1.1 *DRAWINGS, DESIGN AND DOCUMENTATION*

F/C – Foreign Currency
FJD – Fijian Dollars

Item No.	Description	Estimated		Rate		Total Price	
		Qty	Unit	F/C	FJD	F/C	FJD
1	***KALABU TAX FREE ZONE SUBSTATION***						
1.1	**ELECTRICAL WORKS**						
1.1.1	Design and Liaison of Works	1	LS				
1.1.2	Drawings and Documentation required for Electrical works	1	LS				
1.2	**MECHANICAL WORKS**						
1.2.1	Design and Liaison of Works	1	LS				
1.2.2	Drawings and Documentation required for Mechanical works	1	LS				
1.3	**CIVIL WORKS**						
1.3.1	Design and Liaison of Works	1	LS				
1.3.2	Drawings and Documentation required for Civil works	1	LS				
TOTAL (Transfer to Grand Summary)							

1.3 *PLANT EQUIPMENT INCLUDING MANDATORY SPARE PARTS*

ITEM NO.	DESCRIPTION	ESTIMATE QTY	DDU FIJI Foreign Currency		DDU FIJI FJD		ERECTION ON SITE FJD		TOTAL AMOUNT (Excluding Taxes & Duties)	
			Unit Rate	Amount	Unit Rate	Amount	Unit Rate	Amount	F/C	FJD
			(1)		(2)		(3)		(4=1)	(5=2+3)
	KALABU TAX FREE ZONE SUBSTATION									
1	**ELECTRICAL WORKS**									
1.1	INDOOR 33 kV SWITCHGEAR									
1.1.1	2000A, 36 kV, 31.5 kA, 3 phase circuit breaker complete with housing panel (Bus section breaker)	1 Nos								
1.1.2	1250A, 36 kV, 31.5kA, 3 phase circuit breaker complete with housing panel (transformer breaker)	2 Nos								
1.1.3	1250A, 36 kV, 3 phase circuit breaker complete with housing panel (feeder circuit breaker)	4 Nos								
1.1.4	36kV VT Three phase voltage transformers, ratio 33,000/√3:110/√3:110/3 V Class 0.2 for Metering and Protection	6 Nos.								
1.1.4	CTs									
1.1.4.1	800/600:1, Class 5P20	4 Nos								
1.1.4.2	2000/1200:1 Class 0.1PX	8 Nos								
1.1.4.3	2000/1200:1 Class 5P20	2 Nos								
1.1.4.4	800/600:1 Class 0.1 PX	4 Nos								
1.1.4.5	600/400:1 Class 0.1 PX	2 Nos								
1.1.4.6	600/400:1 Class 5P20	2 Nos								
1.2	INDOOR 11 kV SWITCHGEAR									

1.2.1	2000A, 12 kV, 25 kA, 3 phase circuit breaker complete with housing panel (Bus section)	1 No								
1.2.2	1250A, 12 kV, 25 kA, 3 phase circuit breaker complete with housing panel (Transformer breaker)	2 Nos								
1.2.3	1250A, 12 kV, 25 kA, 3 phase circuit breaker complete with housing panel (Feeder breaker)	6 Nos								
1.2.4	1250A, 12 kV, 25 kA, 3 phase circuit breaker complete with housing panel (Aux Transformer breaker)	1 Nos								
1.2.5	CTs									
1.2.5.1	800/400:1, Class 5P20	7 Nos								
1.2.5.2	1600/1200:1, Class 0.1PX	2 Nos								
1.2.5.3	1600/1200:1, Class 5P20	2 Nos								
1.2.5.4	300/1500:1, Class 0.1PX	2 Nos								
1.2.5.5	2000/1600:1, Class 5P20	1 No								
1.2.6	12kV VT Three phase voltage transformers, ratio 11,000/√3:110/√3:110/3 V Class 0.2 for Metering and Protection	4 Nos.								
1.3	LVAC SWITCHBOARD									
1.3.1	The two incoming supplies to switchboard are to be interlocked to automatically establish supply to the busbar in the event of failure of the selected supply (Incomer No.1 & 2) and not to parallel two of the incoming supplies at any time. Shall include at least 54 pole single chassis and 4 x MCCB (2 x 100A and 2 x 250A). Shall have provision for incoming energy metering.	1 Lot								
1.4	BATTERIES, CHARGERS AND DISTRIBUTION BOARDS									
1.4.1	110 V maintenance free battery banks with the capacity of 600 Ah (2.2V cell x 54 cells)	2 Nos.								

1.4.2	30A Single phase charger with surge protection/filter capacitors and voltage stabilizer/regulator	2 Nos.								
1.4.3	DC distribution board with 2 incomers, dual chassis with bus tie and with incoming metering. (Note: DC board shall be separate, not part of the charger panel)	1 No								
1.5	PROTECTION RELAYS									
1.5.1	33 kV Relays									
1.5.1.1	SEL311L	4 No								
1.5.1.2	SEL351S-7	7 No.								
1.5.1.3	SEL387E	2 No.								
1.5.1.4	SEL587Z	1 No								
1.5.1.5	Areva MVAJ13	2 No.								
1.5.1.6	VAMP Arc Flash Protection	2 No.								
1.5.1.7	Partial Discharge Monitoring System	2 No.								
1.5.1.8	SEL2515	As Required								
1.5.2	11 kV Relays									
1.5.2.1	SEL351S-7	10 No.								
1.5.2.2	VAMP Arc Flash Protection	2 No.								
1.5.2.3	Partial Discharge Monitoring System	2 No.								
1.5.2.4	SEL2515	As Required								
1.5.3	Others									
1.5.3.1	33 kV Control Panel to house relays, indications and manual controls. Control panel to come complete with LED's, switches, etc.	As Required								

1.5.3.2	33 kV Control Panel to house relays, indications and manual controls. Control panel to come complete with LED's, switches, etc.	As Required								
1.5.3.3	Contractor to add others									
1.6	COMMUNICATION & SCADA EQUIPMENT									
1.6.1	IP Telephone (Mitel 5312) – blue tooth wireless handset	2 Lot								
1.6.2	Radio Telephone (RT) - Tait 9355 VHF DMR mobile radio 136 – 174 Mhz	1 Lot								
1.6.3	Fiber distribution cabinet – Warren & Brown Rack 1200mm x 300mm x 2200mm	As required								
1.6.4	Fiber patch cords on both sides of the substations – SC – SC (20 x 3m duplex)	As required								
1.6.5	Fiber accessories on both sides of the substations – SC pigtails (144)	As required								
1.6.6	VHF Radio TM935	As required								
1.6.7	Cisco Switch, dual power supply (AC & DC) – Cisco CGS2520	2 Lot								
1.6.8	UPS	If required								
1.6.9	Fibre transceiver – GLC – EX (40km)	4 Lot								
1.6.10	SEL RTAC 3530 – 3530, 33 ports with both link ports to be Ethernet.	5 Lot								
1.6.11	SEL RS232 cable – 9 pin male	20 Lot								
1.6.12	Patch for RTU - Cat 6 cable (red)	As required								
1.6.13	Fibre patch for Switch - LC – SC duplex cable, single mode (4 x 3m length or as required)	As required								
1.6.14	Equipment Rack (cabinet) – Rital (790mm x 600mm x 2100mm – or as required), glass front door with build in fan and light.	1 Lot								
1.6.15	4RF Data Radio and Antenna									

1.6.16	CARDAX Access System									
1.6.17	CCTV System for indoor and outdoor monitoring capable of integrating with EFL system									
1.7	SUBSTATION EARTHING									
1.7.1	The earthing installation rates shall include the excavation, backfilling and reinstatement of the ground, driving the rods and making of the connections.	1 Lot								
1.8	LIGHTNING PROTECTION SYSTEM									
1.8.1	Design and erection of lightning protection system with earth wires as specified	1 Lot								
1.8.2	Galvanised E.H.S steel wires of size 7/3.35 complete with accessories, for lightning protection of entire substation	1 Lot								
1.9	GROUNDING SYSTEM									
1.9.1	Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes	1 Lot								
1.10	POWER AND CONTROL CABLES									
1.10.1	All low voltage AC power cables and terminations	1 Lot								
1.10.2	All DC power and control cables and terminations	1 Lot								
1.10.3	Power and lighting cable for all works, including indoor and outdoor lighting and auxiliary supply	1 Lot								
1.11	TRANSFORMERS									
1.11.1	12/15 MVA 33/11kV Dyn1 Power Transformer with On-load Tap Changer	2 Nos.								

1.11.2	Digital temperature monitoring equipment for power transformers (Qualitrol)	2 Nos.								
1.12	OPTIC FIBER									
	Optic fiber equipment	1 Lot								
2	CIVIL AND ARCHITECTURAL WORKS									
2.1	Air condition and ventilation for building	1 Lot								
2.2	Firefighting system for control building	1 Lot								
2.3	Accessories for cable trench (indoor and outdoor)	1 Lot								
3	Others									
	TOTAL OF EQUIPMENT SUPPLY									

1.4 *CIVIL WORKS, INSTALLATION AND OTHER SERVICES*

ITEM NO.	DESCRIPTION	ESTIMATE QTY	DDU FIJI Foreign Currency		DDU FIJI FJD		ERECTION ON SITE FJD		TOTAL AMOUNT (Excluding Taxes & Duties)	
			Unit Rate	Amount	Unit Rate	Amount	Unit Rate	Amount	F/C	FJD
			(1)		(2)		(3)		(4=1)	(5=2+3)
	KALABU TAX FREE ZONE SUBSTATION									
1	**ELECTRICAL INSTALLATION**									
1.1	INDOOR 33 kV SWITCHGEAR									
1.1.1	2000A, 36 kV, 31.5 kA, 3 phase circuit breaker complete with housing panel (Bus section breaker)	1 Nos								
1.1.2	1250A, 36 kV, 3 phase circuit breaker complete with housing panel (transformer breaker)	2 Nos								
1.1.3	1250A, 36 kV, 3 phase circuit breaker complete with housing panel (feeder circuit breaker)	4 Nos								
1.1.4	36kV VT Three phase voltage transformers, ratio 33,000/√3:110/√3:110/3 V Class 0.2 for Metering and Protection	6 Nos.								
1.1.4	CTs									
1.2	INDOOR 11 kV SWITCHGEAR									
1.2.1	2000A, 12 kV, 25 kA, 3 phase circuit breaker complete with housing panel (Bus section)	1 No								
1.2.2	1250A, 12 kV, 25 kA, 3 phase circuit breaker complete with housing panel (Transformer breaker)	2 Nos								
1.2.3	12500A, 12 kV, 25 kA, 3 phase circuit breaker complete with housing panel (Feeder breaker)	6 Nos								

1.2.4	1250A, 12 kV, 25 kA, 3 phase circuit breaker complete with housing panel (Aux Transformer breaker)	1 Nos								
1.2.5	CTs									
1.2.6	12kV VT Three phase voltage transformers, ratio 11,000/√3:110/√3:110/3 V Class 0.2 for Metering and Protection	4 Nos.								
1.3	LVAC SWITCHBOARD									
1.3.1	The two incoming supplies to switchboard are to be interlocked to automatically establish supply to the busbar in the event of failure of the selected supply (Incomer No.1 & 2) and not to parallel two of the incoming supplies at any time. Shall include at least 54 pole single chassis and 4 x MCCB (2 x 100A and 2 x 250A). Shall have provision for incoming energy metering.	1 Lot								
1.4	BATTERIES, CHARGERS AND DISTRIBUTION BOARDS									
1.4.1	110 V maintenance free battery banks with the capacity of 600 Ah	2 Nos.								
1.4.2	Charging equipment	2 Nos.								
1.4.3	DC distribution board	1 Nos								
1.5	PROTECTION RELAYS									
1.5.1	33 kV Relays									
1.5.1.1	SEL311L	4 No								
1.5.1.2	SEL351S-7	7 No.								
1.5.1.3	SEL387E	2 No.								
1.5.1.4	SEL587Z	1 No								
1.5.1.5	Areva MVAJ13	2 No.								
1.5.1.6	SEL2515	As Required								

1.5.1.7	VAMP Arc Flash Protection	2 Nos.								
1.5.1.8	Partial Discharge Monitoring System	2 Nos.								
1.5.2	11 kV Relays									
1.5.2.1	SEL351S-7	10 Nos.								
1.5.2.2	VAMP Arc Flash Protection	2 Nos.								
1.5.2.3	Partial Discharge Monitoring System	2 Nos.								
1.5.2.4	SEL2515	As Required								
1.5.3	Others									
1.5.3.1	33 kV Control Panel to house relays, indications and manual controls. Control panel to come complete with LED's, switches, etc.	As Required								
1.5.3.2	33 kV Control Panel to house relays, indications and manual controls. Control panel to come complete with LED's, switches, etc.	As Required								
1.6	COMMUNICATION & SCADA EQUIPMENT									
1.6.1	IP Telephone (Mitel 5312) – blue tooth wireless handset	2 Lot								
1.6.2	Radio Telephone (RT) - Tait 9355 VHF DMR mobile radio 136 – 174 Mhz	1 Lot								
1.6.3	Fiber distribution cabinet – Warren & Brown Rack 1200mm x 300mm x 2200mm	As required								
1.6.4	Fiber patch cords on both sides of the substations – SC – SC (20 x 3m duplex)	As required								
1.6.5	Fiber accessories on both sides of the substations – SC pigtails (144)	As required								
1.6.6	VHF Radio TM935	As required								
1.6.7	Cisco Switch, dual power supply (AC & DC) – Cisco CGS2520	2 Lot								

1.6.8	UPS	If required								
1.6.9	Fibre transceiver – GLC – EX (40km)	4 Lot								
1.6.10	SEL RTAC 3530 – 3530, 33 ports with both link ports to be Ethernet.	5 Lot								
1.6.11	SEL RS232 cable – 9 pin male	20 Lot								
1.6.12	Patch for RTU - Cat 6 cable (red)	As required								
1.6.13	Fibre patch for Switch - LC – SC duplex cable, single mode (4 x 3m length or as required)	As required								
1.6.14	Equipment Rack (cabinet) – Rital (790mm x 600mm x 2100mm – or as required), glass front door with build in fan and light.	1 Lot								
1.6.15	4RF Data Radio and Antenna									
1.6.16	CARDAX Access System									
1.6.17	CCTV System for indoor and outdoor monitoring capable of integrating with EFL system									
1.7	SUBSTATION EARTHING									
1.7.1	The earthing installation rates shall include the excavation, backfilling and reinstatement of the ground, driving the rods and making of the connections.	1 Lot								
1.8	LIGHTNING PROTECTION SYSTEM									
1.8.1	Design and erection of lightning protection system with earth wires as specified	1 Lot								
1.8.2	Galvanised E.H.S steel wires of size 7/3.35 complete with accessories, for lightning protection of entire substation	1 Lot								
1.9	GROUNDING SYSTEM									

1.9.1	Grounding system including connections of all steel structures and electrical apparatus to earth mesh and grounding electrodes	1 Lot								
1.10	POWER AND CONTROL CABLES									
1.10.1	All low voltage AC power cables and terminations	1 Lot								
1.10.2	All DC power and control cables and terminations	1 Lot								
1.10.3	Power and lighting cable for all works, including indoor and outdoor lighting and auxiliary supply	1 Lot								
1.11	TRANSFORMERS									
1.11.1	12/15 MVA 33/11kV Dyn1 Power Transformer with On-load Tap Changer	2 Nos.								
1.11.3	Digital temperature monitoring equipment for power transformers	2 Nos.								
1.12	OPTIC FIBER									
	Optic fiber equipment	1 Lot								
2	CIVIL AND ARCHITECTURAL WORKS									
2.1	Carry out Environmental Impact Assessment (EIA)	1 Lot								
2.2	Soil investigation	1 Lot								
2.3	Clearing, site formation and slope protection (retaining wall, etc)	1 Lot								
2.4	Filling of earth to a height of 1 foot	1 Lot								
2.5	Construction of Control Building	1 Lot								
2.6	Construction of boundary fence	1 Lot								
2.7	Construction of Switchyard Fence (not applicable)	1 Lot								
2.8	Construction of approach road (not applicable)	1 Lot								

2.9	Air condition and ventilation for control building	1 Lot								
2.10	Firefighting system for control building	1 Lot								
2.11	Accessories for cable trench (indoor and outdoor)	1 Lot								
2.12	Concrete drain	1 Lot								
2.13	Concrete cable trench with accessories (outdoor)	1 Lot								
3	Others									
	TOTAL OF EQUIPMENT SUPPLY									

1.5 *GRAND SUMMARY*

ITEM	DESCRIPTION	TOTAL PRICE	
		F/C	FJD
1.0	Design, drawings and documentation		
2.0	Plant and equipment including mandatory spares		
3.0	Civil Works, installation and other services		
GRAND TOTAL			

1 MANUFACTURERS, PLACES OF MANUFACTURE & TESTING

ITEM	*MANUFACTURER*	*PLACE OF MANUFACTURE*	*PLACE OF TESTING & INSPECTION*
36 kV Switchgear			
Indoor switchgear			
Indoor circuit breaker			
Busbar			
Current Transformer			
Voltage Transformer			
11 kV Switchgear			
Indoor switchgear			
Indoor circuit breaker			
Busbar			
Current Transformer			
Voltage Transformer			
400 V Switchboard			
Protection, Metering & Control			
36 kV panels			
11 kV panels			
Instruments			
Relays			
Meters			
DC Equipment			
Batteries			
Chargers			
Distribution Boards			
Earthing			
Copper Conductors			
Clamps			
Earthing Rods			
Site Erecting			
To be carried out by: -			
Transformers			
Power Transformer 33/11 kV			
Transformers Complete			
Windings			
33 kV terminal			
11 kV terminal			
Insulators			
Tap changers			

Copper			
Core Parts			
Tanks			
Radiators			
Fan motors			
Temperature Indicators			
Oil valves			
Pressure relief device			
Motor control equipment			
Alarm devices			
Gas and oil actuated relays			
Dissolved gas analyser			
Digital temperature monitoring			
Automatic voltage regulator panel			
Pad Mount Auxiliary Transformer			
Transformer complete			
HV bushings			
LV bushings			
Insulators			
Steel structures			
SCADA equipment			
Fiber optic equipment			

2 TECHNICAL PARTICULARS AND GURANTEES

2.1 BUSBARS 36KV

	Item	***Units***	***Required***	***Tendered***
			36 kV	***36 kV***
1.	Rated Normal Current	A	2000	
2.	Rated current at Max. ambient temperature	A		
3.	Conductor Material		Cu	
4.	Standard Applicable			
5.	Single conductor Cross section	mm^2		
6.	Insulation material			
7.	Fire Certification (IEC 60466, etc)			

2.2 BUSBARS 11KV

	Item	***Units***	***Required***	***Tendered***
			12 kV	***12 kV***
1.	Rated Normal Current	A	2000	
2.	Rated current at Max. ambient temperature	A		
3.	Conductor Material		Cu	
4.	Standard Applicable			
5.	Single conductor Cross section	mm^2		
6.	Insulation material			
7.	Fire Certification (IEC 60466, etc)			

2.3 12/15 MVA 33/11 kV TRANSFORMER

Employer's List of Preferred Manufacturers is:

1. Tyree Transformers of Australia
2. Wilson Transformers of Australia

ITEM	MANUFACTURER	PLACE OF MANUFACTURE	PLACE OF TESTING & INSPECTION
33/11kV TRANSFORMER			
Transformer Complete			
Windings	SAM DONG KOREA		
33 kV terminal	ABB Sweden		
Neutral terminal	ABB Sweden		
11 kV terminal	ABB Sweden		
33kV & 11kV cable end box			
33kV and 11kV Insulators	ABB Sweden Micafil		
ON LOAD Divertor Switch	MR Reinhausen		
Copper	Sam Dong Korea		
Core parts	JFE Japan		
Tanks			
Radiators	MENK Germany		
Oil level indicators	MR Reinhausen		
Oil Valves			
Pressure relief device	MR Reinhausen / Qualitrol		
Dehydrating breather	MR Reinhausen DB200 MESSKO® MTraB® DB 200		
Alarm devices			
Gas and Oil actuated relays	MR Reinhausen		
Digital Temperature Monitoring	Qualitrol 509DW		
Transformer Fan and Controller	ZHEIL ABEGG		

	Item	*Units*	*Required*	*Tendered*
(a)	**RATING & PERFORMANCE**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Continuous Maximum rating (CMR) (ONAN/ONAF)	MVA	12/15	
4.	Number of phases		3	
5.	Number of Windings		2	
6.	Applicable Standard – IEC		60076	
7.	System maximum voltage for both windings Um	HV	36 kV	
		MV	12 kV	
8.	Insulation type	HV	Graded	
		MV	Uniform	
9.	Highest Voltage for equipment	HV	36 kV	
		MV	12 kV	
10.	Winding Insulation Level	HV		
		N		
		MV		
11.	Transformer Nominal ratio		33/11 kV	
12.	Phase Connections	HV	Delta	
		MV	Star	
	Vector group		Dyn1	
13.	Short circuit withstand fault level at terminals of			
	36kV busbars	kA	25	
	12kV busbars	kA	25	
14.	Type of Cooling		ONAN/ONAF	
15.	External cooling medium		Air	
16.	Service conditions :			
	Altitude not exceeding	m	200	
	Air temperature not exceeding	^{o}C	50	
	Average air temperature in any one year not exceeding	^{o}C		
	In any one day	^{o}C	32	
	Average in one year	^{o}C	30	
17.	Tap Changer (On load)		On load	
	(A) Type			
	(B) Category of voltage control		CFVV	
	(C) HV or LV winding		HV	
	(D) Range (+ & -)	%	+12% to -15%	
	(E) Step size	%	1.5	
	(F) Power frequency withstand test voltage between first and last contacts of the selector switch between any two adjacent contacts	(kV)		

	of the selector between diverter and switch contacts			
	(G) Type test certificate reference			
18.	Size of tapping step with position nos.		+8/-10 x 1.5%	
19.	Approximate ONAN rating	MVA		
20.	Hot spot temperature rise at CMR under service and at 30°C ambient temperature	°C	55	
21.	Top oil temperature rise (average daily ambient air temperature 32°C)			
	(A) CMR	°C	50	
	(B) ONAN rating			
22.	Maximum hot spot temperature when loaded according to IEC 60354	°C		
23.	Winding hot spot temperature on emergency overload not exceeding	°C		
24.	Flux density in iron at normal voltage and frequency and at normal ratio - (no load).			
	(A) Core	Tesla		
	(B) Yokes	Tesla		
25.	Magnetising current (approx) at nominal ratio and			
	at 0.9 x nominal voltage	%		
	at 1.0 x nominal voltage	%		
	at 1.1 x nominal voltage	%		
	at 1.2 x nominal voltage	%		
26.	Guaranteed Losses at nominal ratio			
	(A) No Load losses	kW		
	(B) Copper losses at CMR	kW		
	(C) Auxiliary losses at CMR	kW		
27.	Regulation at 75°C and normal ratio -			
	(A) At unity power factor	%		
	(B) At 0.8 lagging power factor	%		
28.	Impedance voltage at 75°C and CMR. Between HV and LV Windings at Tap			
	Maximum	%		
	Nominal	%	5	
	Minimum	%		
29.	Equivalent circuit zero sequence impedance between HV and LV windings			
	Maximum Tap (1)	Ω/phase		
	Nominal Tap (5)	Ω/phase		
	Minimum Tap (9)	Ω/phase		
30.	Maximum current density in windings at C.M.R.			
	(A) HV Winding	A/mm^2		
	(B) LV Winding	A/mm^2		
31.	Efficiency	%	99.5	
32.	Digital Temperature Monitoring Equipment:			

	Manufacturer's Name		Qualitrol	
	Manufacturer's Address			
	Equipment Model		IED 509-100	
	Number of inputs			
	Number of outputs			
	Number of fiber optic sensor probes			
	Tank wall plate assembly		Welded on tank	
	Number of optical feed throughs			
	Communications options			
	Rated voltage	V		
	Frequency	Hz	50	
	Power	W		
33	DGA Monitoring Equipment:			
	Manufacturer's Name		Calisto	
	Manufacturer's Address			
	Equipment Model			
	Number of inputs			
	Number of outputs			

	Item	***Units***	***Required***	***Tendered***
(b)	**CONTROL CIRCUITS**			
1.	Type of controls for cooler			
2.	Whether automatic control required and the		Yes	
	reference voltage (VT output line to line)	V	110 V AC 50 Hz	
3.	Whether load compensation required on the AVR.		N/A	
4.	Whether separate remote control panel required		No (use existing)	
5.	Estimated distance between remote control point and transformer	m	N/A	
6.	DC supply (control voltage) :			
	Nominal	V	110	
	Maximum float voltage	V	120	
7.	AC supply voltage for tap changer operating motor 3 phase.	V	415	
8.	Whether provision for supervisory control required, including AVR setting		yes	
9.	Whether marshalling kiosk required		Yes	
10.	Number of transformers for which automatic control is to be provided		All	
11.	Transformer terminals for line and neutral			
	(i) HV line		Cable box	
	(ii) Neutral		Cable box	

	(iii) MV line		Cable box	
12.	Accommodation for current transformers in bushings at			
	(i) HV line		Yes	
	(ii) Neutral		No	
	(iii) MV line		Yes	
13.	Accommodation of tank for outdoor weatherproof HV neutral current transformers		Yes	
14.	Pollution category of bushings High-25mm/kV based on system highest voltage	mm/kV	25	

	Item	***Units***	***Required***	***Tendered***
(c)	**COOLING**			
1.	Minimum number of radiators per transformer			
2.	Maximum rating of each radiator as percentage of total loss at CMR			
(d)	**GENERAL**			
1.	Type of oil preservation system		Silica Gel	
2.	Whether wheels, skid or flat bottom base required		Flat bottom	
3.	Whether anti-vibration pads required		Yes	
4.	Transformer sound pressure acceptance level	dB	65	
(d)	**DETAILS OF CONSTRUCTION**			
1.	Types of winding -			
	(A) HV			
	(B) MV			
2.	Material of Insulation			
	(A) HV Windings			
	(B) MV Windings			
3.	Insulation of tapping connections			
4.	Insulation of -			
	(A) Yoke bolts.			
	(B) Side plates.			
5.	Winding connections brazed or crimped Specify material (winding material and the joint material)			
6.	Is facility provided for adjustment of axial pressure on windings?	Yes/No		
7.	Thickness of transformer tank			
	(A) Sides	mm		

	(B) Bottom	mm		
8.	Material used for gaskets for oil tight joints.			
9.	Top Cover flange:-			
	Level: Low/High			
	Joint: WELDED/GASKETTED		Welded	

	Item	***Units***	***Required***	***Tendered***
(f)	**RADIATORS VALVES & FANS**			
1.	Thickness of radiator plates and/or cooling tubes.	mm		
2.	Valve type/material:			
	75mm and below			
	above 75mm			
3.	Equipment for ONAN cooling state (A) or (B) -		A	
	(A) Radiator on main tank			
	(B) Separate cooler bank			
4.	Number of cooling air blowers per transformer			
5.	Speed of air blowers and air flow	rpm/m^3 per min		
6.	Rating of each air blower motor	kW		
7.	Starting current of each blower motor,	A		
(g)	**OIL VOLUMES & WEIGHTS**			
1.	Total oil required including cooler system	Litres		
2.	Volume of oil to fill transformer to above the top yoke.	Litres		
3.	Total volume of conservator	Litres		
4.	Volume of oil in conservator between highest and lowest visible	Litres		
5.	Weight of core and winding assembly	Tons		
6.	Weight of each oil cooler bank complete with oil if mounted separately from transformer	Tons		
7.	Total weights of complete transformers, including attached coolers, voltage regulating equipment, all fittings and oil	Tons		
8.	Weight of transformer arranged for transport	Tons		

	Item	***Units***	***Required***	***Tendered***
(h)	**TRANSFORMER OIL**			

1.	Manufacture, type and class of oil to BS 148-1972	mm		
(i)	**TRANSFORMER PARTS SUBJECT TO SHORT-CIRCUIT TEST**			
1.	Brief description of Transformer or parts thereof subjected to short circuit test for which short-circuit calculations are available.	Yes/No		
(j)	**TRANSFORMER BUSHING (IF APPLICABLE)**			
1.	Manufacturer			
2.	Insulator material (solid/oil-paper):			
	a. HV bushing			
	b. Neutral bushing			
	c. MV bushing			
3.	Manufacturer's type reference and rated voltage			
4.	Rated current			
	a. HV bushing			
	b. Neutral bushing			
	c. MV bushing			
5.	Manufacturer of porcelain			
6.	Length of insulator (overall).			
	a. HV bushing	mm		
	b. Neutral bushing	mm		
	c. MV bushing	mm		
7.	Weight of insulator.			
	a. HV bushing	kg		
	b. Neutral bushing	kg		
	c. MV bushing	kg		
8.	Electrostatic capacity of complete bushings.			
	a. HV bushing	pF		
	b. Neutral bushing	pF		
	c. MV bushing	pF		
9.	Dry lightning impulse voltage withstand. (1.2/50 wave)			
	a. HV bushing	kV		
	b. Neutral bushing	kV		
	c. MV bushing	kV		
10.	50Hz dry voltage withstand			
	a. HV bushing	kV		
	b. Neutral bushing	kV		
	c. MV bushing	kV		
11.	50Hz wet withstand voltage without arcing horns			
	a. HV bushing	kV		
	b. Neutral bushing	kV		
	c. MV bushing	kV		
12.	Total Creepage distance of shed (specified minimum 25mm/kV based on maximum system voltage)			

	a. HV bushing	mm		
	b. Neutral bushing	mm		
	c. MV bushing	mm		

2.3 *CIRCUIT BREAKERS 36KV*

	Item	***Units***	***Required***	***Tendered***
			36 kV	***36 kV***
1.	Manufacturer's Name			
2.	Country of Manufacture			
3.	Place of Testing			
4.	Applicable Standards – IEC62271,IEC60694, etc			
5.	Manufacturer's type designation, and type ref or model number			
6.	Type tested	Yes/No	Yes	
7.	Type test Report, Ref No.			
8.	Rated Voltage	kV	36	
9.	Rated Frequency	Hz	50	
10.	Rated Normal Current at 20^{o}C			
	- Line feeder circuit breaker	A	1250	
	- Transformer circuit breaker	A	1250	
	- Generator Breaker	A	N/A	
	- Bus section circuit breaker	A	2000	
11.	Rated Current at Max. ambient temperature			
	- Line feeder circuit breaker	A		
	- Transformer circuit breaker	A		
	- Generator Breaker	A		
	- Bus section circuit breaker	A		
12.	Rated Lightning Impulse Withstand	kA	170	
12.	Rated 1 min Power Frequency Withstand	kV	70	
14.	Rated short circuit breaking current (symmetrical, r.m.s)	kA	31.5	
15.	Rated short circuit breaking current (asymmetrical, r.m.s)	kA	31.5	
16.	Rated making current (peak)	kA	50	
17.	Rated Duration of Short Circuit Current	s	3	
18.	Rated cable charging breaking current	A		
19.	Rated line charging breaking current	A		
20.	Rated small inductive breaking current	A		
21.	Voltage drop across terminals of one pole at rated current	mV		
22.	Amplitude factor			
23.	First pole-to-clear fault		1.5	
24.	Rated operating sequence		O-0.3 sec-CO-3 min-CO	
25.	Min. time t" between two successful three phase auto reclosures at full rated breaking current (sequence O-0.3-C-t"-O-0.3-C)	min		
26.	Closing time	ms		
	- tolerances	ms		
27.	Dead time (max)	ms		

	- tolerances	ms		
28.	Break time (max.) at full rated breaking current	ms		
	- tolerances	ms		
29.	Make time (max.)	ms		
	- tolerances	ms		
30.	Arcing time (max.) at full short circuit duty	ms		
	- tolerances	ms		
31.	Life duration of main contacts (no load mechanical operations)	Operations		
32.	Number of switching operations at rated breaking capacity before contact maintenance becomes necessary	No.	Min 100	
33.	Auxiliary contacts:			
	- number NO/NC			
	- voltage rating	V DC	110	
	- current rating	A DC		
34.	Making coil			
	- Rated voltage	V DC	110	
	- min. operating voltage	V	88	
	- Rated power each	W		
35.	Trip coil			
	- Rated voltage	V DC	110	
	- min. operating voltage	V	55	
	- Rated power each	W		
36.	Motor Voltage	V DC	110	
37.	Motor Power	W		
38.	Max. temperature rise of contacts at rated normal Current	K		
39.	Arc quenching medium		Vacuum/SF6	
40.	Material of main contacts			
41.	Maximum Shock load imposed on floor or foundation when opening under fault conditions (compression or tension)	N		
42.	Minimum Clearances in air			
	(a) Between phases	mm	480	
	(b) Phase to earth	mm		
	(c) Across CB poles	mm	700	
43.	Material of filter employed for the absorption of the products of combustion			
44.	Method of controlling voltage distribution between breaks (capacitor, resistor etc.)			
45.	Weight of complete 3 pole breaker	kg		
46.	Weight of heaviest part for shipment	kg		
47.	Period the equipment has been in commercial operation	years	> 5	

2.4 CIRCUIT BREAKERS 12KV

	Item	*Units*	*Required*	*Tendered*
			12 kV	*12 kV*
1.	Manufacturer's Name			
2.	Country of Manufacture			
3.	Place of Testing			
4.	Applicable Standards – IEC62271,IEC60694, etc			
5.	Manufacturer's type designation, and type ref or model number			
6.	Type tested	Yes/No	Yes	
7.	Type test Report, Ref No.			
8.	Rated Voltage	kV	12	
9.	Rated Frequency	Hz	50	
10.	Rated Normal Current at 20^{o}C			
	- Line feeder circuit breaker	A	630	
	- Transformer circuit breaker	A	1250	
	- Generator Breaker	A	N/A	
	- Bus section circuit breaker	A	2000	
11.	Rated Current at Max. ambient temperature			
	- Line feeder circuit breaker	A		
	- Transformer circuit breaker	A		
	- Generator Breaker	A		
	- Bus section circuit breaker	A		
12.	Rated Lightning Impulse Withstand	kA	75	
12.	Rated 1 min Power Frequency Withstand	kV	28	
14.	Rated short circuit breaking current (symmetrical, r.m.s)	kA	25	
15.	Rated short circuit breaking current (asymmetrical, r.m.s)	kA	28	
16.	Rated making current (peak)	kA	50	
17.	Rated Duration of Short Circuit Current	s	3	
18.	Rated cable charging breaking current	A		
19.	Rated line charging breaking current	A		
20.	Rated small inductive breaking current	A		
21.	Voltage drop across terminals of one pole at rated current	mV		
22.	Amplitude factor			
23.	First pole-to-clear fault		1.5	
24.	Rated operating sequence		O-0.3 sec-CO-3 min-CO	
25.	Min. time t" between two successful three phase auto reclosing at full rated breaking current (sequence O-0.3-C-t"-O-0.3-C)	min		
26.	Closing time	ms		
	- tolerances	ms		
27.	Dead time (max)	ms		

	- tolerances	ms		
28.	Break time (max.) at full rated breaking current	ms		
	- tolerances	ms		
29.	Make time (max.)	ms		
	- tolerances	ms		
30.	Arcing time (max.) at full short circuit duty	ms		
	- tolerances	ms		
31.	Life duration of main contacts (no load mechanical operations)	Operations		
32.	Number of switching operations at rated breaking capacity before contact maintenance becomes necessary	No.	Min 100	
33.	Auxiliary contacts:			
	- number NO/NC			
	- voltage rating	V DC	110	
	- current rating	A DC		
34.	Making coil			
	- Rated voltage	V DC	110	
	- min. operating voltage	V	88	
	- Rated power each	W		
35.	Trip coil			
	- Rated voltage	V DC	110	
	- min. operating voltage	V	55	
	- Rated power each	W		
36.	Motor Voltage	V DC	110	
37.	Motor Power	W		
38.	Max. temperature rise of contacts at rated normal Current	K		
39.	Arc quenching medium		Vacuum	
40.	Material of main contacts			
41.	Maximum Shock load imposed on floor or foundation when opening under fault conditions (compression or tension)	N		
42.	Minimum Clearances in air			
	(d) Between phases	mm	120	
	(e) Phase to earth	mm	120	
	(f) Across CB poles	mm	120	
43.	Material of filter employed for the absorption of the products of combustion			
44.	Method of controlling voltage distribution between breaks (capacitor, resistor etc.)			
45.	Weight of complete 3 pole breaker	kg		
46.	Weight of heaviest part for shipment	kg		
47.	Period the equipment has been in commercial operation	years	> 5	

2.5 CURRENT TRANSFORMER

	Item	*Units*	*Required* *12 kV*	*Tendered* *12 kV*	*Required* *36 kV*	*Tendered* *36 kV*
1.	Manufacturer					
2.	Type					
3.	Applicable Standards - IEC		60044-1		60044-1	
4.	Rated secondary current	A	1		1	
5.	Rated lightning impulse withstand voltage (primary)	kV	75		170	
6.	Rated Power Frequency withstand voltage (primary)	kV	28		95	
7.	Rated short-time current					
8.	Protection cores (Transformer Diff):					
	- Rated Primary Current	A				
	- Accuracy class	Class	0.1PX		0.1PX	
	- Resistance of secondary winding at 75°C	Ohms	< 3		< 3	
	- Rated Burden	VA	15		15	
9.	Protection cores(OC & EF for feeders):					
	- Rated Primary Current	A				
	- Accuracy class	Class	5P20		5P20	
	- Resistance of secondary winding protection cores at 75°C	Ohms	< 3		< 3	
	- Rated Burden	VA	min 15		min 15	
10	Protection cores(Bus Section):					
	- Rated Primary Current	A				
	- Accuracy class	Class	0.1PX		0.1PX	
	- Resistance of secondary winding protection cores at 75°C	Ohms	< 3		< 3	
	- Rated Burden	VA	min 15		min 15	
11.	Number of Cores	No.	See scope of works and Drawings		See scope of works and Drawings	
12.	Knee point e.m.f. of protection cores	V	Min 415		Min 415	
13.	Knee point e.m.f. of busbar protection cores	V	Min 415		Min 415	
14.	Insulation material for windings					
15.	Limits on exciting current	A				
16.	Partial discharge	pC	< 50		< 50	

2.6 *VOTLAGE TRANSFORMER*

	Item	***Units***	***Required 12 kV***	***Tendered 12 kV***	***Required 36 kV***	***Tendered 36 kV***
1.	Manufacturer					
2.	Type		magnetic		magnetic	
3.	Applicable Standards - IEC		60044-2		60044-2	
4.	Method of transformation		inductive		inductive	
5.	System Voltage	kV	12		36	
6.	Type of supply		3 phase		3 phase	
7.	Frequency	Hz	50		50	
8.	Basic Insulation Level	kV	75		95	
9.	Creepage distances	Mm				
10.	Transformation ratio					
11.	Class of accuracy					
12.	Class of insulation					
13.	Number of secondaries and accuracy class		See scope of works & drawings		See scope of works & drawings	
14.	Thermal capacity of ground-fault detection winding	A/h				
15.	Rated burden (total on all secondaries)	VA				
16.	Partial discharge		Acc. IEC 60044-4		Acc. IEC 60044-4	
17.	Height	Mm				
18.	Weight of single pole unit	Kg				

2.7 SWITCH PANELS

	Item	***Units***	***Required***	***Tendered***	***Required***	***Tendered***
			12 kV	***12 kV***	***36 kV***	***36 kV***
1.	Manufacturer					
2.	Type		Metal-Clad		Metal-Clad	
	rated voltage	kV	12		36	
3.	Applicable Standards - IEC		IEC 60694		IEC 60694	
	Impulse withstand voltage kV peak	kV	75		170	
	Power frequency withstand voltage	kV	28		70	
4.	Thickness	mm				
5.	Short time rating, 3 sec	kA	25		25	
6.	Integral earthing switch for feeder and busbar	Yes/No	Yes		Yes	
7.	Short circuit rating of earth switch					
8.	Making capacity of earth switch					
9.	Voltmeter					
	- Manufacturer		Crompton		Crompton	
	- Dial Size and scale length					
	- Scale	kV	0 - 15		0 – 40	
10.	Ammeter					
	- Manufacturer		Crompton		Crompton	
	- Dial Size and scale length					
	- Scale	A	0 - 400		0 – 200	
11.	kW/kVAR meter					
	- Manufacturer					
	- Dial Size and scale length					
	- Scale					
12.	Transducer					
	- Manufacturer and model		Areva M253		Areva M253	
	- protocol		DNP3		DNP3	
13.	Anti-Condensation heater					
	- Manufacturer					
	- Heater voltage					
	- Heater Output	W				
	Is heater switch provided		Yes		Yes	
14.	Material					
	Surface Finish					
	Dimensions					
	Length	mm				
	Width	mm				
	Height	mm				
15.	Total Net Weight	kg				

2.8 LVAC EQUIPMENT

	Item	*Units*	*Required*	*Tendered*
(a)	**DISTRIBUTION BOARD**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Manufacturer's type designation and type ref number or Model number			
4.	Rating	A	250	
5.	Fault Rating	kA	16	
6.	Voltage	V	415/240	
(b)	**MCCB**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Manufacturer's type designation and type ref number or Model number			
4.	Type			
5.	Rating	A		
6.	Fault Rating	kA	16	
(c)	**ACB**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Manufacturer's type designation and type ref number or Model number			
4.	Type			
5.	Rating	A		
6.	Fault Rating	kA	16	

2.9 BATTERIES & CHARGERS

	Item	*Units*	*Required*	*Tendered*
			110 V	*110 V*
(a)	**BATTERY**			
1.	Manufacturer's Name			
2.	Country of Manufacture			
3.	Place of testing			
4.	Applicable Standard – IEC		60623	
5.	Manufacturer's type designation and type ref number or Model number			
6.	Voltage	V DC	110	
7.	Capacity at 6 hour rate	Ah		
8.	Number of Cells			
9.	Voltage per Cell	V		
10.	Battery voltage at the end of the duty cycle	V		
11.	Normal charging current	A		
12.	Maximum charging current	A		
13.	Ampere-hour efficiency at ten hour rate	%		
14.	Ampere-hour efficiency at one hour rate	%		
15.	Dimensions of Cells	mm		
16.	Dimensions of Battery complete	mm		
17.	Weight of Cell complete with electrolyte	kg		
18.	Total weight of Battery complete	kg		
19.	Internal resistance per cell when fully charged	ohms		
20.	Material of battery case			
(b)	**BATTERY CHARGER**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Place of testing			
4.	Manufacturer's type designation and type ref number or Model number			
5.	Applicable Standard – IEC			
6.	Number of Phases	Three	3	
7.	Type of Charger Control	Micro Processor		
8.	AC Input Nominal Voltage	V	415	
9.	AC Input Voltage range	%		
10.	Operating Frequency	Hz		
11.	AC input to charger at full load	kVa		
12.	AC Input current	A		
13.	DC Nominal voltage	V	110	

14.	DC output of the charger	kW		
15.	Constant Voltage			
	(i) Floating charge	V		
	(ii) Equalizing Charge	V		
16.	Maximum output voltage			
	(i) at automatic Control	V		
	(ii) at Boost charge	V		
17.	Regulation	%		
18.	Range of DC Voltage Control			
19.	Output ripple voltage	%	4	
20.	Protection class		IP 51	
21.	Operating ambient temperature	deg.	40^{o}C	
22.	Dimensions			
	(i) Height	mm		
	(ii) Width	mm		
	(iii) Depth	mm		
23.	Normal and Boost charge are independent units	Yes/No		
24.	Test report reference no:			
(c)	**DC SWITCHBOARDS**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Place of testing			
4.	Type of construction			
5.	Manufacturer's type designation and type ref number or Model number			
6.	Busbars:-			
	(i) Maximum current rating	A		
	(ii) Dimensions	mm		
7.	Boost charge contactors:-			
	(i) Manufacturer			
	(ii) Maximum current rating	A		
	(iii) Coil rating	W		
	(iv) Method of interlocking			
8.	Alarm relays:-			
	(i) Manufacturer			
	(ii) Type and reference			
	(iii) Power consumption:-			
	a) Quiescent	A		
	b) Operated	mA		
9.	Number and rating of distribution circuits			
10.	Overall dimensions	mm		
11.	Total weight	kg		

FIBER OPTIC & SCADA EQUIPMENT

	Item	*Units*	*Required*	*Tendered*
(a)	**Optical Fiber Terminal Equipment**			
	Multiplexer			
1.	Manufacture's name & address			
2.	Manufacturer's type designation and model number			
3.	Applicable Standard(s)			
4.	Working temperature range	^{o}C		
5.	Relative humidity			
6.	Working Voltage	V DC		
7.	Power Consumption	W		
8.	Number of 64 Kb tributaries			
9.	Output aggregate stream	Mb		
10.	User interface	RS232		
(b)	**IP Telephone**			
1.	Manufacture's name & address		Mitel, USA	
2.	Communications Platform		3300 ICP	
3.	Running Version		7.2	
4.	Model of Phone			
(c)	**SCADA Equipment**			
1.	Manufacturer's Name		SEL	
2.	Model		SEL 3530	
(d)	**VHF RADIO**			
1.	Manufacturer's Name		TAIT	
2.	Model		TM935	

2.10 GROUNDING MATERIALS

	Item	*Units*	*Required*	*Tendered*
(a)	**SHIELD WIRE SYSTEM**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Material			
4.	Overall diameter	mm		
5.	Nominal Section	mm^2		
6.	Cross Section & Make up			
7.	Maximum rated current (3 sec)	A		
8.	Maximum working tension of main connections	kg/ m^2		
9.	Resistance of conductor per 100 m at 30°C	ohm		
10.	Tensile breaking stress of material	N/ mm^2		
11.	Maximum permissible span length	m		
12.	Maximum sag under own weight of maximum span	mm		
(b)	**EARTHING GRID**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Material			
4.	Overall diameter	mm		
5.	Nominal Section	mm^2		
6.	Maximum rated current (3 sec)	A		
7.	Resistance of conductor per 100 m at 30°C	ohm		
(c)	**GROUNDING ELECTRODES**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Material			
4.	Dimensions			
5.	Number of electrode per group			
6.	Number of earthing points per substation			
7.	Calculated resistance of combined earth grid and points			

2.13 PAD MOUNT AUXILIARY/EARTHING TRANSFORMER

Not in scope.

2.14 VENTILATION INSTALLATIONS

	Item	*Units*	*Required*	*Tendered*
(A)	**SPLIT TYPE AIR CONDITIONING UNIT**			
1	Number of Units			
2	Manufacturer's Name and Address			
3	Country of Origin			
4	Type			
5	Model No.			
6	Cooling duty (latent)	kW		
7	Cooling duty (Sensible)	kW		
8	On – Coil Condition	DB/WB ^{o}C		
9	Off – Coil Condition	DB/WB ^{o}C		
10	Total Electrical Input	kW		
11	Air Volume	m^3/hr		
(B)	**AIR COOLED CONDENSING UNITS**			
1	Number of Units			
2	Manufacturer's Name and Address			
3	Country of Origin			
4	Type			
5	Model No.			
6	Refrigeration Effect	kW each		
7	Compressor type			
8	Compressor input	kW each		
9	Suction temperature	^{o}C		
10	Condenser ambient temperature	^{o}C		
11	Fan Motor(s)	Total kW		
12	Capacity Steps	%		
(C)	**SELF CONTAINED AIR CONDITIONING UNITS**			
1	Number of Units			
2	Manufacturer's Name and Address			
3	Country of Origin			
4	Type			
5	Model No.			
6	Refrigeration Effect	kW each		
7	Compressor input	kW each		
8	Fan Motor	kW each		
(D)	**VENTILATION WORKS**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Number of units			

4.	Air volume	m^3/hr		
5.	System resistance	N/m^2		
6.	Fan Motor Size	kW		
7.	Corrosion Protection			

2.15 FIRE SAFETY EQUIPMENT

	Item	*Units*	*Required*	*Tendered*
(a)	**FIRE DETECTION SYSTEM**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Voltage	V		
4.	Power	W		
5.	Number of outputs			
6.	Number of alarms			
(b)	**TROLLY MOUNTED EXTINGUISHERS, CO_2, 50kg**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Dimensions	mm		
4.	Total Weight	kg		
5.	Length of Hose	mm		
6.	Type of Powder			
7.	Working pressure	kg/cm^2		
8.	Test Pressure	kg/cm^2		
(c)	**WALL MOUNTED EXTINGUISHERS, CF, 5.5kg**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Dimensions	mm		
4.	Total Weight	kg		
5.	Length of Hose	mm		
6.	Type of Powder			
7.	Working pressure	kg/cm^2		
8.	Test Pressure	kg/cm^2		
(d)	**TROLLY MOUNTED EXTINGUISHERS, BCF, 50kg**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Dimensions	mm		
4.	Total Weight	kg		
5.	Length of Hose	mm		
6.	Type of Powder			

7.	Working pressure	kg/cm^2		
8.	Test Pressure	kg/cm^2		

2.16 LIGHTING AND SMALL POWER

	Item	*Units*	*Required*	*Tendered*
(a)	**DISTRIBUTION BOARDS (fitted with Fuse)**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type and/or figure no.			
4.	Rating	A		
5.	Fault Rating	kA		
6.	Voltage	V		
(b)	**DISTRIBUTION BOARDS (fitted with circuit breakers)**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type and/or figure no.			
4.	Rating	A		
5.	Fault Rating	kA		
6.	Voltage	V		
(c)	**PVC CABLE**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
4.	Voltage rating	V		
(d)	**CONDUIT**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
(e)	**CONDUIT ACCESSORIES**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
(f)	**CABLE TERMINATIONS**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
4.	Material			
(g)	**SWITCHES**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
4.	Rating	W		
(h)	**SOCKET OUTLETS**			
1.	Manufacturer's Name			

2.	Manufacturer's Address			
3.	Type and/or Figure No.			
4.	Rating	W		
5.	Finish			
(i)	**CONTACTORS**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
4.	Rating	W		
5.	Number of Contacts			
6.	Rating of Coil AC	VA		
(j)	**MINIATURE CIRCUIT BREAKERS**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
4.	Rating	A		
5.	Fault rating	kA		
(k)	**EARTHING MATERIAL**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Material and Size			
(l)	**LIGTHING FITTINGS - FLUORESCENT**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
4.	Rating			
5.	Harmonic content			
(m)	**LIGTHING FITTINGS**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
4.	Rating	W		
(n)	**LIGTHING FITTINGS - EMERGENCY**			
1.	Manufacturer's Name			
2.	Manufacturer's Address			
3.	Type			
4.	Rating	W		

2 WORK PROGRAMME

The bidder is required to state the commencement and completion timeline for the following tentative work programme. The contractor is to also submit a Gantt chart for the programme outlining the activity, duration, start date, completion date, milestones, resources, etc.

	Component	***Start***	***Finish***
	Design of plant and equipment and approval by employer	Week 1	
	Manufacture of plant		
	Testing at Manufactures premises (witness testing)		
	Shipping of plant and equipment		
	Installation of switchgear (may be carried out in stages)		
	Completion of wiring for controls and protection equipment		
	Inspection and pre-commissioning tests		
	Testing and commissioning		

Note that the items in the work programme are the responsibility the contractor. Certain items which have been omitted, such as removal of existing switchgear panels, and cable terminations will be carried out by the Employer. of All site tests to be carried out as per the contract are an absolute minimum. Additional tests may be required by the employer's representative.