointing of Fault - Breakdown Voltage recognition - Sheath Testing 	
8.	Fault methods pre-location	<ul style="list-style-type: none"> TDR – Time Domain Reflectometer ARM/SIM/MIM Secondary/Multiple Impulse Method up to 32kV ICM – Impulse Current Method up to 32kV Decay - Voltage coupled decay method up to 40kV Optional feature (if any) 	

Sl. No.	Description	Required BPDB specifications	Manufacturer's Guaranteed Particulars
9.	Pin-pointing methods	<ul style="list-style-type: none"> Acoustic pin-pointing Step voltage method Cable tracing 	
10.	System software	<p>The cable fault analysis shall be done automatically via a software controlled fully automatic mega ohmmeter with minimum 20kV IR -test voltage and a powerful TDR.</p> <p>The TDR output must provide at least CAT IV/400V input protection.</p>	
11.	Functional modules to be provided	• Central Control Unit/Time Domain reflectometer	
		• Fully Automatic Multi-functional Surge Generator	
		• Mains & Safety Control Unit	
		• LV & HV connector panel	
		• Cable drum rack with connection cables	
	• Operating desk with drawers		
12.	Pre Locator		
	TDR pulse width (Minimum)	20 ns – 10 micro sec	
	Measuring pulse	10 – 50 V	
	Output impedance	8 – 500 Ohm	
	Sampling rate	400 MHz or higher	
	Input signal gain	-37 to +37 dB	
	De-attenuation	0 to + 22dB	
	SIM/MIM	Min. 15 TDR multi-shot measurements	
13.	Display range	20 m – 160km or higher	
	Resolution (minimum)	0.1 m	
	Accuracy	0.2% of measuring result	
	Propagation velocity factor	10 – 150 m/μs	
	Size of screen (Minimum)	10 inch	
	Power supply	100 – 240 V, 50 Hz	
	Power consumption(maximum)	280 VA	
14.	IR test		
	Test voltage	up to 20KV or higher	
	Measuring range	up to 650 M-Ohm(Inbuilt)	
15.	Surge Voltage Generator		
	Type	The Surge Generator Unit with built-in Cable Fault Analyzer should be used as thumper and DC Hipot for charging of cable under test (i.e. defective cable) till sufficient flashover is achieved at the point of fault. The set should be used in conjunction with Surge Receiver Unit for fault pinpointing.	
	Surge Voltage Ranges	0-4 KV, 0 – 8 kV, 0 – 16 kV, 0 – 32 kV	
	Surge Energy(minimum)	1100J @ 0-4kV voltage range 2000J @ 0 – 8, 0 – 16, 0 – 32 kV	

Sl. No.	Description	Required BPDB specifications	Manufacturer's Guaranteed Particulars
	DC Voltage	0 – 40 KV Continuously Variable or higher	
	Surge sequence	6 – 20 surges/min., single surge	
	standard safety features	<ul style="list-style-type: none"> • High voltage ON lamp • automatic grounding upon shutdown Auto-OFF in case of power supply break • overload protection with circuit breaker • automatic discharge • Reliable operated surge switch electromagnetic operated • Safety control circuit according to VDE 0104 	
16.	Accessories to be provided	<ul style="list-style-type: none"> • mains leads • earth cable • HV connecting cable, auxiliary earth cable • carrying case • user's manual with complete operating and maintenance instructions. 	
17.	Filter unit for SIM/MIM/ARM	<p>Since pulse echo or reflection may not be suitable for high impedance or resistance faults. Thus, keeping in view, a suitable band pass inductive filter unit should be inbuilt into surge generator to stabilize the ARC at the flashover or the point of fault.</p> <p>The offered filter must simplify the operation causing less stress, causing minimum damage on the tested cables to detect the high resistive faults. There should be complete compatibility of TDR, Surge Generator/Thumper with inbuilt filter unit. This unit must filter or stabilize the arc at the fault point and record the same in the supplied TDR to compare it with previous trace recorded without the filter in the same core. Suitable connection for coupling the TDR and Surge generator with inbuilt filter must be available. The inbuilt filter must contain switching elements necessary for the triggering and the coupling of the pulse. After the pre-location using the ARM/SIM/MIM method, there must be an inbuilt decoupling element which must pass the surge generator for making it ready for use in pinpointing the cable fault. The control unit should connect automatically the inbuilt filters with appropriate coupler with the surge generator and TDR when SIM/MIM mode.</p>	
	Inductive coupler	Inductive Coupler required for pre-location of high resistance faults with a Surge Voltage Generator according to the Impulse Current Method (ICM).	
	Capacitive coupler	Capacitive voltage divider required for location of	

Sl. No.	Description	Required BPDB specifications	Manufacturer's Guaranteed Particulars
		intermittent cable faults up to 40 KVDC to perform the Decay Method.	
18.	Surge Wave Receiver Unit	<p>The unit shall comprise of receivers, headphones, sensors, amplifiers and any other auxiliary item as necessary for operation of the unit.</p> <p>Detection of both acoustic and electromagnetic pulses emitted from an arcing fault when it is surged.</p> <p>Determine the proximity and direction to the cable fault</p> <p>Measure the time delay between acoustic and electromagnetic signals.</p> <p>Automatic Noise Suppression to filter and eliminate background noise.</p> <p>Pinpoint the exact location of the fault.</p> <p>Rechargeable battery/dry cell operated.</p> <p>Mute feature to activate while in motion.</p> <p>Adjustable/automatic feature for adjusting the electromagnetic gain & acoustic gain.</p> <p>LCD display with backlit feature.</p> <p>Acoustic headphone set shall be provided to receive the acoustic signal for pin pointing the fault point.</p> <p>LCD display should indicate the cable route through the electromagnetic signal in bar graph form & the proximity to fault point by a numeric display of delay/distance.</p> <p>Communication shall be done via a wireless or a wired connection.</p> <p>Accessories to be provided:</p> <ul style="list-style-type: none"> • lightweight receiver with carrying straps • handy sensor • carrying case • user's manual with complete operating and maintenance instructions 	
19.	Cable route tracer	<p>The set shall comprise of a transmitter & receiver.</p> <p>The set shall battery operated (rechargeable) and portable type</p> <p>The cable tracing shall be done with audio & visual signals</p> <p>Detect the depth of the cable (at least 4 meter) at any point by using sufficient wattage of the generator up to 50watts at least.</p> <p>Automatic impedance matching</p> <p>Detect the AC signals (50 Hz) from a charged cable without transmitter.</p> <p>Filters shall be provided to optimize the</p>	

Sl. No.	Description	Required BPDB specifications	Manufacturer's Guaranteed Particulars
		measurements and minimize the ambient noise.	
		The transmitter of the tracer shall be capable of energizing the cable either by magnetic induction or by direct conductive connection to the cable.	
		The receiver shall filter out electric noise and static noise.	
		The unit shall also be able to determine the depth of the cable.	
		The unit shall be suitable to trace cables in areas with multiple energized / de-energized cables in the same route.	
20.	Audio Frequency Generator		
	LF output power (minimum)	0-200 Watt	
	O/P Frequencies	To be mentioned	
	Output Adjustment	To be mentioned	
	Permitted load resistance	any short circuit, open circuit, continuous but with reactive load etc.	
	Power Supply	shall be capable to work on mains AC supply with built in charging and battery unit.	
21.	The audio frequency receiver		
	type	battery operated, shall be connected directly to the search coil. The coil can be rotated to 0-45 degree or 90 deg spans in position	
22.	Cable Identification Set		
	i. Transmitter		
	Output voltage (minimum)	55V (15 pulses/min)	
	Output current(minimum)	100A	
	Power Supply	230v, 50 Hz Battery operated	
	ii. Receiver		
	Display	Graphic LCD/ Analog signal/LED Array	
	Sensitivity	100%; at 400 ohm	
	Power Supply	Battery operated	
23.	Safety Measure	<ul style="list-style-type: none"> • monitor auto discharge, earth monitoring, etc. from the central software • Visual indication of failure of safety circuits/incorrect selection etc. with possible corrective methods. • Constant monitoring of all safety circuits such as earth monitoring circuit etc. should be inbuilt into the control unit, safety interlock monitoring etc. 	
24.	Accessories to be provided	<ul style="list-style-type: none"> • HV Cable with Cable drum rated up to 40 KV-25m 	

Sl. No.	Description	Required BPDB specifications	Manufacturer's Guaranteed Particulars
		<ul style="list-style-type: none"> Main Power supply lead-3m Auxiliary Earthing cable drum-25m Safety Earth/Ground cable -5 m 	
25.	Dimension	To be mentioned	
26.	Weight	To be mentioned	

Seal and Signature of the Tenderer

Seal & Signature of the Manufacturer

8.43 GUARANTEED TECHNICAL PARTICULARS FOR SFRA TEST SET

(To be filled up by the Seal & Signed by both manufacturer letter head pad ,than to be Sealed & Signed by both manufacturer & bidder otherwise the bid will be rejected)

Sl No.	Description	Purchaser's Requirement	Manufacturer's Guaranteed Particulars
01	Mfg's Name and Address	Shall be mentioned	
02	Mfg's Type / Model	Shall be mentioned	
03	Country of Origin	USA/Canada/Europe/Australia/Japan/S. Korea	
04.	Manufacturer's Authorization	To be mentioned	
05.	Original Catalogues	To be mentioned	
06	Application	Sweep Frequency Response Analysis for detecting electromechanical changes/failures in all types of power transformers.	
07	Power Supply	90-264VAC, 47-63 Hz, optional built-in battery	
Analog source			
08	Channels	1	
09	Voltage output	24VPeak	
10	Output coupling	DC	
11	Output impedance	50 ohm	
12	Protection	Protected against overload and short circuit	
13	Frequency range	0.1 Hz – 25 MHz	
Analog inputs			
14	Channels	2	
15	Sampling	Simultaneously	
16	Frequency range	0.1 Hz – 25 MHz	
17	Input impedance	50 Ohm	
18	Sample rate	100 MS/s	
19	Max input level	24 V (peak-to-peak), Measurement Voltage@50Ohm(12Vpeak).	
Data collection			
20	Test method	Sweep frequency analysis	
21	Frequency range	0.1 Hz – 25 MHz	
22	No. of points	Up to 32 000 points, user selectable.	

Sl No.	Description	Purchaser's Requirement	Manufacturer's Guaranteed Particulars
23	Sweep settings	Individual settings for customer defined frequency bands. Linear and logarithmic scale or combination of both.	
24	Dynamic range	>130 dB	
25	Frequency resolution	> 0.01%	
26	Frequency accuracy	> 0.01%	
27	Level resolution	> 0.001 dB	
28	Accuracy	± 0.1 dB from +10 dB down to -40 dB ± 0.5 dB down to -100 dB	
29	IF bandwidth	User selectable, default <10%	
30	Calibration interval	Not exceeding three years	
	Data display		
31	Plotting	Magnitude (linear or log) Phase Difference Impedance Admittance Inductance Resistance Customer defined	
32	Scaling	Linear and logarithmic or combination	
33	Data analysis	Sub-band analysis Difference DL/T 911-2004 standard User-defined correlation analysis	
	Data management		
34	Software	Windows XP/ Windows7 for measurement control and data analysis	
35	Display	Operation through External PC / Laptop Built-in PC with powerful backlit screen for use in direct sunlight	
36	Database	Open XML format	
37	PC communication	USB (galvanic isolated)	
	Environmental		
38	Operating temperature	-20 to +55° C	
39	Operating relative humidity	< 95 % RH non-condensing.	
40	Storage temperature	-20 to +70° C	
41	EMC	EN 61000 and CISPR 11	
42	Communication	USB port	
	Standard accessories include:		

Sl No.	Description	Purchaser's Requirement	Manufacturer's Guaranteed Particulars
43	PC software	Windows based Testing & analysis Software	
	Cables and clamps	AC Power cord (IEC60320-C13 to US standard) AC Power cord (IEC60320-C13 to Schuko CEE 7/7) Canvas carrying bag (for leadset) Ground cable 5 m (16 ft) Earth/Ground braid lead 2 x 3 m (9 ft) Earth/Ground braid lead (insulated) 2 x 3 m (9 ft) C-clamp (Bushing clamps) 2 pcs C-clamp (Ground braid clamps) 2 pcs Field Test Box, FTB101 Earth/Ground braid with clamp 2 x 0.3 m (1 ft) Nylon accessory bag	
48	Documentation	User's manual (paper copy and in software)	
49		Calibration and Test Certificate	
50	Field test verification box	Kit Should be complied Cigre 342 report and fields test verification box shall be supplied along with instrument to assure Kit and cable healthiness in the field.	
Optional accessories			
51	Custom length cable sets	Yes	
52	Battery	Built-in battery option	
53	Calibration set incl SW	Yes	
54	Dimension (HxWxD)	To be mentioned	
55	Weight	To be mentioned	
56	Printed catalogue shall furnish with identifying by indelible ink.	To be provided	

Seal & Signature of the Tenderer

Seal & Signature of the Manufacturer

8.44 GUARANTEED TECHNICAL PARTICULARS FOR PORTABLE PARTIAL DISCHARGE MEASURING INSTRUMENT FOR GIS, TRANSFORMER AND CABLES

(To be filled up with the seal & Signed by both manufacturer and bidder in Manufacturer's Letterhead, otherwise the bid will be rejected)

SI No.	Description	BPDB's Requirements	Manufacturer's Guaranteed Particulars
1.	Manufacturer 's name and address	To be mentioned.	
2.	Model	To be mentioned.	
3.	Country of Origin	USA/Canada/Europe/Australia/Japan/S. Korea	
4.	General Requirement	<p>a) The instrument shall be supplied with the different types of pre-amplifiers for selecting the different bandwidth & increasing the sensitivity of measured partial discharge signal by IEC-60270, HFCT, Acoustic or UHF principle of detection.</p> <p>b) The instrument shall be capable of connecting minimum 4 PD measurement channels, 1 gating channel and 1 external synchronization channel. The instrument needs to show partial discharge signals vs phase of the synchronized voltage.</p> <p>c) The instrument shall have feature to show the Partial discharge signals in spectrum mode (Amplitude vs. Frequency) to identify the best signal to noise ratio.</p> <p>d) To ensure a high versatility in various use-cases, the instrument should be operational through push-buttons and its built-in display and from a connected laptop.</p> <p>e) The instrument shall provide a spectrum mode (Amplitude vs Frequency) to identify the best signal to noise ratio for measurements. The operator should be guided through an automatic spectrum calibration procedure. This function allows to calibrate the system at various measurement frequencies while the asset is offline. During online operation, the user can select the most suitable calibration and decide on the frequency providing the best signal-to noise ratio to ensure the best sensitivity.</p>	

Sl No.	Description	BPDB's Requirements	Manufacturer's Guaranteed Particulars
		f) The instrument shall be capable to store on the device memory up to 20 calibration factors recorded at different measurement frequencies during calibration in spectrum mode. As a consequence the instrument should not need to become recalibrated again after energizing the asset and shifting the measurement frequency to best suited center frequency.	
		g) The instrument shall have feature to connect an external disturbance antenna. The disturbance antenna shall be used to pick up noise signals caused by local corona discharge. It shall be equipped with the magnetic holder, which allows a flexible placement on a transformer tank or to other metallic parts close to the object under test. The output signal can be used to trigger the gate input circuit of all PD acquisition.	
		h) The equipment must capable for measuring Partial Discharge in Noisy and charged sub-station environment.	
		i) The equipment shall be battery operated with built-in battery charger and capable of testing for minimum 3 hours. It shall also be suitable for 230V AC/50 Hz input.	
		j) The equipment shall be capable of showing stable reading in presence of vibrations within complex assemblies of electrical asset, which can produce high frequency disturbance signals in the frequency spectra of Partial Discharge.	
		k) The Instrument shall be operated through software installed over PC/Laptop for analysis or without software.	
		l) The expert software shall be part of the instrument offer, which can accurately interpret the root cause of partial discharges like corona, protrusions, gas inclusions (voids), surface discharges, and others etc.	
		m)The instrument needs to show partial discharge signals vs. phase of the synchronized voltage.	

Sl No.	Description	BPDB's Requirements	Manufacturer's Guaranteed Particulars
		<p>n) The instrument shall include a built-in server that allows continuous data recording, analysis and storage. The built-in server should be accessible through a web interface (TCP/IP connection). It should allow the manual operation of the instrument. Furthermore, it should allow the instrument to operate as a standalone system without operator presence for days, weeks or month. During such an operation, the system should automatically record a trending of the PD activity. In case configurable thresholds are exceeded, the instrument should store the current measurement as a PRPD with a date and time stamp, the sensor/channel on which it occurred and allow the operator to review the PD activity in an alarm event list when accessing through the web interface.</p>	
		<p>o) The instrument shall be housed in a IP65 enclosure for prolonged outdoor operation. The cable connections should be available from the outside of the enclosure to ensure the protection class while the instrument is fully set up and in operation. The housing should be temperature and humidity controlled.</p>	
		<p>1) Supply should cover</p> <ul style="list-style-type: none"> a) 4 Channel PD Measurement Instrument X 1 qty b) Set of UHF Connection accessories for GIS X 3 qty c) Set of Quadrupole and Pre-amplifier X 3qty d) UHF Drain Valve Sensor X 1 qty e) HFCT X 3 qty f) Disturbance Antenna X 1 qty g) Transport Case X 1 qty h) Suitable case and hardware for Temporary Continuous monitoring purpose 	
5.	Technical Data for PD monitoring system		
6.	<u>Acquisition unit:</u>	<p>Mains supply: 90–264 VAC, 47–440 Hz Power requirements: Approx. 60 VA Battery lifetime: Up to 3 hours Display: Backlit LCD Display resolution : 128 x 240 Pixel B/W</p>	

Sl No.	Description	BPDB's Requirements	Manufacturer's Guaranteed Particulars
		<p>Operation: 5 menu supported pushbutton : 5 fix function pushbuttons or remote controlled via software</p> <p>Remote connection: USB , LAN , Modem, UMTS</p> <p>Input impedance : 50 W// 50 pF (AMP IN)</p> <p>A/D converter (PD): 8 bit (unipolar) / ± 7 bit (bipolar)</p> <p>Opt. recorder output: 0–10 V with R=1000hm</p>	
7.	<u>Standard PD Mode:</u>	<p>Lower cut-off (-6 dB): 40, 80, or 100 kHz (software controlled)</p> <p>Upper cut-off (-6 dB): 250, 600, or 800 kHz (software controlled)</p> <p>Input sensitivity: < 500 μVrms / 5pC (without preamplifier)</p> <p>Gain range: 1, 2, 4, 8, 10, 20 ..., 200,400, 800</p>	
8.	<u>Preamplifier</u>	<p>Input impedance: 1 kΩ // 50 pF</p> <p>Input sensitivity: < 15 μVrms /0.02 pC</p> <p>Bandwidth: 40 kHz–20 MHz</p>	
9.	<u>Synchronization</u>	<p>Sync. Frequency : 8–320 Hz</p> <p>Maximum voltage : 200 Vpeak (140 Vrms),100 Vrms nom.</p> <p>Input impedance : 10 MW</p>	
10.	<u>Spectrum Function</u>	<p>Input sensitivity: < 5 μVrms / 0.5 pC (270 kHz bandwidth)</p> <p>: < 1 μVrms / 2 pC (9 kHz bandwidth)</p> <p>Max. input voltage : 120 mVrms (270 kHz bandwidth): 5 mVrms (9 kHz bandwidth)</p> <p>: 2.5 mVrms (RIV)</p> <p>Frequency range : 10 kHz–10 MHz (in steps of 10 kHz)</p> <p>Bandwidth: 9 kHz or 270 kHz</p> <p>Precision: Typ. < 5%</p>	
11.	<u>Quadrupole</u>	<p>Coupling capacitance range: 600 pF to 2.5 nF</p> <p>Max. current: 400 mA</p> <p>Input connection: Banana</p> <p>Output connection: BNC (RG 58 / 50 ohm)</p>	
12.	<u>HFCT</u>	<p>Transfer ratio at 50 ohms: 1:10</p> <p>Primary window: 100 mm</p> <p>Bandwidth at -3dB: 2-25 MHz</p> <p>Bandwidth at -6dB: 1.2 -40 MHz</p>	
13.	<u>UHF Drain Valve Sensor</u>	<p>Frequency range: 300 MHz–1000 MHz</p> <p>Flange connections: DN-40 or DN-50 or DN-100</p> <p>Frequency Converter: built-in UHF to HF converter</p>	

SI No.	Description	BPDB's Requirements	Manufacturer's Guaranteed Particulars
14.	<u>Disturbance Antenna</u>	Frequency range: 20 MHz - 150 MHz Connector: 1 x TNC	

Bidder's signature with seal

Manufacturer's signature with seal

8.45 TECHNICAL REQUIREMENT & GUARANTEE SCHEDULE FOR DAS & DTS SYSTEM

(To be filled up by the Manufacturer in Manufacturer's Letterhead Pad with appropriate data, otherwise bid shall be rejected.)

Sl. No	DESCRIPTION	BPDB REQUIREMENT	Bidders declared Value
1.	Name of the Manufacturer/Developer	Shall be mentioned	
	Country of Origin	Shall be mentioned	
	Model/Type	Shall be mentioned	
2. General Requirement:			
	Standards to be complied with DAS & DTS system		
	Communication protocol at all levels	IEC61850. Fully complying with the standard.	
	Temperature range (min/max) Computer	Shall be mentioned	
	Sensing Range/Distance (km)	Shall be mentioned	
3. Detailed Requirements for Cable Monitoring System:			
3 (a) Distributed Temperature Sensing (DTS)			
	Name of the Manufacturer	Shall be mentioned	
	Model/Type	Shall be mentioned	
3 (b) Distributed Acoustic Sensing (DAS)			
	Name of the Manufacturer	Shall be mentioned	
	Model/Type	Shall be mentioned	
4. Remote Terminal Unit			
	Manufacturer's name & address - Standard - Supported Protocol - Power Supply - Communication Ports - Operation Temperature - RTU shall be expandable - Panel	Shall be mentioned IEC/IEEE IEC-61850 Edition 2 IEC 60870-5-104 Modbus To be provided To be provided To be provided Yes Simplex	
	Dimensions of ubicle - Width - Depth - Height	mm mm mm	

Seal & Signature of the Manufacturer

Seal & Signature of the Bidder