Schedule D: Schedules of Technical Data (STD)

The Schedule of Technical Data (STD) shall be filled-in and dully signed and stamped by the Tenderer.

Any deviation from the required value shall be show clearly in the schedule L. and statement of compliance.

Schedule of Technical Data (STD) 400 kV GIS, AIS and cables

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
1	**400kV GAS INSULATED SWITCHGEAR**			
1.1.	**GENERAL**			
1.1.1.	Manufacturer & Place of manufacturing			
1.1.2.	Type designation			
1.1.3.	Type		Metal enclosed, gas insulated GIS, grounded - indoor	
1.1.4.	Standards	IEC	IEC 62271-203, 62271-1, 62271-110, 62271-100, 62271-102, 60270, 60376, 60480	
1.1.5.	Rated voltage	kV	420	
1.1.6.	System Voltage	kV	400	
1.1.7.	Rated frequency	Hz	50	
1.1.8.	Lightning impulse withstand voltage			
	Phase to earth	KVp	1425	
	Across the isolating distance	kVp	1425	
1.1.9.	Switching impulse voltage withstand level of insulation to ground			
	Phase to earth	kVp	1050	
	Across the isolating distance	kVp	900	
1.1.10.	Power frequency withstand voltage			
	Phase to earth	kV	520	
	Across the isolating distance	kV	610	
	Maximum radio influence voltage level measured at 1.1times Us/sqrt3	µV	≤ 2500	
1.1.11.	Phase to earth at SF6 pressure of 1 bar	kV	1.1 U phase	
1.1.12.	Rated short-time withstand current (1 s)	kA	40	
1.1.13.	Rated peak withstands current	kA	100	
1.1.14.	Type of busbars		Double Busbars	
1.1.15.	Type of enclosure		phase-segregated enclosures or	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
			single phase enclosed	
1.1.16.	Material of enclosure for:			
	Circuit breaker		Al (cast)	
	Busbars		Al (welded)	
	Other compartments		Al (cast or welded)	
1.1.17.	Material of HV conductor		Al/Cu	
1.1.18.	Material of contacts (indicate bi-metallic where used)			
1.1.19.	Type of contact		Tulip	
1.1.20.	Minimum subdivision of switchgear:			
	Busbars		Yes	
	Busbar isolator		Yes	
	Circuit breaker		Yes	
	Circuit isolator		Yes	
	Cable box		Yes	
	Voltage transformer		Yes	
1.1.21.	Method of compensation of expansion and contraction			
	For busbars		Bellows	
	For enclosure		Bellows	
1.1.22.	Type of pressure relief device for required compartment		Bursting disk	
1.1.23.	Rupturing pressure	bar		
1.1.24.	Type of filter employed for moisture absorption		Molecular Sieve	
1.1.25.	Design lifetime of moisture absorbent	Years	10	
1.1.26.	Total mass of switchgear (average per bay)	kg		
1.1.27.	Mass of heaviest single component to be handled during erection	kg		
1.1.28.	Total mass of SF6 gas (average per bay)	kg		
1.1.29.	Density of gas in:			
	Circuit breaker compartment	(g/l)		
	Other than circuit breaker compartments	(g/l)		
1.1.30.	Maximum Permissible moisture content of gas at 20^{0} C			
1.1.31.	Nominal working gas pressure at 15^{o}C in:			
	Circuit breaker compartment	bar		
	Other than circuit breaker compartment	bar		
1.1.32.	Nominal working gas pressure at 45^{o}C in:			
	Circuit breaker compartment	bar		
	Other than circuit breaker compartment	bar		
1.1.33.	Design maximum pressure for:			
	Circuit breaker compartment	bar	7	
	Other than circuit breaker compartment	bar	7	
1.1.34.	Maximum leakage rate for any gas compartment	per annum	Less than 0.5%	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
1.1.35.	Maximum leakage rate for the whole switchgear	per annum	As per IEC	
1.1.36.	Maximum time of degassing and filling of largest compartment			
1.1.37.	Minimum operating period without total replacement of SF6 gas	years	10	
1.1.38.	Material used for gas seal			
1.1.39.	Minimum thickness of enclosure	mm		
1.1.40.	Internal arc fault duration with “no burn through” and “no fragmentation” with rated short time withstand current for the period of:	ms	300 or: secondary (back up) protection fault clearance time under worst condition, whichever is greater	
1.1.41.	Minimum factors of safety for switchgear			
	Busbars or other connections based on elastic limit		2.5	
	Complete insulators based on electro-mechanical test		2.5	
	Insulator metal fittings based on elastic limit		2.5	
	Steel structures based on elastic limit of tension members and on crippling loads of compression members		2.5	
	Foundations for structures against overturning or uprooting under maximum simultaneous working loadings		2.5	
1.1.42.	Seismic factor			
1.2.	**CIRCUIT BREAKER**			
1.2.1.	Manufacturer & Place of manufacturing			
1.2.2.	Type designation			
1.2.3.	Type		Single pressure puffer, SF6	
1.2.4.	Standards		IEC 62271-203, IEC 62271-100, 60376, 60480	
1.2.5.	Rated voltage	kV	420	
1.2.6.	Rated Current			
	– Busbars, Bus Section and Bus coupler			
	at 40^{0}C	A	Min. 3150	
	at 50^{0}C (Contractor to confirm by calculation)	A		
	– Line (OHL) bays			
	at 40 ^{0}C	A	AS SCHEDULE A	
	at 50 ^{0}C (Contractor to confirm by calculation)	A		
	– auto transformer bays			
	at 40 ^{0}C	A	AS SCHEDULE A	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	at 50 ^{0}C (Contractor to confirm by calculation)	A		
	BS & BC bays			
	at 40 ^{0}C		AS SCHEDULE A	
	at 50 ^{0}C (Contractor to confirm by calculation)			
1.2.7.	Rated frequency	Hz	50	
1.2.8.	Lightning impulse withstand voltage			
	Phase to earth	KVp	1425	
	Across the isolating distance	KVp	1425	
1.2.9.	Switching impulse voltage withstand level of insulation to ground			
	Phase to earth	kVp	1050	
	Across the isolating distance	kVp	900	
1.2.10.	Power frequency withstand voltage			
	Phase to earth	kV	520	
	Across the isolating distance	kV	610	
1.2.11.	Rated short-time withstand current (1 s)	kA	40	
1.2.12.	Rated peak withstand current	KAp	100	
1.2.13.	Rated operating sequence		O -0.3 sec- CO -3 min – CO	
1.2.14.	Auto reclosing		O -0.3 sec- CO -3 min – CO	
1.2.15.	Rated making current	KAp	100	
1.2.16.	Rated breaking current (asymmetrical)	KA	To IEC 62271-100	
	%dc	%dc		
1.2.17.	Rated breaking current under out-of-phase conditions	kA	10	
1.2.18.	First phase to clear factor		1.5	
1.2.19.	Transient Recovery Voltages	TRVs	To IEC 62271-100	
1.2.20.	Rated capacitive breaking current		To IEC 62271-100	
	Rated line charging breaking current	A	400	
	Rated cable charging breaking current	A	400	
	Rated Single/Back to Back Capacitor bank breaking current	A	400	
1.2.21.	Rated small inductive/reactor breaking currents of:		To IEC 62271-110	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	small inductive	A	10, 20, 50 and 100	
	reactor	A	306	
1.2.22.	Maximum overvoltage factor on any switching duty	pu	2.3	
1.2.23.	Maximum overvoltage factor when interrupting rated line/cable/capacitor bank charging currents	pu	2.3	
1.2.24.	Maximum overvoltage factor when switching small inductive/reactor currents	pu	2.3	
1.2.25.	Maximum total break time (trip initiation to final arc extinction)	ms	60	
1.2.26.	Opening time (trip initiation to contact separation)			
	Without current	ms		
	With 100% rated breaking current	ms		
1.2.27.	Maximum time interval between opening of first and last phase of three phase circuit breakers	ms	3	
1.2.28.	Maximum time interval between opening of interrupters of one phase	-	-	
1.2.29.	Closing time from energisation of close coil to latching of circuit breaker in fully closed position	ms		
1.2.30.	Making time (energisation of close coil to contact touch)			
	Without current	ms		
	100% making current	ms		
1.2.31.	Maximum time interval between closure of first and last phase of three phase circuit breaker	ms	3	
1.2.32.	Maximum time interval between closure of interrupters of one phase	-	-	
1.2.33.	Minimum time from extinction of main arc to contact make during auto-reclosing duty	ms	300	
1.2.34.	Mechanical life of circuit breaker and mechanism in No. of operations		10,000	
1.2.35.	Electrical contact life in number of operations at:			
	Rated current -			
	Fault current		20	
	Cumulative ampere rating			
1.2.36.	Number of current interrupting break units in series per phase		One	
1.2.37.	Type of operating mechanism		Spring-charged or hydraulic	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
1.2.38.	Type of power device (motor charged)			
	For closing		Spring or hydraulic	
	For opening		Spring or hydraulic	
1.2.39.	Hand operating facility		Yes	
1.2.40.	Hand charging facility		Yes	
1.2.41.	Manual spring release		Yes	
1.2.42.	Mechanical on/off indicator		Yes	
1.2.43.	Mechanical spring charge / discharge indication		Yes	
1.2.44.	Charging time	s		
1.2.45.	Number of trip coils		2	
1.2.46.	Number of close coils		1	
1.2.47.	Nominal control and operating voltage	V	110 DC	
1.2.48.	Nominal heater voltage	V	240 AC	
1.2.49.	Rated power of trip coil	W		
1.2.50.	Rated power of close coil	W		
1.2.51.	Rated motor power	W		
1.2.52.	Total load of heaters for circuit breaker	W		
1.2.53.	Mass of circuit breaker complete (three pole)	kg		
1.2.54.	Mass of single phase circuit breaker	-	-	
1.2.55.	Emergency Trip Facility during failure of DC supply		Yes	
1.3.	**GIS ISOLATORS / DISCONNECTOR**			
1.3.1.	Manufacturer & Place of Manufacturing			
1.3.2.	Type designation			
1.3.3.	Type of operating mechanism		Motor	
1.3.4.	Standards		IEC 62271-1, 62271-102, 62271-203, 62271-104	
1.3.5.	Rated voltage	kV	420	
1.3.6.	Rated normal current - Busbars, Bus Section and Bus Coupler / TRANSF Incomer & O/G Feeder			
	Required current at 40°C	A	(To match CB)	
	Required current at 50°C (Contractor to confirm by calculation)	A		
1.3.7.	Rated frequency	Hz	50	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
1.3.8.	Lightning impulse withstand voltage			
	Phase to earth	KVp	1425	
	Across the isolating distance	KVp	1425	
1.3.9.	Switching impulse voltage withstand level of insulation to ground			
	Phase to earth	kVp	1050	
	Across the isolating distance	kVp	900	
1.3.10.	Power frequency withstand voltage			
	Phase to earth	kV	520	
	Across the isolating distance	kV	610	
1.3.11.	Rated short time withstand current (1 s)	kA	40	
1.3.12.	Rated peak withstand current	KAp	100	
1.3.13.	Maximum capacitive current that can be interrupted by the isolator	A		
1.3.14.	Total time from initiation of opening operation to isolator in fully open position	s		
1.3.15.	Time from contact separation to extinct of capacitive arc	s		
1.3.16.	Total time from initiation of opening operation to time when isolator gap can withstand phase voltage	s		
1.3.17.	Hand operating facility		yes	
1.3.18.	Locking arrangement in on/off position		yes	
1.3.19.	Nominal control and operating voltage	V	110 DC	
1.3.20.	Automatic isolation of control supplies when lock off		yes	
1.3.21.	Accessibility to operating mechanism from ground level or catwalk		yes	
1.3.22.	Nominal heater voltage	V	240 AC	
1.3.23.	Rated power of operation coil	W		
1.3.24.	Rated motor power	W		
1.3.25.	Total load of heaters for isolator	W		
1.3.26.	Total mass of three phase isolator complete	kg		
1.3.27.	Mass of single phase isolator	kg		
1.3.28.	Contact type		Tulip	
1.4.	**EARTHING SWITCH**			
1.4.1.	Manufacturer & place of manufacturing			
1.4.2.	Type designation			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
1.4.3.	Type of operating mechanism		Motor	
1.4.4.	Standards		IEC 62271-102, IEC 62271-1, 62271-203	
1.4.5.	Rated voltage	kV	420	
1.4.6.	Rated frequency	Hz	50	
1.4.7.	Lightning impulse withstand voltage phase to earth	KVp	1425	
1.4.8.	Switching impulse voltage withstand level of insulation to ground	KVp	1050	
1.4.9.	Power frequency withstand voltage phase to earth	kV	520	
1.4.10.	Rated short time withstand current (1 s)	kA	40	
1.4.11.	Rated peak withstand current / class	kA	100	
1.4.12.	Hand operating facility		yes	
1.4.13.	Locking arrangement in on/off position		yes	
1.4.14.	Nominal control and operating voltage	V	110 DC	
1.4.15.	Mechanical endurance			
1.4.16.	Automatic isolation of control supplies when lock off		yes	
1.4.17.	Accessibility to operating mechanism from ground level or catwalk		yes	
1.4.18.	Nominal heater voltage	V	240 AC	
1.4.19.	Rated power of operating coil	W		
1.4.20.	Rated motor power	W		
1.4.21.	Total load of heaters for earthing switch	W		
1.4.22.	Total mass of earthing switch complete	kg		
1.4.23.	Electrical and mechanical interlocking		Yes	
1.4.24.	Visible earthing		IEC 62271	
1.5.	**HIGH SPEED EARTHING SWITCH**			
1.5.1.	Manufacturer & place of manufacturing			
1.5.2.	Type designation			
1.5.3.	Type of operating mechanism		Motor-spring	
1.5.4.	Standards		IEC 62271-102, IEC 62271-1, 62271-203	
1.5.5.	Rated voltage	kV	420	
1.5.6.	Rated frequency	Hz	50	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
1.5.7.	Lightning impulse withstand voltage phase to earth	KVp	1425	
1.5.8.	Switching impulse voltage withstand level of insulation to ground	KVp	1050	
1.5.9.	Power frequency withstand voltage phase to earth	kV	520	
1.5.10.	Rated short time withstand current (1 s)	kA	40	
1.5.11.	Rated peak withstand current	KAp	100	
1.5.12.	Rated short-circuit making current /class E2	KAp	Accor. To IEC	
1.5.13.	Rated capacitive symmetrical breaking current	A		
1.5.14.	Rated inductive symmetrical breaking current	A		
1.5.15.	Total time from initiation of opening operation to earth switch in fully open position	ms		
1.5.16.	Time from contact separation to extinction of arc when interrupting rated breaking current	ms		
1.5.17.	Making time	ms		
1.5.18.	Charging time	s		
1.5.19.	Hand operating facility		yes	
1.5.20.	Locking arrangement in on/off position		yes	
1.5.21.	Nominal control and operating voltage	V d.c.	110	
1.5.22.	Automatic isolation of control supplies when lock off		yes	
1.5.23.	Accessibility to operating mechanism from ground level or catwalk		yes	
1.5.24.	Nominal heater voltage	V	240 AC	
1.5.25.	Rated power of operation coil	W		
1.5.26.	Rated motor power	W		
1.5.27.	Total load of heaters for earthing switch	W		
1.5.28.	Total mass of earthing switch complete	kg		
1.6.	**CURRENT TRANSFORMER**			
1.6.1.1.	GIS CURRENT TRANSFORMER			
1.6.1.2.	Manufacturer & place of manufacturing			
1.6.1.3.	Type		Toroidal, GIS enclosed	
1.6.1.4.	Standards		IEC 62271-1, 61869-1&2	
1.6.1.5.	Rated voltage			
	GIS	kV	420	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
1.6.1.6.	Lightning impulse withstand voltage phase to earth			
	GIS	kVp	1425	
	Cores	kVp	As per. IEC	
1.6.1.7.	Switching impulse withstand voltage phase to earth			
	GIS	kVp	1050	
	Cores	kVp		
1.6.1.8.	Power frequency withstand voltage phase to earth			
	GIS	kV	650	
	Cores	kV	3 kV (EK < 2kV)	
		kV	5 kV (EK ≥ 2kV)	
1.6.1.9.	Rated power frequency between secondaries		3kV	
1.6.1.10.	Inter-turn test			
	M/P type		4.5 kV peak	
	Class PX		As per IEC	
1.6.1.11.	Rated frequency	Hz	50	
1.6.1.12.	Rated continuous thermal current at 45°C		Rated extended primary current	
1.6.1.13.	Rated short-time withstand current (3 S)	kA	40	
1.6.1.14.	Rated dynamic current	kAp	100	
1.6.1.15.	Are earthed metal screens fitted between primary and secondary windings			
1.6.1.16.	Is current transformer housed in a separate gas compartment			
1.6.1.17.	Transformer bays current transformer:		As SCH A	
	Number of cores			
	Rated extended primary current		140%	
1.6.1.18.	Line bays current transformer		As SCH A	
	Number of cores			
	Rated extended primary current		120%	
1.6.1.19.	Bus Section & Bus Coupler CT No.1		As SCH A	
	Number of cores			
	Rated extended primary current		120%	
1.6.1.20.	Bus Section & Bus Coupler CT No. 2		As SCH A	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Number of cores			
	Rated extended primary current		120%	
1.7.	**VOLTAGE TRANSFORMERS**			
1.7.1.1.	**GIS INDUCTIVE VOLTAGE TRANSFORMERS**			
1.7.1.2.	Manufacturer & Place of manufacturing			
1.7.1.3.	Type designation for			
	Busbar VT – 1 phase			
	VT -3 phase			
1.7.1.4.	Type		Inductive, SF6 gas insulated, enclosed	
1.7.1.5.	Standards		IEC 61869-1 & 61869-3,62271-1, 62271-203,	
1.7.1.6.	Rated voltage	kV	420	
1.7.1.7.	Rated frequency	Hz	50	
1.7.1.8.	Rated lightning impulse phase to earth	KVp	1425	
1.7.1.9.	Switching impulse withstand voltage phase to earth	KVp	1050	
1.7.1.10.	Power frequency withstand voltage phase to earth	kV	650	
1.7.1.11.	Maximum permissible partial discharge level Um	pC	10	
1.7.1.12.	Maximum permissible partial discharge level 1.2Um /√3	pC	5	
1.7.1.13.	Over voltage factor	p.u. / s	1.5 / 30 1.2 / continuous	
1.7.1.14.	Maximum capacitive current discharge rating	A	TBA	
1.7.1.15.	Method of suppressing ferro- resonance phenomena		a low-loss induction filter or suitable damping circuit	
1.7.1.16.	Busbar voltage transformer- single phase		As SCH A	
1.7.1.17.	voltage transformer- three phases		As SCH A	
1.7.1.18.	Mass of single-phase voltage transformer	kg		
1.8.	**Surge Arresters**			
1.8.1.	Type		MOA), gapless, ZnO inside the GIS enclosure, vertically	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
1.8.2.	Standard		IEC 62271-1, 60099-4, 60099-1 60099-5, 62271-1	
1.8.3.	Rated/system voltage	kV	420/400	
	- Maximum overvoltage factor on the system due to any switching duty	pu	2.5	
1.8.4.	Rated system frequency	Hz	50	
1.8.5.	Condition of system neutral		Solidly earthed neutral	
1.8.6.	Nominal Discharge current	KA crest	20	
1.8.7.	Energy capability as per IEC 60099-4	KJ/kV	≥15	
1.8.8.	Rated voltage - MOA	kV	350	
1.8.9.	Long duration discharge class as per IEC 60099-4	Class	3 or better	
1.8.10.	Maximum Continuous Operating Voltage (COV)	kV	280	
1.8.11.	TOV capability for			
	1 sec	kV	420	
	10 sec	kV	350	
1.8.12.	Maximum residual voltage with current wave			
	Switching Surges of 30/60 μs at 1kA	kV	650	
	Lightning Surges 8/20 μs - 10kA	kV	800	
	Steep Impulse 1 μs - 10kA	kV	900-950	
1.8.13.	Housing			
1.8.14.	Discharge current withstand strength			
	High current (4/10 μs)	KAp	100	
	Low current	Ap	900	
1.8.15.	Pressure relief capability			
	High current (0.2 s)	kA	50	
	Low current		As per IEC	
1.8.16.	Rating of earth connection	KA/sec	40/1	
1.8.17.	Surge counter provided with monitoring		Yes	
1.8.18.	Maximum radio influence voltage	μV	2500	
1.8.19.	Minimum corona extinction voltage	kV	279 for 420kV	
1.9.	**GIS arrangement and interface**			
	400 kV side of Auto transformer bays		SF6/Oil bushing	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	400 kV OHL Feeder Bay(s) through GIB Bushing shall be equipped with corona shields and PD performance suitable for GIS-to-OHL transition.		SF6/Air bushing	
	- Type of designation			
	- Phase to phase	mm		
	- Height of live part above ground	mm		
	- Creepage distance	mm		
	- Cantilever loading	kN		
	- Terminal type /size			
1.10.	**CABLE BOX (if applicable)**			
	Manufacturer & Place of manufacturing			
	Type of designation		Suitable for GIS plug in cable terminations	
	Standards		IEC 62271-209	
	Rated voltage	kV	420	
	Lightning impulse withstand voltage phase to earth	kVp	1425	
	Power frequency withstand voltage phase to earth	kV	650	
	Cable HV test withstand capability	kV		
	Rated frequency	Hz	50	
	Rated normal current at 40°C	A		
	Required current at 45°C (Contractor to confirm by calculation)	A		
	Rated short time withstand current (1s)	kA	40	
	Rated peak withstand current	kA	100	
	Total mass of three phase cable box complete	kg		
1.11.	**Local control cabinet**		As per PTS	
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Free-standing type	
	Type designation by the manufacturer			
	Standards			
	Installation		indoor	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Panels painting colour (RAL)		RAL 7044	
	Degree of mechanical protection		IP41	
	Location		Per each GIS bays	
	Heating and lighting voltage	V AC	230	
	Control voltage	V DC	110	
1.12.	**Manufacturer quality system in accordance to ISO 9000, 9001, 9002, 9003 and 9004**		Yes	
	Date of issue		Latest	
	Validity		Valid Certificates - Yes	
1.13.	**Type test certificate to be issued by independent laboratory or independently witnessed type test certificate to be submitted**		Yes	
1.14.	**GIS Crane**			
	General			
	Manufacturer name			
	country of manufacturing			
	Applicable standards		DIN 15018, DIN 15020	
	Construction Data			
	Operating mechanism	DIN	1Am	
	Crane span	m		
	Minimum lifting capacity	kg	5000	
	Max. deflection under design load	mm	1/750 of the span	
	Design safety factor	DIN/FEM	150%	
	Speed (dual)			
	– hoist	m/mm	0.8/5	
	– traversing	m/mm	5/20	
	– Maximum travelling	m/mm	5/20	
	Clearance (from operating floor to hook in top position)	m		
	Limit of hook approaches for hoist			
	– Left	m		
	– right	m		
	– front	m		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	– rear	m		
	– up	m		
	– down	m		
	Minimum clearance above platform	m	2	
	Material			
	– hook			
	– block			
	Total weight	kg		
	Operation of crane			
	pendent controller as emergency control		yes	
	radio remote controller		yes	
	Crane classification as per DIN 15018			
	lifting class		H2	
	stress group		B3	
	Electrical Data			
	Operating voltage	V	230/400	
	Rated voltage	V	230/400	
	Frequency	Hz	50	
	Insulation level - power frequency withstand voltage, 1 min.	kV	1	
	Supporting documents			
	Technical literature enclosed		yes	
	Standard conditions of installation enclosed		yes	
	Relevant drawings enclosed		yes	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
2	**400 AIS OUTDOOR EQUIPMENTS**			
2.1	**CURRENT TRANSFORMER FOR MAIN TRANSFORMER HV NEUTRAL POINT**			
2.1.1.	**General Data**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type		Oil-insulated, hermetically sealed, post type	
	Standards		IEC 61869-1&2	
	Installation		outdoor	
2.1.2.	**Rated Characteristics**			
	Highest voltage for equipment	kV	As per. IEC	
	Rated frequency	Hz	50	
	Rated power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min)	kV	As per. IEC	
	Rated lightning impulse withstand voltage (peak value), LI (1.2/50 μs)	kV	As per. IEC	
	Rated short-time (3 s) thermal current (I_{th})	kA	40	
	Rated dynamic current (I_{dyn})	kA	100	
	Rated continuous thermal current	%In	120	
	Rated characteristics of CTs cores		AS SCH A	
2.1.3.	**Design and Construction**			
	Insulator material		Porcelain	
	Insulating material		Oil – paper	
	Minimum creepage distance to earth	mm		
	Permissible partial discharges levels:			
	- PD test voltage: U_m	pC	≤ 10	
	- PD test voltage: $1.2 \times U_m/\sqrt{3}$	pC	≤ 5	
	Winding conductor		Copper	
	Secondary terminals enclosure minimum degree of mechanical protection		IP55	
	HV terminals:			
	- shape			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- dimension	mm×mm		
	- number of holes	pcs		
	- dimensions of holes	mm		
	- distance between holes	mm		
	- material suitable to		Al connector	
	Earthing terminal:			
	- shape			
	- dimension	mm×mm		
	- number of holes	pcs		
	- dimensions of holes	mm		
	- distance between holes	mm		
	- material suitable to		copper	
	Terminal for tgδ measurement		Yes	
	Oil sampling valve		Yes	
	Weights and dimensions:			
	- total weight	kg		
	- total height	mm		
2.2	**CURRENT TRANSFORMER FOR MAIN TRANSFORMER LV ARTIFICIAL NEUTRAL POINT**			
2.2.1.	**General Data**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type		Oil-insulated, hermetically sealed, post type	
	Standards		IEC 61869-1&2	
	Installation		outdoor	
2.2.2.	**Rated Characteristics**			
	Highest voltage for equipment	kV	As per. IEC	
	Rated frequency	Hz	50	
	Rated power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min)	kV	As per. IEC	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Rated lightning impulse withstand voltage (peak value), LI (1,2/50 μs)	kV	As per. IEC	
	Rated short-time (3 s) thermal current	kA	40	
	Rated dynamic current	kA	100	
	Rated continuous thermal current	%In	120	
	Rated characteristics of CTs cores		AS SCH A	
2.2.3.	**Design Characteristics**			
	Insulator material		Porcelain	
	Insulating material		Oil – paper	
	Minimum creepage distance to earth	mm		
	Permissible partial discharges levels:			
	- PD test voltage: U_m	pC		
	- PD test voltage: $1.2\times U_m/\sqrt{3}$	pC		
	Winding conductor		Copper	
	Secondary terminals enclosure minimum degree of mechanical protection		IP55	
	HV terminals:			
	- shape			
	- dimension	mm×mm		
	- number of holes	pcs		
	- dimensions of holes	mm		
	- distance between holes	mm		
	- material suitable to		Al connector	
	Earthing terminal:			
	- shape			
	- dimension	mm×mm		
	- number of holes	pcs		
	- dimensions of holes	mm		
	- distance between holes	mm		
	- material suitable to		copper	
	Oil sampling valve		Yes	
	Weights and dimensions:			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- total weight	kg		
	- total height	mm		
2.3	**400 KV CAPACITIVE VOLTAGE TRANSFORMER**			
2.3.1.	**General Data**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type		Oil-insulated, hermetically sealed, capacitive type	
	Standards		IEC 61869-1&5	
	Installation		outdoor	
	System earthing		Solidly earthed neutral	
2.3.2.	**Site Conditions**			
	Altitude above sea level	m		
	Minimum ambient temperature	°C	-10	
	Maximum ambient temperature	°C	45	
	Daily average temperature	°C	38	
2.3.3.	**Rated Characteristics**			
	Highest voltage for equipment	kV	420	
	Rated network operating voltage	kV	400	
	Rated frequency	Hz	50	
	Rated power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min)	kV	630	
	Rated lightning impulse withstand voltage (peak value), LI (1.2/50 μs)	kV	1425	
	Rated power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min) for second windings	kV	3	
	Rated capacity	pF		
	Rated voltage factor/Rated time	p.u. / s	1.5 / 30 1.2 / continuous	
	Static withstand terminal load	N		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Rated characteristics of VTs for Feeder (OHTL) Bay		AS SCH A	
2.3.4.	**Design and Construction**			
	Insulator material		Porcelain	
	Insulating material		Oil – paper	
	Minimum creepage distance to earth	mm		
	Permissible partial discharges levels:			
	- PD test voltage: U_m	pC	≤ 10	
	- PD test voltage: $1.2\times U_m/\sqrt{3}$	pC	≤ 5	
	Winding conductor		Copper	
	Secondary terminals enclosure minimum degree of mechanical protection		IP55	
	HV terminals:			
	- shape			
	- dimension	mm×mm		
	- number of holes	pcs		
	- dimensions of holes	mm		
	- distance between holes	mm		
	- material suitable to		Al connector	
	Earthing terminal:			
	- shape			
	- dimension	mm×mm		
	- number of holes	pcs		
	- dimensions of holes	mm		
	- distance between holes	mm		
	- material suitable to		copper	
	Terminal for tgδ measurement		Yes	
	Oil sampling valve		Yes	
	Weights and dimensions:			
	- total weight	kg		
	- total height	mm		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
2.4	**400 KV AIS Surge Arresters**			
2.4.1.	Type		MOA), gapless, ZnO outdoor	
2.4.2.	Standard		IEC 62271-1, 60099-4, 60099-1 60099-5, 62271-1	
2.4.3.	Rated/system voltage	kV	420/400	
	- Maximum overvoltage factor on the system due to any switching duty	pu	2.5	
2.4.4.	Rated system frequency	Hz	50	
2.4.5.	Condition of system neutral		Solidly earthed neutral	
2.4.6.	Nominal Discharge current	KA crest	20	
2.4.7.	Energy capability as per IEC 60099-4	KJ/kV	≥15	
2.4.8.	Rated voltage - MOA	kV	350	
2.4.9.	Long duration discharge class as per IEC 60099-4	Class	3 or better	
2.4.10.	Maximum Continuous Operating Voltage (COV)	kV	280	
2.4.11.	TOV capability for			
	1 sec	kV	420	
	10 sec	kV	350	
2.4.12.	Maximum residual voltage with current wave			
	Switching Surges of 30/60 μs at 1kA	kV	650	
	Lightning Surges 8/20 μs - 10kA	kV	800	
	Steep Impulse 1 μs - 10kA	kV	900-950	
2.4.13.	Housing			
2.4.14.	Discharge current withstand strength			
	High current (4/10 μs)	KAp	100	
	Low current	Ap	900	
2.4.15.	Pressure relief capability			
	High current (0.2 s)	kA	50	
	Low current		As per IEC	
2.4.16.	Rating of earth connection	KA/sec	40/1	
2.4.17.	Surge counter provided with monitoring		Yes	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
2.4.18.	Maximum radio influence voltage	µV	2500	
2.4.19.	Minimum corona extinction voltage	kV	279 for 420kV	
2.5	**400 KV Open terminal EARTHING SWITCH**			
2.5.1.	**General Data**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type		Single break / vertical plane	
	Standards		IEC 62271-102	
	Installation		Outdoor	
	Number of poles	pcs	3	
	Type of operating mechanism of earthing switch (swing lever)		motorised operating mechanism	
	Number of operating mechanisms of earthing switch		1	
	System earthing		Solidly earthed neutral	
2.5.2.	**Site Conditions**			
	Altitude above sea level	m		
	Minimum ambient temperature	°C	-10	
	Maximum ambient temperature	°C	50	
	Daily average temperature	°C	38	
2.5.3.	**Rated Characteristics**			
	Highest voltage for equipment	kV	420	
	Rated network operating voltage	kV	400	
	Rated frequency	Hz	50	
	Rated power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min):			
	- phase to earth	kV	520	
	- across the isolating distance	kV	610	
	Rated lightning impulse withstand voltage (peak value), LI (1,2/50 µs):			
	- phase to earth	kV	1425	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- across the isolating distance	kV	1425+240	
	Rated Current	A	As schedule A	
	Rated short-time withstand current I_k	kA	40	
	Duration of short circuit (t_k)	s	≥ 1	
	Rated peak withstand current I_p	kA	100	
	Disconnector mechanical endurance	Class	M2	
	Earthing switch electrical endurance	Class	E0	
	Rated mechanical terminal loads:			
	- static horizontal force, longitudinal F_{thA}	N		
	- static horizontal force, transversal F_{thB}	N		
	- static vertical force F_{tV}	N		
	- dynamic horizontal force, longitudinal	N		
	- dynamic horizontal force, transversal	N		
2.5.4.	**Design and Construction**			
	EARTH SWITCH			
	Insulator material		Porcelain	
	Minimum creepage distance to earth	mm		
	HV Terminals:			
	- shape			
	- dimensions	mm×mm		
	- number of holes	pcs		
	- dimensions of holes	mm		
	- distance between holes	mm		
	- material corresponding to			
	Weights and dimensions:			
	- total height	mm		
	- distance between poles	mm		
	- isolating distance	mm		
	- total weight including operating mechanisms	kg		
2.5.5.	Operating Mechanism			
	Type			
	Waterproof, corrosion resistance housing		IP55	
	Material of housing			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Rated motor voltage	V DC	110	
	Rated motor power	W		
	Control and signalling voltage	V DC	110	
	Number of closing coils	pcs	1	
	Rated closing coil power	W		
	Number of opening coils	pcs	1	
	Rated opening coil power	W		
	Rated heater, lighting and socket outlet voltage	V AC	230	
	Rated heater power	W		
	Number of auxiliary contacts available			
	Class of auxiliary contacts		Class 1	
	Accessories in the Operating Mechanism Cubicle:			
	- manual operating crank		Yes	
	- local/manual/remote control selector switch		Yes	
	- local operation lockable rotary switch		Yes	
	- door switch for lighting control		Yes	
	- lighting, heating and socket outlet for 230 V, 50 Hz		Yes	
	- miniature circuit breaker for motor		Yes	
	- miniature circuit breaker for lighting, heating and socket outlet		Yes	
	- earthing busbar with connection to external earthing terminal		Yes	
	- cable entry flange		Yes	
2.6	**TENSION AND SUSPENSION INSULATORS**			
2.6.1.	**General Data**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type		Composite type	
	Standards		IEC 61109 IEC 60120 IEC 60372	
	Installation		Outdoor	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
2.6.2.	**Site Conditions**			
	Altitude above sea level	m		
	Minimum ambient temperature	°C	-10	
	Maximum ambient temperature	°C	45	
	Daily average temperature	°C	38	
2.6.3.	**Rated Characteristics**			
	Highest voltage for equipment	kV	420	
	Rated network operating voltage	kV	400	
	Rated frequency	Hz	50	
	Rated power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min)	kV	520	
	Rated lightning impulse withstand voltage (peak value), LI (1.2/50 μs)	kV	1425	
	Breaking load of complete string	N		
2.6.4.	**Design and Construction**			
	Insulator material		Composite	
	Colour of insulator			
	Minimum creepage distance of complete string	mm		
	Minimum creepage distance of cap and pin insulator	mm		
	Number of insulators per string	pcs		
	Fitting's material			
	Arcing horns or rings material			
	Overall length of string	mm		
	Mass of complete string together with all fittings	kg		
2.7	**TACSR CONDUCTOR**			
2.7.1.	**General Data**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards		IEC 61089 BS EN 50182 IEC 60888	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
			BS EN 50189 IEC 60889	
	Installation		Outdoor	
2.7.2.	**Site Conditions**			
	Altitude above sea level	m		
	Minimum ambient temperature	°C	-10	
	Maximum ambient temperature	°C	45	
	Daily average temperature	°C	38	
2.7.3.	**Rated Characteristics, Design and Construction**			
	Rated cross-sectional area	mm^2		
	Total cross-sectional area	mm^2		
	Overall diameter	mm		
	Number of wires:			
	- Aluminium	pcs		
	- Steel	pcs		
	Wire diameter:			
	- Aluminium	mm		
	- Steel	mm		
	Rated current (ambient temperature +45 °C)	A		
	Resistance at 20 °C	Ω/km		
	Total weight	kg/km		
	Modulus of elasticity	N/m^2		
	Coefficient of linear expansion	1/°C		
	Ultimate tensile strength	daN/mm^2		
2.8	**OVERHEAD SHIELD CONDUCTOR**			
2.9.1.	**General Data**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards		IEC 61089	
	Installation		Outdoor	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
2.9.2.	**Site Conditions**			
	Altitude above sea level	m		
	Minimum ambient temperature	°C	-10	
	Maximum ambient temperature	°C	45	
	Daily average temperature	°C	38	
2.9.3.	**Rated Characteristics, Design and Construction**			
	Rated cross-sectional area	mm^2		
	Total cross-sectional area	mm^2		
	Overall diameter	mm		
	Number of steel wires	pcs		
	Steel wire diameter	mm		
	Resistance at 20 °C	Ω/km		
	Total weight	kg/km		
	Modulus of elasticity	N/m^2		
	Coefficient of linear expansion	1/°C		
	Ultimate tensile strength	daN/mm^2		
2.9	**CONNECTORS**			
2.9.1.	**General Data**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Standards		IEC 61284	
	Installation		Outdoor	
2.9.2.	**Site Conditions**			
	Altitude above sea level	m		
	Minimum ambient temperature	°C	-10	
	Maximum ambient temperature	°C	45	
	Daily average temperature	°C	38	
2.9.3.	**Rated Characteristics, Design and Construction**			
	Sizes of conductors:			
	- tubular	mm		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- TACSR	mm		
	Rated current	A	Same as for conductors at same temperature rise	
	Rated short-time (1s) withstand current	kA	40	
	Material of connectors		Aluminium/Bi-metal where necessary	
	Connectors type (non-limitative)			
2.10	**Steel structure and quality of material**			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards			
	Maximum ratio of unsupported length of steel compression members to their least radius of gyration			
	Main members (legs, cross arm struts etc)		120	
	Other members with calculated stress		200	
	Tension only members		350	
	Members without calculated stress		250	
	Maximum ultimate stresses, for checking tower designs not subjected to test			
	Compression members: - Where L = unsupported length of member R = least radius of gyration of a member			
	Mild steel	Newton/ mm2	248/(1+L/17000R)	
	High tensile steel	Newton/ mm2	373/(1+L/14300R)	
	Tension members (elastic limit):-			
	Mild steel	Newton/ mm2	250	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	High tensile steel	Newton/ mm2	370	
	Shear on bolts:-			
	Mild steel	Newton/ mm2	234	
	High tensile steel	Newton/ mm2	350	
	Bearing on bolts: -			
	Mild steel	Newton/ mm2	465	
	High tensile steel	Newton/ mm2	700	
	Tension of conductors for purposes of structure design and application			
	Busbar conductors total per phase Dependent upon Substation design	N		
	Earth conductors per conductor Dependent upon Substation design	N		
	Downleads, line conductors total per phase	kN	10	
	Downleads, per earth conductor	kN	4.5	
	Quality of materials of structure			
	Grade			
	Mild steel : steel / steel			
	High tensile steel: steel / steel nuts and bolts			
	Tensile breaking stress	N/mm2		
	Mild steel : steel / steel			
	High tensile steel: steel / steel nuts and bolts			
	Elongation on breaking	%		
	Mild steel : steel / steel			
	High tensile steel: steel / steel nuts and bolts			
	Gauge length of specimen	mm		
	Mild steel : steel / steel			
	High tensile steel: steel / steel nuts and bolts			
	Diameter of specimen	mm		
	Mild steel : steel / steel			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	High tensile steel: steel / steel nuts and bolts			
	Yield point as percentage of breaking stress			
	Mild steel : steel / steel			
	High tensile steel: steel / steel nuts and bolts			
	Quality of materials of insulators and fittings			
	Grade			
	Insulator unit metalwork			
	Steel			
	Malleable cast iron			
	Insulator caps			
	Phase and earth conductor metal fittings			
	Steel			
	Malleable cast iron			
	Insulator caps			
	Tensile breaking stress	N/mm2		
	Insulator unit metalwork			
	Steel			
	Malleable cast iron			
	Insulator caps			
	Phase and earth conductor metal fittings			
	Steel	%		
	Malleable cast iron			
	Insulator caps			
	Gauge length of specimen	mm		
	Insulator unit metalwork			
	Steel			
	Malleable cast iron			
	Insulator caps			
	Phase and earth conductor metal fittings			
	Steel			
	Malleable cast iron			
	Insulator caps			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Diameter of specimen	mm		
	Insulator unit metalwork			
	Steel			
	Malleable cast iron			
	Insulator caps			
	Phase and earth conductor metal fittings			
	Steel			
	Malleable cast iron			
	Insulator caps			
	Yield point as percentage of breaking stress			
	Insulator unit metalwork			
	Steel			
	Malleable cast iron			
	Insulator caps			
	Phase and earth conductor metal fittings			
	Steel			
	Malleable cast iron			
	Insulator caps			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
3	**400 kV CONTROL, PROTECTION & METERING EQUIPMENT**			
3.1	**Control Panel for 400 kV OHTL Feeder Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Free-standing type	
	Type designation by the manufacturer			
	Standards			
	Installation		indoor	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Panels painting colour (RAL)		RAL 6019	
	Degree of mechanical protection		IP41	
	Multi-function Digital Meter			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption at rated voltage	W		
	Auxiliary voltage	V DC		
	Consumption at rated voltage	W		
	Auxiliary voltage	V DC		
	Transducers for Supervisory Indications			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Panel Design Characteristics			
	Mimic diagram	Yes		
	Annunciator	Yes		
	Lockable control selector switch (“*Remote/Supervisory*”)	Yes		
	Lockable selector switch (“*Off/Synchro*”)	Yes		
	Synchronising socket	NO	NA	
	Anti-condensation heater	Yes		
	Internal lighting	Yes		
	Type of indication lamps	LED		
	Panel steel sheet thickness			
	Dimensions and masses of the Control and Protection panel:			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- width			
	- depth			
	- height			
	- weight			
3.2	**Main 1 Protection Panel for 400 kV OHTL Feeder Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type	Free-standing type		
	Type designation by the manufacturer			
	Standards			
	Installation	indoor		
	Panels painting colour (RAL)	RAL 6019		
	Degree of mechanical protection	IP41		
	Main Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Software (to specify)			
	Back-up Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	Auto reclose and synch check relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	CBF protection relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	Trip Circuit Supervision Device			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	LED signalization		Yes	
	Number of auxiliary contacts			
	Tripping Relays			
	Manufacturer			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage		V	
	Consumption at rated voltage		W	
	Number of auxiliary contacts		No	
	Contacts data:			
	- voltage		V	
	- current carrying capacity, continual		A	
	- breaking capacity at 110 V DC		A	
	- trip time		ms	
	Panel Design Characteristics			
	Auto-reclosure selector switch (1P/3P/1+3P/Off)			
	Selector switch “Protection in Service/out of service for CBF Relay.			
	Synchronising socket		NO	
	Anti-condensation heater			
	Internal lighting			
	Type of indication lamps			
	Panel steel sheet thickness			
	Dimensions and masses of the Protection panel:			
	- width			
	- depth		Yes	
	- height	No		
	- weight			
3.3	**Main 2 Protection Panel for 400 kV OHTL Feeder Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Type	Free-standing type		
	Type designation by the manufacturer			
	Standards			
	Installation	indoor		
	Panels painting colour (RAL)	RAL 6019		
	Degree of mechanical protection	IP41		
	Main Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	CBF protection relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	Trip Circuit Supervision Device			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	LED signalization		Yes	
	Number of auxiliary contacts			
	Tripping Relays			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage		V	
	Consumption at rated voltage		W	
	Number of auxiliary contacts		No	
	Contacts data:			
	- voltage		V	
	- current carrying capacity, continual		A	
	- breaking capacity at 110 V DC		A	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- trip time		ms	
	Panel Design Characteristics			
	Auto-reclosure selector switch (1P/3P/1+3P/Off)		NO	
	Selector switch “Protection in Service/out of service for CBF Relay.			
	Synchronising socket		NO	
	Anti-condensation heater		YES	
	Internal lighting		YES	
	Type of indication lamps		LED	
	Panel steel sheet thickness	mm		
	Dimensions and masses of the Protection panel:			
	- width			
	- depth			
	- height			
	- weight			
3.4	**Control Panel for 400 kV ATR Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Free-standing type	
	Type designation by the manufacturer			
	Standards			
	Installation		indoor	
	Panels painting colour (RAL)		RAL 6019	
	Degree of mechanical protection		IP41	
	Multi-function Digital Meter			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Standards			
	Supply voltage	V		
	Consumption at rated voltage	W		
	Auxiliary voltage	V DC		
	Consumption at rated voltage	W		
	Auxiliary voltage	V DC		
	Transducers for Supervisory Indications			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Panel Design Characteristics			
	Mimic diagram	Yes		
	Annunciator	Yes		
	Lockable control selector switch (“*Remote/Supervisory*”)	Yes		
	Lockable selector switch (“*Off/Synchro*”)	Yes		
	Synchronising socket	NO	NA	
	Anti-condensation heater	Yes		
	Internal lighting	Yes		
	Type of indication lamps	LED		
	Panel steel sheet thickness			
	Dimensions and masses of the Control and Protection panel:			
	- width			
	- depth			
	- height			
	- weight			
3.5	**Main 1 Protection Panel for 400 kV ATR Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Place of Factory Inspection and Testing			
	Type	Free-standing type		
	Type designation by the manufacturer			
	Standards			
	Installation	indoor		
	Panels painting colour (RAL)	RAL 6019		
	Degree of mechanical protection	IP41		
	Main Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	CBF protection relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	Trip Circuit Supervision Device			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	LED signalization		Yes	
	Number of auxiliary contacts			
	Tripping Relays			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage		V	
	Consumption at rated voltage		W	
	Number of auxiliary contacts		No	
	Contacts data:			
	- voltage		V	
	- current carrying capacity, continual		A	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- breaking capacity at 110 V DC		A	
	- trip time		ms	
	Panel Design Characteristics			
	Auto-reclosure selector switch (1P/3P/1+3P/Off)		NO	
	Selector switch “Protection in Service/out of service for CBF Relay.			
	Synchronising socket		NO	
	Anti-condensation heater			
	Internal lighting			
	Type of indication lamps			
	Panel steel sheet thickness			
	Dimensions and masses of the Protection panel:			
	- width			
	- depth			
	- height			
	- weight			
3.6	**Main 2 Protection Panel for 400 kV ATR Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type	Free-standing type		
	Type designation by the manufacturer			
	Standards			
	Installation	indoor		
	Panels painting colour (RAL)	RAL 6019		
	Degree of mechanical protection	IP41		
	Main Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	Back-up Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	CBF protection relay			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	Trip Circuit Supervision Device			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	LED signalization		Yes	
	Number of auxiliary contacts			
	Tripping Relays			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Supply voltage		V	
	Consumption at rated voltage		W	
	Number of auxiliary contacts		No	
	Contacts data:			
	- voltage		V	
	- current carrying capacity, continual		A	
	- breaking capacity at 110 V DC		A	
	- trip time		ms	
	Panel Design Characteristics			
	Auto-reclosure selector switch (1P/3P/1+3P/Off)		NO	
	Selector switch “Protection in Service/out of service for CBF Relay.			
	Synchronising socket		NO	
	Anti-condensation heater			
	Internal lighting			
	Type of indication lamps			
	Panel steel sheet thickness			
	Dimensions and masses of the Protection panel:			
	- width			
	- depth			
	- height			
	- weight			
3.7	**Control Panel for 400 kV B.C Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Free-standing type	
	Type designation by the manufacturer			
	Standards			
	Installation		indoor	
	Panels painting colour (RAL)		RAL 6019	
	Degree of mechanical protection		IP41	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Multi-function Digital Meter			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption at rated voltage	W		
	Auxiliary voltage	V DC		
	Consumption at rated voltage	W		
	Auxiliary voltage	V DC		
	Transducers for Supervisory Indications			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Panel Design Characteristics			
	Mimic diagram	Yes		
	Annunciator	Yes		
	Lockable control selector switch (“*Remote/Supervisory*”)	Yes		
	Lockable selector switch (“*Off/Synchro*”)	Yes		
	Synchronising socket	NO	NA	
	Anti-condensation heater	Yes		
	Internal lighting	Yes		
	Type of indication lamps	LED		
	Panel steel sheet thickness			
	Dimensions and masses of the Control and Protection panel:			
	- width			
	- depth			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- height			
	- weight			
3.8	**Protection Panel for 400 kV B.C Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type	Free-standing type		
	Type designation by the manufacturer			
	Standards			
	Installation	indoor		
	Panels painting colour (RAL)	RAL 6019		
	Degree of mechanical protection	IP41		
	Main Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	CBF protection relay			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	Trip Circuit Supervision Device			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	LED signalization		Yes	
	Number of auxiliary contacts			
	Tripping Relays			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Supply voltage		V	
	Consumption at rated voltage		W	
	Number of auxiliary contacts		No	
	Contacts data:			
	- voltage		V	
	- current carrying capacity, continual		A	
	- breaking capacity at 110 V DC		A	
	- trip time		ms	
	Panel Design Characteristics			
	Auto-reclosure selector switch (1P/3P/1+3P/Off)		NO	
	Selector switch “Protection in Service/out of service for CBF Relay.			
	Synchronising socket		NO	
	Anti-condensation heater			
	Internal lighting			
	Type of indication lamps			
	Panel steel sheet thickness			
	Dimensions and masses of the Protection panel:			
	- width			
	- depth			
	- height			
	- weight			
3.9	**Control Panel for 400 kV B.S Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Free-standing type	
	Type designation by the manufacturer			
	Standards			
	Installation		indoor	
	Panels painting colour (RAL)		RAL 6019	
	Degree of mechanical protection		IP41	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Multi-function Digital Meter			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption at rated voltage	W		
	Auxiliary voltage	V DC		
	Consumption at rated voltage	W		
	Auxiliary voltage	V DC		
	Transducers for Supervisory Indications			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Panel Design Characteristics			
	Mimic diagram	Yes		
	Annunciator	Yes		
	Lockable control selector switch (“*Remote/Supervisory*”)	Yes		
	Lockable selector switch (“*Off/Synchro*”)	Yes		
	Synchronising socket	NO	NA	
	Anti-condensation heater	Yes		
	Internal lighting	Yes		
	Type of indication lamps	LED		
	Panel steel sheet thickness			
	Dimensions and masses of the Control and Protection panel:			
	- width			
	- depth			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- height			
	- weight			
3.10	**Protection Panel for 400 kV B.S Bay**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type	Free-standing type		
	Type designation by the manufacturer			
	Standards			
	Installation	indoor		
	Panels painting colour (RAL)	RAL 6019		
	Degree of mechanical protection	IP41		
	Main Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	CBF protection relay			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	Trip Circuit Supervision Device			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	LED signalization		Yes	
	Number of auxiliary contacts			
	Tripping Relays			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Supply voltage		V	
	Consumption at rated voltage		W	
	Number of auxiliary contacts		No	
	Contacts data:			
	- voltage		V	
	- current carrying capacity, continual		A	
	- breaking capacity at 110 V DC		A	
	- trip time		ms	
	Panel Design Characteristics			
	Auto-reclosure selector switch (1P/3P/1+3P/Off)		NO	
	Selector switch “Protection in Service/out of service for CBF Relay.			
	Synchronising socket		NO	
	Anti-condensation heater			
	Internal lighting			
	Type of indication lamps			
	Panel steel sheet thickness			
	Dimensions and masses of the Protection panel:			
	- width			
	- depth			
	- height			
	- weight			
3.11	**400 kV High Impedance Busbar Protection Panel**			
	General Data			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Free-standing type	
	Type designation by the manufacturer			
	Standards			
	Installation		indoor	
	Panels painting colour (RAL)		RAL 6019	
	Degree of mechanical protection		IP41	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	High Impedance Busbar Protection Relay			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number and type of current analogue inputs	No		
	Number and type of voltage analogue inputs	No		
	Number of RTD inputs	No		
	Number of mA inputs	No		
	Number and type of binary inputs (110 V DC)	No		
	Number and type of binary outputs (110 V DC)	No		
	Number of Ethernet ports for IEC 61850 communication	No		
	Protection functions (to specify)			
	Software (to specify)			
	CT Supervision Relays			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Number of auxiliary contacts	No		
	Tripping Relays			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Supply voltage	V		
	Consumption at rated voltage	W		
	Number of auxiliary contacts	No		
	Contacts data:			
	- voltage	V		
	- current carrying capacity, continual	A		
	- breaking capacity at 110 V DC	A		
	- trip time	ms		
	Transducers for Supervisory Indications		NA	
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards			
	Panel Design Characteristics			
	Annunciator		Yes	
	Selector switch “Protection in Service/out of service for each protection Relay.		Yes	
	Anti-condensation heater		Yes	
	Internal lighting		Yes	
	Type of indication lamps		LED	
	Panel steel sheet thickness	mm		
	Dimensions and masses of the Control and Protection panel:			
	- width	mm		
	- depth	mm		
	- height	mm		
	- weight	kg		
3.12	**Fault recorder**			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Standards			
	Supply voltage	V		
	Consumption	W		
	Number of analogue inputs	No	128	
	Number of digital inputs	No	256	
	Distance to fault (fault locater) feature		Yes	
	Inter trigger between recorders		Yes	
	Accessories shall comply with NEPCO requirements		Yes	
	Software packages with full facility		Yes	
	Non-volatile storage as specification		Yes	
	Global positioning system(GPS) with all accessories		Yes	
	Panel Design Characteristics			
	Annunciator		NO	
	Anti-condensation heater and fans		Yes	
	Internal lighting		Yes	
	Type of indication lamps		LED	
	Panel steel sheet thickness	mm		
	Dimensions and masses of the Control and Protection panel:			
	- width	mm		
	- depth	mm		
	- height	mm		
	- weight	kg		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
4.	**400 V AC DISTRIBUTION BOARD/SWITCHGEAR**	At 630 KVA ETR		
	General Data			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type		Free-standing type	
	Standards		IEC 60947	
	Installation		indoor	
	Number of panels within distribution board/switchgear	pcs		
	Panels painting colour (RAL)		RAL 6019	
	Degree of mechanical protection		IP41	
	Rated Characteristics for Distribution Board/Switchgear			
	Rated voltage	V	400	
	Rated frequency	Hz	50	
	Highest voltage for equipment	V		
	Rated busbar current	A	Min. 1250	
	Rated short-time (1 s) withstand current	kA	40	
	Rated peak withstand current	kA	100	
	Busbars			
	Conductor material			
	Phase conductor cross section	mm^2		
	Phase conductor total dimensions	mm×mm		
	Phase conductor moment of inertia			
	Mass of phase conductor	kg/m		
	Resistance at 20 °C	mΩ/mm		
	Resistance coefficient	10^{-3}/°C		
	Phase conductor maximum permissible temperature:			
	- Continuous current	°C		
	- Short-circuit current, 1 s	°C		
	Modulus of elasticity	N/mm^2		
	Coefficient of linear expansion	10^{-5}/°C		
	Incoming Circuit Breakers & Bus Section Circuit Breaker			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Type designation			
	Type		Withdrawable Air Circuit Breaker (ACB) / Moulded Case Circuit Breaker (MCCB)	
	Standards		IEC 60947-2	
	Rated Characteristics			
	Rated voltage	V	400	
	Rated frequency	Hz	50	
	Rated current	A	Min. 1250	
	Rated short-circuit breaking capacity I_{cu}	kA	40	
	Rated short-circuit making capacity I_{cm}	kA	100	
	Rated short-time (3 s) withstand current I_{cw}	kA	40	
	Electronic Protection Unit			
	Type		electronic	
	Serial number			
	Protection functions		LSI	
	Other functions (to be specified)			
	Dimensions and Masses			
	Circuit breaker dimensions (W×D×H)	mm		
	Circuit breaker weight	kg		
	Current Transformers			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards		IEC 61869-1&2	
	Rated Characteristics			
	Rated voltage	V	400	
	Rated frequency	Hz	50	
	Rated primary current	A	min. 1250	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Rated continuous thermal current / Rated extended primary current	A		
	Rated secondary current	A		
	Rated short-time (3 s) thermal current	kA	40	
	Rated dynamic current	kA	100	
	Rated output	VA		
	Accuracy class			
	Design Characteristics			
	Insulation material			
	Mass of complete current transformer	kg		
	Moulded Case Circuit Breakers (MCCBs)			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards		IEC 60947-2	
	Number of MCCBs **MCCBs Rated Characteristics**		According to Contractor's Design approved by Client	
	Miniature Circuit Breakers (MCBs)			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards		IEC 60947-5-1	
	Number of MCBs **MCBs Rated Characteristics**		According to Contractor's Design approved by Client	
	Automatic Transfer Switch (ATS)			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Type			
	Standards			
	Dimensions (W×D×H)	mm		
	Measuring Instruments			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards			
	Instrument dimensions (W×D×H)	mm		
	Selector Switches			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards			
	Cubicles/Panels Design Characteristics			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards			
	Dimensions of the Panel:			
	- width	mm		
	- depth	mm		
	- height	mm		
	Cubicle outer steel sheet thickness	mm		
	Minimum free space around switchboard necessary for operation and overhauls (maintenance):			
	- front side	mm		
	- rear side	mm		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- lateral side	mm		
	Overal dimensions of the switchboard (W×D×H)	mm		
	Dimensions and masses of the largest panel for transport:			
	- width	mm		
	- depth	mm		
	- height	mm		
	- weight	kg		
5	**110 V DC SYSTEM**			
5.1	**110 V DC BATTERY**			
	General Data			
	Manufacturer			
	Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Ni-Cd type	
	Serial number			
	Standards		IEC 60623	
	Installation		indoor	
	Rated Characteristics			
	Number of battery banks	No	2	
	Rated voltage of the battery bank	V DC	110	
	Number of cells for each battery bank	No		
	Rated voltage per cell	V DC	1.2	
	Rated discharge period	h	5	
	Minimum 5 h capacity (C_{5h})	Ah	≥ 450	
	5 h discharge current	A		
	1 h discharge current	A		
	Battery float charging voltage per cell	V DC	1.4	
	Battery boost charging voltage per cell	V DC	1.55	
	Minimum battery voltage per cell	V DC	1.1	
	Internal resistance per cell	mΩ/cell		
	Maximum permitted ambient temperature	°C		
	Minimum permitted ambient temperature	°C		
	Design and Construction			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Dimensions and weights of cells:			
	- cell width	mm		
	- cell depth	mm		
	- cell height	mm		
	- cell weight with electrolyte	kg		
	- cell weight without electrolyte	kg		
	Electrolyte relative density	kg/m^3		
	Material of the battery stands			
5.2	**MAIN BATTERY FUSES**			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards		IEC 60269	
	Installation		indoor	
	Rated Characteristics			
	Rated voltage	V DC		
	Rated current	A		
	Rated breaking current	kA		
	Fuse characteristic			
	Design and Construction			
	Fuses to be installed in appropriate fuse box		Yes	
	Fuse box painting colour (RAL)		RAL 6019	
	Fuse box degree of mechanical protection		IP41	
	Dimensions of the fuse box (W×D×H)	mm		
	Weight of the complete fuse box	kg		
5.3	**BATTERY CHARGER - RECTIFIER**			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Type designation			
	Manufacturer			
	Standards			
	Installation		indoor	
	Operation method		Parallel with pertaining battery	
	Rated Characteristics			
	Number of battery chargers	No	2	
	Rated input characteristics:			
	- voltage	V		
	- current (at rated capacity)	A		
	- frequency	Hz	50	
	- permitted voltage variations	%		
	- output	kW		
	Rated output characteristics:			
	- voltage	V DC	110	
	- permitted voltage variations	%		
	Efficiency:			
	- at 25% of rated capacity	%		
	- at 50% of rated capacity	%		
	- at 75% of rated capacity	%		
	- at 100% of rated capacity	%		
	Design and Construction			
	Dimensions of battery charger (W×D×H)	mm		
	Weight of battery charger	kg		
	Battery charger panel painting colour (RAL)		RAL 6019	
	Battery charger panel degree of mechanical protection		IP41	
	Dimensions and masses of the battery charger panel:			
	- width	mm		
	- depth	mm		
	- height	mm		
	- weight	kg		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
5.4	**110 V DC DISTRIBUTION BOARD/SWITCHGEAR**			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type		Free-standing type	
	Standards		IEC 60947	
	Installation		indoor	
	Number of panels within distribution board/switchgear	pcs		
	Panels painting colour (RAL)		RAL 6019	
	Degree of mechanical protection		IP41	
	Rated Characteristics for Distribution Board/Switchgear			
	Rated voltage	V DC	110	
	Rated busbar current	A		
	Busbars			
	Conductor material			
	Phase conductor cross section	mm^2		
	Phase conductor total dimensions	mm×mm		
	Phase conductor moment of inertia			
	Mass of phase conductor	kg/m		
	Resistance at 20 °C	mΩ/mm		
	Resistance coefficient	10^{-3}/°C		
	Phase conductor maximum permissible temperature:			
	- Continuous current	°C		
	- Short-circuit current, 1 s	°C		
	Modulus of elasticity	N/mm^2		
	Coefficient of linear expansion	10^{-5}/°C		
	Incoming Circuit Breakers & Bus section Circuit Breaker			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Standards		IEC 60947-2	
	Rated Characteristics			
	Rated voltage	V DC	110	
	Rated current	A		
	Dimensions and Masses			
	Circuit breaker dimensions (W×D×H)	mm		
	Circuit breaker weight	kg		
	Miniature Circuit Breakers (MCBs)			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type		Two-pole	
	Standards		IEC 60947-5-1	
	Number of MCBs **MCBs Rated Characteristics**		According to Contractor's Design approved by Client	
	Measuring Instruments			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards			
	Instrument dimensions (W×D×H)	mm		
	Cubicles/Panels Design Characteristics			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards			
	Dimensions of the Panel:			
	- width	mm		
	- depth	mm		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- height	mm		
	Cubicle outer steel sheet thickness	mm		
	Minimum free space around switchboard necessary for operation and overhauls (maintenance):			
	- front side	mm		
	- rear side	mm		
	- lateral side	mm		
	Overall dimensions of the switchboard (W×D×H)	mm		
	Dimensions and masses of the largest panel for transport:			
	- width	mm		
	- depth	mm		
	- height	mm		
	- weight	kg		
6	STANDBY DIESEL GENERATOR			
	General Data			
	Manufacturer & Place of Manufacture			
	Place of Factory Inspection and Testing			
	Type designation			
	Type			
	Standards			
	Rated voltage (3pahse/single phase)	V	400/230	
	Frequency	Hz	50	
	Continuous site Rating	KVA	AS schedule A	
	Rated power of proposed diesel generator	KW		
	Power factor	Cos phi	0.8	
	Power factor at MCR	Cos phi		
	Fuel consumption	g/kWh		
6.1	Enclosure			
	Type of Enclosure		Weather protected and sound attenuated	
	Concrete Room		Yes	
	Sun shield for bulk tank		Yes	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
6.2	ALTERNATOR			
	Nominal Voltage	V	400/230 - 3 phase	
	Voltage Stability	%	± 1%	
	Voltage Adjustment Range	%	± 5%	
	Frequency Stability	%	- 5%	
	Voltage recovery time, dynamic	sec	< 1 sec	
	Efficiency at 4/4 load 0.8 pf		91%	
	exciter type			
	Automatic Voltage Regulator type			
	Insulation Class		F/H	
	Waveform Distortion Factor		< 5%	
	Test voltage at power frequency, one minute	kV		
	Circuit Breaker		3 poles with shunt trip	
	LV terminals		Cable Box	
6.3	ENGINE / Diesel motor			
	Manufacturer			
	Power of diesel motor at ISO conditions	KW		
	Power of diesel motor at Site conditions	KW		
	N° of cylinders			
	Bore x strokes	mm		
	Aspiration		Natural or Exhaust gas turbo-charged	
	Speed	rpm	< 1500	
	Lower Calorific value of fuel	MJ/KG	41	
	Daily service fuel tank capacity	Hrs	9	
	Bulk fuel tank capacity	Days	5	
	Bulk fuel storage capacity	litres		
	Daily storage tank capacity	litres		
6.4	Control Panel			
	Local alarm and remote annunciator modules		Yes	
	Remote Start Signal		Yes	
	Refilling System		Yes	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
7	**33 kV CAPACITOR BANKS**			
7.1.	**General Data**			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type			
	Type designation by the manufacturer			
	Standards		IEC 60871	
	Installation			
	Configuration		Ungrounded double star (Y-Y)	
7.2.	**Rated Characteristics**			
	Rated system voltage	kV	33	
	Capacitor bank operating voltage	kV	34	
	Rated frequency	Hz	50	
	Highest voltage for equipment	kV	36	
	Rated reactive output/power of the capacitor bank at 35 kV and 45 °C	MVAr	20	
	Rated current of the capacitor bank	A		
	Temperature category according to IEC 60871	Class	-10/D	
	Number of capacitor elements per capacitor unit:			
	- total number of capacitor elements	No		
	- number of capacitor elements connected in parallel	No		
	- number of capacitor elements connected in series	No		
	Number of capacitor units in each phase of the capacitor bank:			
	- total number of capacitor units in each phase	No		
	- number of capacitor units connected in parallel in each phase	No		
	- number of capacitor units connected in series in each phase	No		
	Total number of capacitor units per capacitor bank	No		
	Rated capacitance:			
	- of each capacitor element	µF		

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	- of each capacitor unit	µF		
	- of single-phase of capacitor bank	µF		
	Permitted residual voltage of the capacitor unit	V	75	
	Maximum discharge time to specified residual voltage	min	10	
	Losses in capacitor unit determined according to IEC 60871 at dielectric temperatures of:			
	- 20 °C	W/kWAr		
	- 75 °C	W/kWAr		
	Capacitor units internally fused		Yes	
	Discharge resistor		Yes	
7.3	**Design and Construction**			
	Capacitor element dielectric material			
	Dimensions and weights of capacitor units:			
	- width	mm		
	- depth	mm		
	- height	mm		
	- weight	kg		
	Dimensions of assembled capacitor bank:			
	- width	mm		
	- depth	mm		
	- height	mm		
	Material of the capacitor unit racks			
7.4	**Series (Current Limiting) Reactors**			
7.4.1	**General Data**			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Dry type	
	Type designation by the manufacturer			
	Standards		IEC 60076-6	
	Installation			
7.4.2	**Rated Characteristics**			

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Rated system voltage	kV	33	
	Rated frequency	Hz	50	
	Highest voltage for equipment	kV	36	
	Power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min)	kV	70	
	Lightning impulse withstand voltage (peak value), LI (1.2/50 μs)	kV	170	
	Rated current	A		
	Rated short-time (3 s) thermal current	kA	31.5	
	Rated inductance	mH		
	Winding resistance at 75°C	Ω/phase		
	Total loss at 75 ºC and rated current	kW		
	Maximum noise level	dB		
7.4.3	**Design and Construction**			
	Type of core			
	Type of winding			
	Type of cooling			
	Winding conductor material			
	Winding insulation material			
	Weights and dimensions:			
	- total weight	kg		
	- height	mm		
	- reactor diameter	mm		
	- weight or reactor arranged for transport	kg		
7.5	**Surge Arrester**			
7.5.1	**General Data**			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Metal oxide, gapless	
	Type designation by the manufacturer			
	Standards		IEC 60099-4	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Installation			
7.5.2	**Rated Characteristics**			
	Rated system voltage	kV	33	
	Rated frequency	Hz	50	
	Highest voltage for equipment	kV	36	
	Power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min)	kV	70	
	Lightning impulse withstand voltage (peak value), LI (1.2/50 µs)	kV	170	
	Rated arrester voltage (Ur)	kV		
	Rated continuous operating voltage (Uc)	kV		
	Rated discharge current (8/20 µs)	kA_{peak}		
	Line discharge class (IEC 60099-4)			
	Maximum residual voltages at 10 kA, 8/20 µs	kV		
7.5.3	**Design and Construction**			
	Insulation material			
	Weights and dimensions:			
	- weight	kg		
	- height	mm		
	- arrester diameter	mm		
7.6.	**Current Transformer for Unbalance Detection**			
7.6.1	**General Data**			
	Manufacturer			
	Place and country of Manufacture			
	Place of Factory Inspection and Testing			
	Type		Epoxy resin	
	Type designation by the manufacturer			
	Standards		IEC 61869-1&2	
	Installation			
7.6.2	**Rated Characteristics**			
	Rated system voltage	kV	33	
	Rated frequency	Hz	50	

ITEM	DESCRIPTION	UNIT	DATA	
			Required	Offered
	Highest voltage for equipment	kV	36	
	Power frequency withstand voltage (r.m.s. value), AC (50 Hz, 1 min)	kV	70	
	Lightning impulse withstand voltage (peak value), LI (1,2/50 µs)	kV	170	
	Rated short-time (3 s) thermal current	kA	31.5	
	Rated dynamic current	kA	80	
	Rated transformation ratio	A/A		
	Accuracy class			
	Rated output	VA		
7.6.3	**Design Characteristics**			
	Insulation material			
	Mass of complete current transformer	kg		
	- weight	kg		